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FINAL REMEDIAL INVESTIGATION REPORT SOLID WASTE MANAGEMENT UNIT 20 (SWMU 20) ATLANTIC FLEET WEAPONS TRAINING AREA FORMER VIEQUES NAVAL TRAINING RANGE VIEQUES ISLAND PUERTO RICO

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Final

Solid Waste Management Unit 20 Remedial Investigation Report

Atlantic Fleet Weapons Training Area – Vieques
Former Vieques Naval Training Range
Vieques, Puerto Rico

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Executive Summary

This Remedial Investigation (RI) Report presents the data and findings to characterize the nature and extent of contamination and to assess potential risks to human health and the environment at Solid Waste Management Unit (SWMU) 20, located at the former Vieques Naval Training Range (VNTR) in Vieques, Puerto Rico.

A Preliminary Assessment/Site Inspection (PA/SI), Expanded Site Inspection (ESI), and Supplemental ESI were performed in 2006, 2009, and 2011 respectively, at the previously named Photo-Identified Site 4 (PI-4). During the PA/SI (CH2M, 2008), relatively low levels of several volatile organic compounds (VOCs) were detected in groundwater, including an exceedance of the Federal Maximum Contaminant Level (MCL) and Puerto Rico Water Quality Class SG standards for trichloroethene (TCE) of 5 micrograms per liter (µg/L). TCE was detected in a single well (MW-05) at a concentration of 9.3 µg/L, but no TCE was found in the soil during the investigation. Based on the PA/SI findings, a second round of groundwater sampling was conducted during the ESI (CH2M, 2010b), which appeared to confirm the presence of localized and low concentrations of TCE and related VOCs. At that time, TCE was detected in well MW-05 at a concentration of 17 µg/L. Based on comprehensive evaluation of the data collected during the PA/SI and ESI, and with concurrence of the Environmental Restoration Program (ERP) Technical Subcommittee, subsequent investigations at the site focused on VOCs, specifically TCE and its parent and daughter products, as the constituents of interest at the site.

Following the ESI, a Supplemental ESI and in situ pilot study were planned to confirm the localized area of groundwater contamination, verify the absence of a source area in the overlying soil, and to determine if the concentrations of TCE (and related VOCs) could be reduced to acceptable levels, such as concentrations at or below the MCLs and/or Puerto Rico Water Quality Standards (PRWQS). Although the soil data collected during the Supplemental ESI confirmed that a TCE source area was not present in soil in the vicinity of well MW-05, the groundwater results (from wells MW-05 and MW-08 through MW-12), as shown in **Figure ES-1,** determined that higher concentrations and a broader area of contamination were present than originally understood. Therefore, in an attempt to find the southern extent of the TCE in groundwater, and to determine whether the planned pilot study was still appropriate, two additional wells (MW-13 and MW-14) were installed to the south (downgradient) of the other SWMU 20 wells. Sampling of these wells showed the highest TCE concentration detected at the site to be in well MW-13 (87.7 µg/L). This information showed the extent of contamination had not been delineated and the potential for a source area in soil elsewhere existed. Therefore, the in situ pilot study was not performed, an RI was planned, the site was renamed SWMU 20 (to be consistent with nomenclature of other sites that proceed to this phase of the Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA] process).

The RI was conducted in two field mobilizations. During the first mobilization, the following RI activities were completed:

- Groundwater sampling of 14 existing monitoring wells (MW-01 through MW-14).
- Installation and sampling of 16 shallow bedrock (MW-15 through MW-30) and two deep bedrock (MW-13D and MW-17D) monitoring wells. Screening-level sampling data from newly installed wells and grab groundwater samples from 11 borings were used to help guide optimally locating these monitoring wells.
- Collection of four soil samples during the drilling of MW-13D and MW-17D to determine if there was a source of contamination in the overlying soil.

A distinct TCE plume was identified within the shallow and deep bedrock that extends in a south-southeastern direction (**Figure ES-2**). Based on the data collected up through the RI's first mobilization, the shallow bedrock TCE plume extent had been sufficiently defined, with the exception of its downgradient extent (i.e., downgradient of wells MW-27 and MW-28). As a result, additional monitoring wells were deemed warranted to sufficiently delineate the downgradient TCE extent in the shallow bedrock.

Note: This summary is presented in English and Spanish for the convenience of the reader. Every effort has been made for the translations to be as accurate as reasonably possible. However, readers should be aware that the English version of the text is the official version.

In addition, there were only two deep wells at the time, one adjacent to MW-13 (i.e., MW-13D) and one adjacent to MW-17 (i.e., MW-17D). The concentrations of VOCs in MW-13D and MW-17D were lower than those in wells MW-13 and MW-17, respectively. This indicated the boundary of the deeper contamination was contained within (i.e., is smaller than) the boundary of the shallower contamination (i.e., concentrations decrease with depth). With one exception in 2014, the concentrations of VOCs in MW-13D and MW-17D were generally lower than those in wells MW-13 and MW-17, respectively. However, additional deep bedrock wells (MW-24D, MW-25D, and MW-28D as described below) were deemed warranted to confirm this observation.

During the second mobilization of RI fieldwork, the following activities were completed:

- Installation of three additional shallow bedrock wells (MW-31 through MW-33) to sufficiently delineate the downgradient extent in the shallow bedrock.
- Installation of three additional deep bedrock monitoring wells (MW-24D, MW-25D, and MW-28D) adjacent to MW-24, MW-25 and MW-28, respectively, to delineate the extent of groundwater contamination in the deeper bedrock.
- Based on the size, orientation, and direction of plume migration as well as knowledge of historical features and activities, five additional surface and subsurface soil samples were collected (SS21/SB21 through SS25/SB25) to supplement the existing soil data collected to determine if there was a source area in soil.
- All monitoring wells, with the exception of those upgradient of the northern 5 µg/L plume boundary (MW-01 through MW-09, MW-11, MW-12, and MW-15) were sampled for the constituents of interest.

Based on the results of these activities, as well as quantitative human health and ecological risk assessments performed using the data collected during the RI and previous investigations, the following conclusions are made:

1. The primary constituent of interest at SWMU 20 is TCE in groundwater. The TCE plume in groundwater is well defined horizontally in the shallow bedrock based on the extensive network of monitoring wells shown in **Figure ES-2**. The horizontal extent of the plume in deep bedrock is not as extensively defined because there are less deep bedrock wells, but the available data suggest that the plume covers a smaller area than in shallow bedrock. While concentrations detected in the deep bedrock wells demonstrate the plume extends deeper than has been delineated with the existing deep wells, the vertical extent delineation is sufficient for making remedial action determinations. Additional wells to refine the understanding of the vertical extent can be added as part of the remedial action and associated monitoring, as applicable. Other chlorinated VOCs were detected far less frequently and at much lower concentrations. This includes the daughter products (cis-1,2-DCE and vinyl chloride) as well as tetrachloroethene (PCE), a parent product of TCE.
2. The configuration of the plume and the absence of contamination in the soil samples collected at the site indicate there is not a contaminant source area in the surface or subsurface soil. None of the constituents of interest were detected in the soil at SWMU 20 during any of the field investigations.
3. Based on the Human Health Risk Assessment (HHRA), TCE, PCE, and vinyl chloride are identified as contaminants of concern (COCs) in site groundwater would pose unacceptable health risks should the groundwater be used as a potable source. While all groundwater in Puerto Rico is considered to be potentially potable, there are currently no plans to use groundwater in this area as a potable source. There are not unacceptable human health risks associated with soil at the site.
4. In the Ecological Risk Assessment (ERA), no chemical was identified as a constituent of potential concern (COPC) in surface soil or for terrestrial food web exposures. Thus, there are no unacceptable ecological risks at the site.

Based on the conclusions listed above, a pilot study to determine the feasibility of in situ groundwater remediation to reduce COC concentrations to levels below drinking water standards is recommended. The findings of the pilot study will then be used to prepare a Feasibility Study (FS) that evaluates potential viable options to address the groundwater contamination.

Resumen Ejecutivo

Este Informe de Investigación para la Remediación (RI, por sus siglas en inglés) presenta los datos y los resultados para caracterizar la naturaleza y el alcance de la contaminación y para evaluar los riesgos potenciales para la salud humana y el ambiente en la Unidad de Manejo de Desperdicios Sólidos (SWMU, por sus siglas en inglés) 20, que se encuentra en el antiguo Campo de Adiestramiento Naval de Vieques (VNTR, por sus siglas en inglés) en Vieques, Puerto Rico.

Una Evaluación Preliminar/Inspección del Sitio (PA/SI, por sus siglas en inglés), una Inspección Ampliada del Sitio (ESI, por sus siglas en inglés), y un ESI Adicional se llevaron a cabo en 2006, 2009 y 2011 respectivamente en el Sitio Identificado con Fotografías 4 y que anteriormente se denominó PI-4. Durante el PA/SI (CH2M, 2008), se detectaron niveles relativamente bajos de varios compuestos orgánicos volátiles (VOCs, por sus siglas en inglés) en el agua subterránea, con una excedencia del nivel Federal Máximo de Contaminantes (MCL, por sus siglas en inglés) y de los Estándares de Calidad de Agua de Clase SG de Puerto Rico para tricloroetileno (TCE, por sus siglas en inglés) que es de 5 microgramos por litro (µg/L). El TCE se detectó en un solo pozo (MW-05) con una concentración de 9,3 µg/L, aunque no se encontró TCE en el suelo durante la investigación. En base a los hallazgos del PA/SI, se llevó a cabo una segunda ronda de muestreo de agua subterránea durante el ESI (CH2M, 2010b), que al parecer confirmó la presencia de concentraciones bajas localizadas de TCE y de compuestos orgánicos volátiles relacionados. En ese entonces, se detectó TCE en el pozo MW-05 con una concentración de 17 µg/L. Basado en la evaluación integral de los datos obtenidos durante el PA/SI y el ESI, y con la concurrencia del Subcomité Técnico del Programa de Restauración Ambiental (ERP, por sus siglas en inglés), las investigaciones posteriores en el sitio se centraron en los VOCs, específicamente TCE, sus productos originales y sus derivados, como los constituyentes de interés en el sitio.

Después del ESI, se planificaron un ESI Suplementario y un Estudio Piloto *in situ* para confirmar el área de contaminación localizada en el agua subterránea, verificar la ausencia de una fuente de contaminación en el suelo superficial y para determinar si las concentraciones de TCE (y VOCs relacionadas) podrían ser reducidas a niveles aceptables, ya sea a concentraciones iguales o inferiores al MCL y/o a los Estándares de Calidad de Agua en Puerto Rico (PRWQS, por sus siglas en inglés). Aunque los datos de suelo obtenidos durante el ESI Suplementario confirmaron que no existía una fuente de contaminación de TCE en el suelo en la proximidad del pozo MW-05, los resultados del agua subterránea (obtenidos de los pozos MW-05 y MW-08 hasta MW-12), como se muestra en la **Figura ES-1**, determinaron la presencia de concentraciones más altas y un área más amplia de contaminación de la que se pensó inicialmente. Por lo tanto, en un intento de encontrar la extensión hacia el sur del TCE en el agua subterránea, y para determinar si el estudio piloto planificado seguía siendo apropiado, se instalaron dos pozos adicionales (MW-13 y MW-14) hacia el sur (gradiente abajo) de los otros pozos de SWMU 20. El muestreo de estos pozos mostró que el pozo MW-13 (87, 7 µg/L) contenía la concentración de TCE más alta que se detectó en el sitio. Esta información demostró que la extensión de la contaminación no se había delineado por completo y que existía el potencial de que una fuente de contaminación estuviera presente en el suelo en otra localidad. Por lo tanto, no se realizó el estudio piloto *in situ*, pero se planificó un RI, y el sitio pasó a denominarse SWMU 20 (para ser consistente con la nomenclatura de otros sitios que pasaron a la siguiente fase del proceso de la Ley Integral de Respuesta, Compensación y Responsabilidad Ambiental [CERCLA, por sus siglas en inglés]).

El RI se llevó a cabo mediante dos movilizaciones de campo. Durante la primera movilización, se completaron las siguientes actividades RI:

- Muestreo de agua subterránea en 14 pozos de monitoreo existentes (MW-01 a MW-14).
- Instalación y muestreo de 16 pozos de monitoreo superficiales en el lecho de roca (MW-15 hasta MW-30) y dos pozos profundos (MW-13D y MW-17D). Se usaron los datos de los niveles de discernimiento (evaluación) de los pozos de monitoreo recientemente instalados y de muestras de agua subterránea de 11 perforaciones en el suelo para ayudar a determinar la localización óptima de estos nuevos pozos de monitoreo.

Nota: Este resumen se presenta en inglés y en español para la conveniencia del lector. Se han hecho todos los esfuerzos para que la traducción sea precisa en lo más razonablemente posible. Sin embargo, los lectores deben estar al tanto que el texto en inglés es la versión oficial.

- Obtención de cuatro muestras de suelo durante la perforación de MW-13D y MW-17D para determinar si había una fuente de contaminación en el suelo superficial.

Se identificó un penachode contaminación de TCE distinta dentro del lecho de roca superficial y profunda que se extiende en dirección sur-sureste (**Figura ES-2**). En base de los datos obtenidos hasta la primera movilización RI, se determinó que la extensión de la contaminación de TCE en el lecho de roca poco profunda había sido definida suficientemente, con la excepción de su extensión gradiente abajo (es decir, hacia abajo de la pendiente de los pozos MW-27 y MW-28). Como resultado, se justificó la instalación de pozos de monitoreo adicionales para delimitar debidamente la extensión del TCE en la dirección gradiente abajo en el lecho de roca superficial.

Además, en ese momento sólo se habían instalado dos pozos profundos, uno adyacente a MW-13 (MW-13D) y uno adyacente a MW-17 (MW-17D). Las concentraciones de los compuestos orgánicos volátiles en MW-13D y 17D-MW fueron inferiores a los de los pozos MW-13 y MW-17, respectivamente. Esto indica que el límite de la contaminación ubicado en la parte más profunda del suelo está contenida dentro (en otras palabras, que es menor) del límite de la contaminación superficial (es decir, que las concentraciones disminuyen con la profundidad). Con una excepción en el 2014, las concentraciones de VOCs en MW-13D y 17D-MW fueron inferiores a las de los pozos MW-13 y MW-17, respectivamente. Sin embargo, para confirmar esta observación se justificó la instalación de pozos profundos adicionales en lecho rocoso (MW-24D, 25D-MW y MW-28D como se describe a continuación).

Durante la segunda movilización, se completaron las siguientes actividades RI:

- Instalación de tres pozos de monitoreo adicionales poco profundos en el lecho de roca (MW-31 hasta MW-33) para delinear lo suficiente la extensión gradiente abajo en el lecho de roca superficial.
- Instalación de tres pozos de monitoreo adicionales profundos en el lecho de roca (MW-24D, MW-25D, y MW-28D) adyacentes a MW-24, MW-25 y MW-28, para delinear lo suficiente la extensión gradiente abajo en el lecho de roca profunda.
- En base al tamaño, la orientación y la dirección de la migración de la pluma de contaminación, así como el conocimiento de los rasgos y actividades históricos, se obtuvieron cinco muestras de suelo superficial adicionales (SS21/SB21 hasta SS25/SB25) para complementar los datos de suelo existentes que se obtuvieron para determinar si había una área fuente en el suelo.
- Se muestrearon para los compuestos de interés todos los pozos de monitoreo, con excepción de los que se encuentran gradiente arriba hacia el norte del límite del penacho de contaminación de 5 µg/L (PM-01 a MW-09, PM-11, PM-12 y PM-15).

En base a los resultados de estas actividades, así como las evaluaciones cuantitativas de los riesgos ecológicos y a la salud humana que se llevaron a cabo utilizando los datos obtenidos durante el RI y las investigaciones previas, se ha llegado a las siguientes conclusiones:

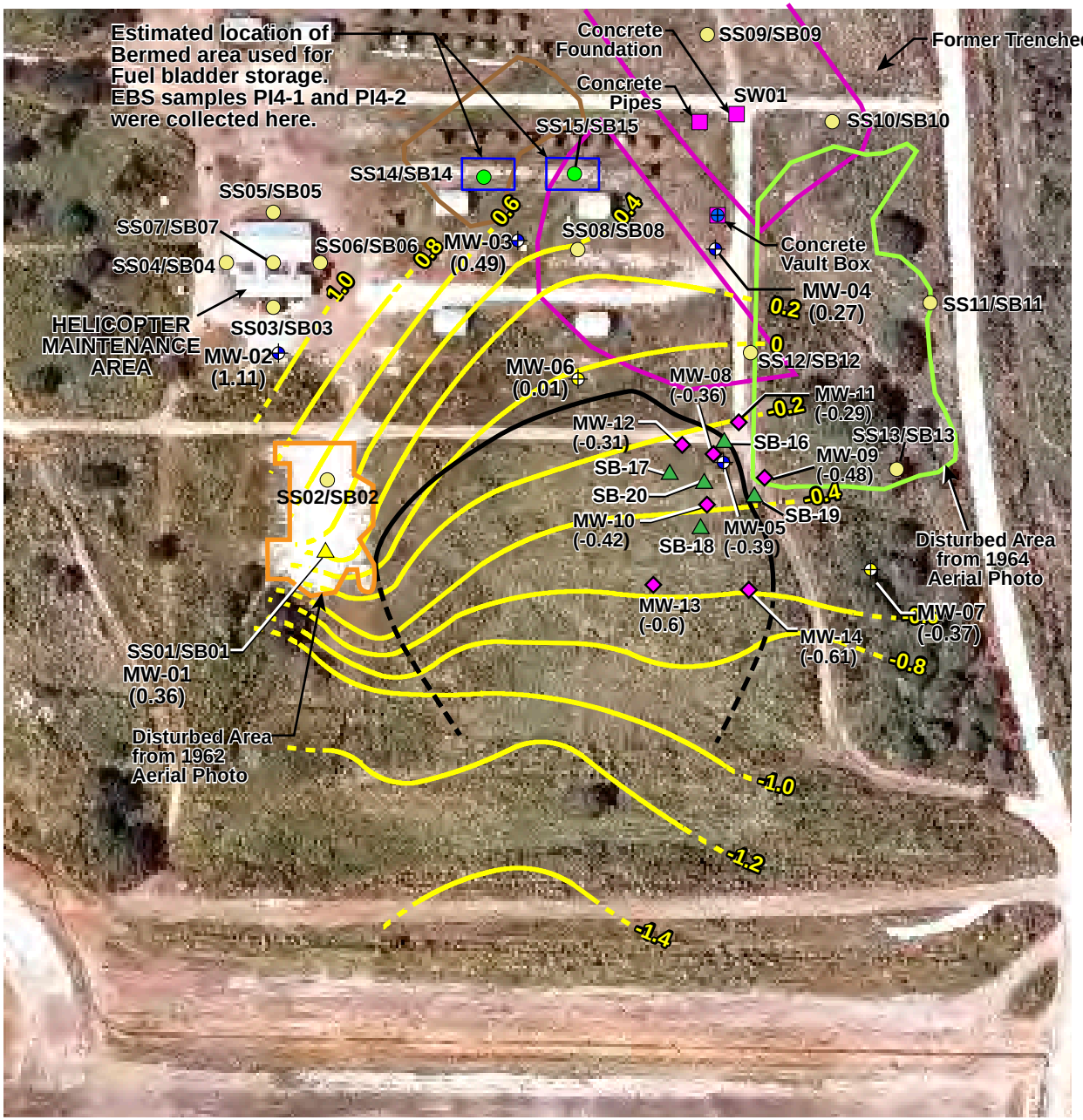
1. El constituyente de interés primario en SWMU 20 es el TCE en el agua subterránea. El penacho de contaminación de TCE en el agua subterránea está bien definida horizontalmente en el lecho de roca superficial como resultado de la extensa red de pozos de monitoreo que se muestran en la **Figura ES-2**. La extensión horizontal del penacho de contaminación en el lecho de roca profundo no se ha definido completamente, aunque los datos disponibles sugieren que cubre un área más pequeña que en el lecho de roca superficial. Otros compuestos orgánicos volátiles clorados se detectaron con menor frecuencia y en concentraciones mucho más bajas. Esto incluye los productos derivados (cis-1,2-DCE y cloruro de vinilo), así como tetracloroetileno (PCE), un producto matriz del TCE.
2. La configuración del penacho de contaminación y la ausencia de contaminación en las muestras de suelo que se obtuvieron del sitio indican que no hay un fuente de contaminación en la superficie del suelo o en el subsuelo. Ninguno de los componentes de interés se detectaron en el suelo de SWMU 20 durante todas las investigaciones de campo.

3. En base a la evaluación de riesgo a la salud humana (HHRA, por sus siglas en inglés), se identificaron el TCE, el PCE y el cloruro de vinilo como productos químicos de interés (COCs, por sus siglas en inglés) en el agua subterránea del sitio, que pudieran presentar riesgos inaceptables para la salud si es que el agua subterránea se utiliza como fuente de agua potable. Mientras que todas las aguas subterráneas en Puerto Rico se consideran potencialmente potables, actualmente no hay planes para utilizar el agua subterránea de este sitio como una fuente de agua potable. No existen riesgos para la salud humana inaceptables asociados con el suelo en el sitio.
4. En la evaluación de riesgos ecológicos (ERA, por sus siglas en inglés), no se identificó ninguna sustancia química como una sustancia química de preocupación potencial (COPC, por sus siglas en inglés) en la superficie del suelo a la cual la cadena alimenticia terrestre pudiera estar expuesta. Por lo tanto, no existen riesgos ecológicos inaceptables en el sitio.

En base a las conclusiones mencionadas anteriormente, se recomienda un estudio piloto *in situ* para determinar la viabilidad de la remediación del agua subterránea para reducir las concentraciones de COCs a niveles por debajo de los estándares de agua potable. Los resultados del estudio piloto serán utilizados para preparar un estudio de viabilidad (FS, por sus siglas en inglés) que evalúa las posibles opciones viables para atender la contaminación del agua subterránea.

PHOTO DATE 1962

PHOTO DATE 1983



LEGEND

- PA/SI Monitoring Well Location
- ESI Monitoring Well Location
- PA/SI Surface and Subsurface Soil Sample Location
- PA/SI Surface and Subsurface Soil Sample Location Co-located with EBS Surface Soil Sample Location
- PA/SI Surface Water Sample Location
- PA/SI Surface and Subsurface Soil Sample and Monitoring Well Location
- Supplemental ESI Subsurface Soil Sample Location
- Supplemental ESI Monitoring Well Location
- Disturbed Ground/Possible Fill Area 1964
- Trench Scars 1959
- Trench/Possible Debris 1959
- Estimated Potentiometric Contour from Water Levels taken on 7/1/13 Dashed Where Inferred
- 3.5
- (4.85) Water Level Elevations (AMSL)
- 5 ppb TCE Concentration Estimated Line

0 100 200 Feet

N W E S

Figure ES-1
Historical Sample Locations (before RI)
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

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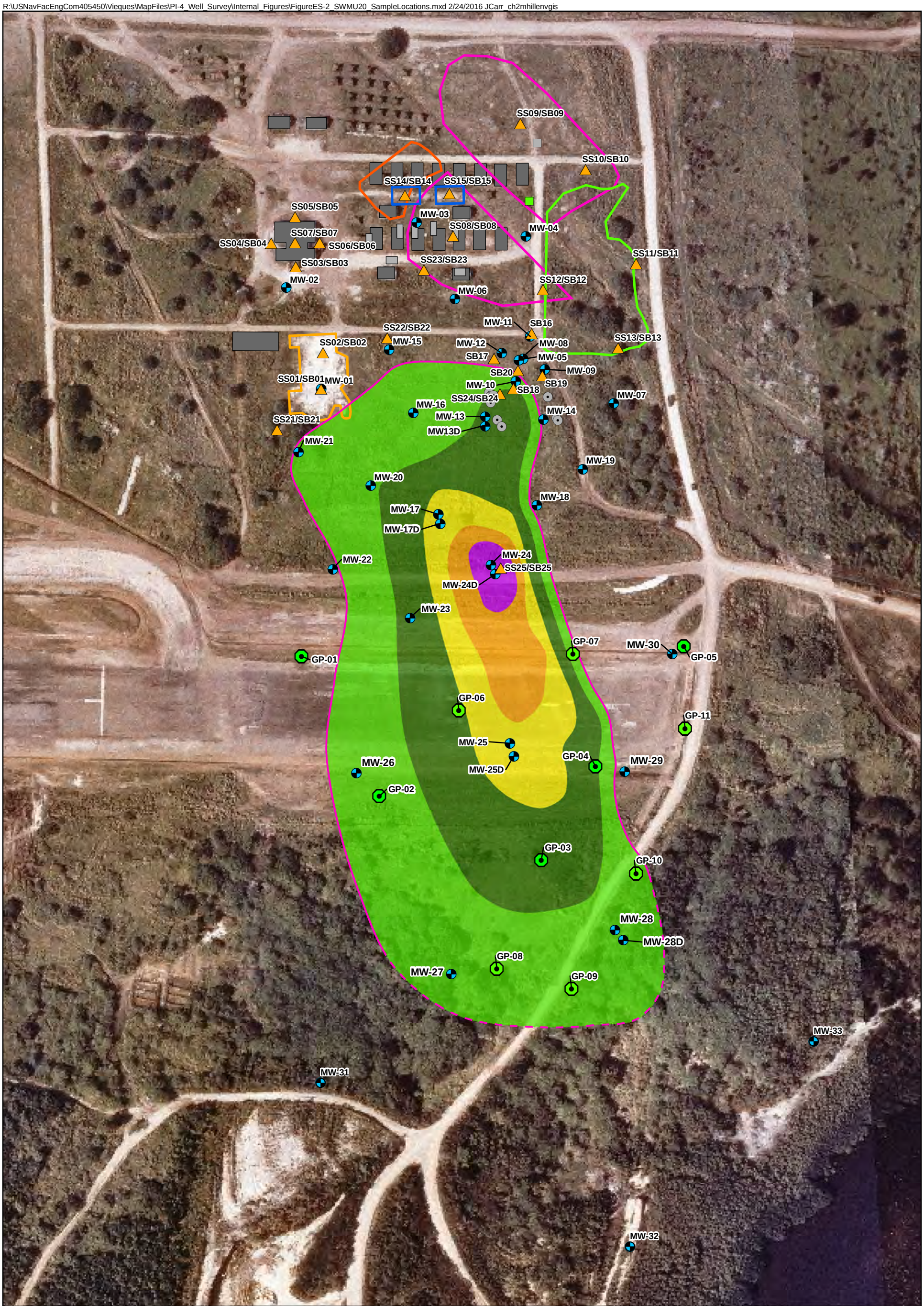

Legend

- Ground Surface Depressions
- Concrete Pad
- Concrete Vault Box
- Monitoring Well installed during the RI
- SS/SB Locations
- Grab Groundwater Location
- 5 ppb TCE Isoconcentration Line 2013 Sampling (dashed where inferred)
- Estimated Location of Bermed Area used for Fuel Bladder Storage
- Former Location of Structures
- Disturbed Areas (1962)

ERI Aerial Photographic Analysis (February 2003)

- Disturbed Ground/Possible Fill Area 1964
- Trench Scars 1959
- Trench/Possible Debris 1959

Isoconcentration

- 5-50 ppb
- 50-100 ppb
- 100-150 ppb
- 150-200 ppb
- 200-250 ppb

N W E S

0 100 200 Feet

Figure ES-2
Sample Locations
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

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4-4 VOC Detections in Groundwater
4-5 VOC Exceedances in Groundwater
4-6 Groundwater Natural Attenuation Parameter Results

5-1 Conceptual Site Model

Acronyms and Abbreviations

°C	degrees Celsius
°F	degrees Fahrenheit
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
amsl	above mean sea level
atm-m^3/M	atmosphere-cubic meter per mole
BCF	bioconcentration factor
bgs	below ground surface
BKG	background
bls	below land surface
cell/mL	cell per milliliter
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-term Environmental Action—Navy
cm	centimeters
COC	contaminant of concern
COPC	constituent of potential concern
CSM	Conceptual Site Model
DNAPL	dense non-aqueous phase liquid
DO	dissolved oxygen
DoD	Department of Defense
DOI	Department of the Interior
DQE	Data Quality Evaluation
EBS	Environmental Baseline Survey
ECA	Eastern Conservation Area
EISB	enhanced in situ bioremediation
ELCR	excess lifetime cancer risk
EMA	Eastern Maneuver Area
EPA	Environmental Protection Agency
EPC	exposure point concentration
ERA	Ecological Risk Assessment
ERP	Environmental Restoration Program
ESI	Expanded Site Inspection
ESL	ecological screening level
ESV	ecological screening value
FS	Feasibility Study
ft	foot/feet
GPS	Global Positioning System
HHRA	Human Health Risk Assessment
HI	hazard index
HQ	hazard quotient
IDW	investigation-derived waste
IR	Installation Restoration
ISCO	In situ chemical oxidation

ISCR	in situ chemical reduction
LIA	Live Impact Area
MCL	maximum contaminant level
MCL	maximum contaminant level
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mL/g	milliliter per gram
MS	matrix spike
MSD	matrix spike duplicate
mV	millivolts
MW	monitoring well
NASD	Naval Ammunition Support Detachment
NAVFAC	Naval Facilities Engineering Command
Navy	Department of the Navy
NOAA	National Oceanic and Atmospheric Administration
NPL	National Priorities List
ORP	oxidation-reduction potential
OVM	organic vapor monitor
PA/SI	Preliminary Assessment/Site Investigation
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PI	Photo Identified (site)
PREQB	Puerto Rico Environmental Quality Board
PRWQS	Puerto Rico Water Quality Standards
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RSLs	regional screening levels
RTK	real time kinetic
SAP	Sampling and Analysis Plan
SB	subsurface soil sample
SI	Site Inspection
SIA	Surface Impact Area
SOP	Standard Operating Procedure
SS	surface soil sample
SSL	site-specific screening level
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit
TAT	turnaround time
TCE	trichloroethene
TCL	target compound list
TCLP	Toxicity Characteristic Leaching Procedure
TDS	total dissolved solids
TOC	total organic carbon
TPH	total petroleum hydrocarbons

TPH-DRO	total petroleum hydrocarbons, diesel-range organics
TPH-GRO	total petroleum hydrocarbons, gasoline-range organics
TRV	toxicity reference value
USCS	Unified Soil Classification System
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UTL	upper tolerance limit
VC	vinyl chloride
VNTR	Vieques Naval Training Range
VOC	volatile organic compound

SECTION 1

Introduction

This Remedial Investigation (RI) Report presents the data collection and evaluation activities that characterized the nature and extent of contamination and assessed potential risks to human health and the environment at Solid Waste Management Unit (SWMU) 20, the helicopter maintenance area, trenched area, and bermed areas for fuel bladder storage, located on the former Vieques Naval Training Range (VNTR), Vieques, Puerto Rico. The report includes a summary of the historical activities and investigations that took place at SWMU 20, which was formerly known Photo Identified Site 4 (PI-4).

On February 11, 2005, Vieques was placed on the National Priority List (NPL), which required all subsequent environmental restoration activities for Navy Installation Restoration (IR) Sites on Vieques be conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) unless and until removed from CERCLA authority. This RI Report has been prepared on behalf of the Naval Facilities Engineering Command (NAVFAC), Atlantic by CH2M HILL, Inc. (CH2M) under Navy Contract N62470-11-D-8012, Comprehensive Long-Term Environmental Action-Navy (CLEAN III), Contract Task Order 013.

On February 22, 2012, the SWMU 20 Sampling and Analysis Plan (SAP) scoping session was held among representatives of the Department of the Navy (Navy), United States Environmental Protection Agency (EPA), Puerto Rico Environmental Quality Board (PREQB), United States Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration (NOAA), and their associated contractors, collectively referred to as the Environmental Restoration Program (ERP) Technical Subcommittee. The purpose of the scoping session was to discuss and concur on the Conceptual Site Model (CSM), technical approach, and data evaluation/decision process for the RI. The former PI-4 was renamed SWMU 20 at the time it was decided to conduct the RI to align with nomenclature protocol defined in the Vieques Federal Facility Agreement. (EPA et al. 2007).

1.1 Objectives

The overall goal of this RI was to sufficiently delineate the nature and extent of potential contamination from the site such that the potential human health and ecological risks could be appropriately assessed and remedial action determinations made. Because a significant amount of information regarding the nature and extent of contamination was gathered during previous investigations (as described in Section 3), the RI field work was able to focus on refining areas of contamination previously identified and filling any remaining “data gaps.” Therefore, the nature and extent of contamination and associated risk assessments incorporate all relevant historical data collected at the site with the data collected during the RI.

During previous site investigations conducted at the site, chlorinated solvents, including tetrachloroethene (PCE) and trichloroethene (TCE), were detected in monitoring wells, at concentrations that exceeded the maximum contaminant level (MCL) of 5 micrograms per liter (µg/L) for each of these constituents. Based on the ERP Technical Subcommittee meeting discussions in 2012, the following were the specific objectives defined for the SWMU 20 RI:

1. Delineate the extent of PCE/TCE and daughter products (constituents of interest) in groundwater.
2. Determine if there is a source of the PCE/TCE and daughter products remaining in soil.
3. Assess the potential ecological and/or human health risks associated with contamination such that remedial action determinations can be made for the site.

The SWMU 20 RI field activities were conducted in accordance with the following documents:

- CH2M, 2013. *Remedial Investigation Sampling and Analysis Plan, Solid Waste Management Unit (SWMU) 20, Prepared as an Addendum to the Final Supplemental Expanded Site Inspection and Pilot Study Sampling and Analysis Plan for Photo-Identified Site 4 (PI-4)*. April.

- CH2M, 2010a. *Master Standard Operating Procedures, Protocols, and Plans, Environmental Restoration Program, Vieques, Puerto Rico*. April.

1.2 Organization of the RI Report

The RI Report is organized as follows:

Section 1, Introduction, presents a summary of the objectives and scope of the RI and the organization of the RI Report.

Section 2, Site History, Physical Setting, and Previous Investigations, presents general information about SWMU 20, such as its former uses, climate, topography, geology and hydrogeology, and ecological setting.

Section 3, Summary of Field Investigations, presents site-specific descriptions and summaries of the various tasks completed as part of the RI for SWMU 20. In addition, Section 3 presents the data management and quality control (QC) measures used during collection of SWMU 20-related data and the Data Quality Evaluation (DQE).

Section 4, Nature and Extent of Contamination, discusses the nature and extent of soil and groundwater contamination present at SWMU 20.

Section 5, Contaminant Fate and Transport, presents an evaluation of the fate and transport of potential contaminants at the site in the context of the CSM.

Section 6, Human Health Risk Assessment Summary, summarizes the results of the HHRA for SWMU 20.

Section 7, Ecological Risk Assessment Summary, summarizes the results of the ERA for SWMU 20.

Section 8, Summary, Conclusions, and Recommendations, summarizes the evaluation of information collected for the site and presents the conclusions drawn based on that evaluation. This section also provides the recommendations for a path forward.

Section 9, References, presents a list of sources used in the development of this RI Report.

Appendixes

Appendix A – Soil Boring Logs: Surface and subsurface lithologic logging and drilling information.

Appendix B – Monitoring Well Completion Logs: Schematic diagrams of well completions, including survey information.

Appendix C – Geophysics Logs and Video Logs: Caliper graphs and video footage of the boreholes at MW-13D and MW-17D.

Appendix D – Photo Documentation of Site: Photographs from the field investigations including soil sampling and monitoring well installation.

Appendix E – Well Development Logs: Logs of monitoring well development, including field parameters collected.

Appendix F- Groundwater Sampling Logs: Data sheets identifying volumes removed, rates, parameters collected, and other information collected during groundwater sampling.

Appendix G- Survey Data: Summary of survey information for surface and subsurface soil sampling locations and monitoring wells.

Appendix H – Analytical Data Summary: Analytical data tables for surface and subsurface soil samples and groundwater samples.

Appendix I - Data Validation Report: Third party review of the sample collection activities and the performance of the analytical laboratory in generating the data.

Appendix J – Data Quality Evaluation: Data Quality Evaluation reports that assess the overall quality and usability of the data are included in the RI.

Appendix K- Human Health Risk Assessment: Presents the full HHRA and supporting tables with risk calculations.

Appendix L – Ecological Risk Assessment: Presents the full ERA and supporting tables with risk calculations.

Appendix M – Final Responses to Regulatory Agency Comments.

SECTION 2

Site History, Physical Setting, and Previous Investigations

This section presents a summary of the history, physical setting, and previous environmental investigations conducted at SWMU 20. Also contained in this section are descriptions of the ecological setting at SWMU 20.

2.1 Site Location and Description

Vieques, Puerto Rico, is located in the Caribbean Sea, approximately seven miles southeast across the Vieques Passage from the eastern tip of the main island of Puerto Rico, as illustrated in **Figure 2-1**. This island is located on the Antillean Island Arc separating the Caribbean Sea from the Atlantic Ocean and is approximately 21 miles long and 4.5 miles wide, with an area of approximately 33,100 acres, or 51 square miles.

2.1.1 Former Vieques Naval Training Range

The Navy purchased large portions of Vieques in the early 1940s to conduct activities related to military training. The western end of Vieques within the former Naval Ammunition Support Detachment (NASD) consisted mainly of ammunition loading and storage, vehicle and facility maintenance, and some training. The eastern end of Vieques was used for various aspects of naval gunfire training, including air-to-ground ordnance delivery and amphibious landings, as well as housing the main base of operations for these activities at Camp García.

The former VNTR is located on the eastern one-third of the island, and comprises the Surface Impact Area (SIA), Live Impact Area (LIA), and Eastern Conservation Area (ECA), totaling approximately 3,600 acres, as well as the adjacent and wholly contiguous Eastern Maneuver Area (EMA), totaling approximately 11,000 acres. **Figure 2-2** shows the locations of the SIA, LIA, ECA, EMA, and SWMU 20 on the former VNTR.

A Resource Conservation and Recovery Act (RCRA) Consent Order was signed in January 2000 to address potential hazardous constituent releases. SWMU 20, then known as PI-4, was included in the RCRA Consent Order. On April 30, 2003, the Navy ceased training exercises on the VNTR. Following termination of training operations on Vieques, the 14,573 acres of the former VNTR were transferred to the jurisdiction of the Department of the Interior (DOI), to be managed by the USFWS as a National Wildlife Refuge pursuant to Section 1049 of the National Defense Authorization Act for Fiscal Year 2002 (Public Law 107–107). On February 11, 2005 the former Naval facilities on eastern and western Vieques were designated as a National Priorities List (NPL) site, which put the environmental restoration program under CERCLA.

2.1.2 SWMU 20

SWMU 20 is located south of Camp Garcia (**Figure 2-2**). Historical information suggests the site was in use from 1959 to 1964 and comprised a former helicopter maintenance area, barracks, mess hall, trenched area, disturbed areas, and bermed area for storage of fuel bladders. Although there was no known historical documentation of CERCLA-related releases at the site, nor was physical evidence of a release observed during 2001 and 2002 site visits, five potential sources of a release were identified during the PA/SI for sampling:

- Former trenches
- Area of disturbed ground south of the helicopter maintenance area
- Bermed fuel bladder storage area
- Former helicopter maintenance area
- Disturbed area in the southeast part of the trenched area

These site features are shown on **Figure 2-3.** The historical activities at the site no longer occur and there are no structures remaining at the site other than concrete pads (potential relics of building foundations) and concrete vaults believed to have been associated with a sanitary septic system for barracks and mess hall potentially

located at the site. Currently there is no continuous human presence or use at the site, and no cultural resources are located at SWMU 20.

2.2 Physical Setting

This subsection summarizes the regional environmental setting of SWMU 20, including weather and climate, topography, land and water use, geology, hydrology and hydrogeology.

2.2.1 Weather and Climate

The climate of Vieques is characterized as warm and humid (tropical-marine). Temperatures are nearly constant with an annual average temperature of about 79°F; August is the warmest month, with an average temperature of 82°F and February the coolest, with an average temperature of 76°F. Vieques lies in the path of the prevailing easterly trade winds, regulating the climate. The trade winds result in a rainfall pattern characterized by a dry season from December through April and a rainy season from May through November. Due to tropical low-pressure systems carried by the trade winds, heavy precipitation results from tropical storms and occasional hurricanes from July to November. The island's average rainfall is approximately 36 inches, with extremes of 25 inches in the east (where SWMU 20 is located) and 45 to 50 inches in the west.

2.2.2 Topography

The site slopes gently to the southeast with elevations dropping from about 45 feet (ft) above mean sea level (amsl) to approximately 5 feet amsl. This is shown in **Figure 2-4**.

2.2.3 Land and Water Use

The former VNTR occupies 14,573 acres, most of which is undeveloped, and is bound by the Vieques Sound to the north, and the Caribbean Sea to the south and east. The former VNTR is currently owned by DOI and managed by USFWS as part of the National Wildlife Refuge System. The Comprehensive Conservation Plan (USFWS, 2007), which includes USFWS' planned land use, indicates there is no current or planned public use of the area that includes SWMU 20.

Groundwater beneath SWMU 20 is classified by the Commonwealth of Puerto Rico as SG, which is defined as "ground waters intended for use as source of drinking water supply and agricultural uses including irrigation." Also included under this class are those ground waters that flow into coastal, surface, and estuarine waters and wetlands (Commonwealth of Puerto Rico, 2010). The Esperanza aquifer, shown in **Figure 2-5**, is not currently used as a potable water source at or in the vicinity of SWMU 20, and there are no known plans for potable use of groundwater in this area.

2.2.4 Geology

The geology of Vieques is characterized by plutonic and volcanic rocks generally overlain by alluvial deposits and sedimentary rocks. The volcanic rocks, of Late Cretaceous age, were deposited in a marine environment. Later in the Cretaceous Period, a quartz-diorite/granodiorite plutonic complex intruded the volcanics, and is exposed over a large part of the island (USGS, 1989).

Much of the igneous bedrock is exposed over the island with exceptions where it is overlain by limestone of Tertiary age and alluvial, beach, and swamp deposits of Quaternary age. Limestone only occurs within portions of the north, south, and eastern parts of the island. Alluvial sedimentary deposits generally consist of sand with percentages of silt, clay and gravel, generated from the weathering of bedrock. These deposits generally occur in valleys and near the ocean. Geophysical surveys show that the alluvial deposits average about 30 feet in thickness and overlie bedrock composed of granodiorite and quartz diorite (USGS, 1989). Five general categories are present in eastern Vieques:

1. Qa - Alluvial deposits (sand, silt, and clay)
2. Qb - Beach and dune deposits (calcite, quartz, volcanic rock fragments and minor magnetite)

3. TI - Marine sedimentary rocks (report indicated variable limestones)
4. Kv - Sandstone, siltstone, conglomerate, lava, tuff, and *tuffaceous breccia*
5. KTd - Plutonic rock made up largely of granodiorite and quartz diorite

Figure 2-6 shows where SWMU 20 lies with respect to each geologic zone. The site crosses geologic zones KTd and Qa, the boundary representing the northern extent of where alluvial deposits (Qa) overly the plutonic rock (KTd). Soil on Vieques is predominantly chemically weathered remnants of parent bedrock due to the climate conditions and the susceptibility of the parent rock to chemical weathering.

Soil borings at SWMU 20 encountered primarily unconsolidated soil above weathered bedrock grading into fractured, competent granodiorite bedrock. The overburden consists of poorly graded dry sands and dry silty sands and occasional trace clay and gravel, with intermittent clay-silt lenses. As show in **Figure 2-7**, this is consistent with the general soil type and geologic zones identified in this part of Vieques. Soil type in northern portion of SWMU 20 is labeled Not Com (Not Completed), and it is a reworked area associated with a former runway. The more southern area is referred to as Frb, which fraternidad clay, 2-5% slopes.

Monitoring well lithologic data from the PA/SI and Expanded Site Inspection (ESI) provide descriptions of the SWMU 20 subsurface geology. **Figure 2-8** shows the locations of the geologic cross-sections shown in **Figures 2-9 and 2-10**. Bedrock cores for MW-02 and MW-04 encountered granite and some fine grained volcanic rock. Bedrock boreholes for MW-03 and MW-05 encountered granodiorite. Bedrock was encountered in the monitoring well borings at between 17 and 28 feet below ground surface (bgs). Weathered bedrock (saprolite) was encountered in all wells at the site, with the exception of MW-31.

For more details on the unconsolidated material overlying bedrock, see the boring logs in **Appendix A** of this RI Report.

2.2.5 Hydrology and Hydrogeology

There are no surface water bodies at the site. As shown in **Figure 2-4**, the closest surface water body topographically downgradient of the site is Bahia Tapón along the coast. Five rounds of water-level readings from SWMU 20 monitoring wells are presented in **Table 2-1**. Groundwater flows as a subdued replica of the topography, through the fractured bedrock toward the south-southeast (**Figure 2-11**) with a likely tidal influence associated with the bay to the south. The tides create a pressure change through the fractures within the bedrock. Because the flow and elastic storage properties of the fractures cause time lag and attenuation of the tidal pressure fluctuations, each well's water level is affected differently and has a unique tidal response. Because of this, depicting the piezometric surface based on synoptic water level measurements can be misleading. However, because of the detail with which the TCE plume has been delineated, the plume configuration itself demonstrates the overall groundwater flow direction, which is consistent with what would be predicted from site topography and proximity to the most likely discharge point (Bahia Tapón).

The network of monitoring wells at SWMU 20 now includes 33 shallow bedrock wells and five deep bedrock wells. The shallow bedrock wells are screened between about -3 to -13 feet amsl; the deep bedrock wells are screened between about -30 to -40 feet amsl. As shown in **Table 2-1** and displayed on **Figures 2-8 and 2-9**, the piezometric head between the shallow and deep bedrock varies across the site. This is not unusual for fractured bedrock/saprolite, such as that present at SWMU 20, because the measured head reflects the pressures imparted by the various fractures the well screen encounters (which likely vary in all directions), which are themselves influenced by the degree of interconnectivity both laterally and vertically. Slightly upward gradients, such as those observed in well pairs MW-13/13D, MW-24/24D, and MW-25/25D, may reflect semi-confined conditions, but may also reflect a higher degree of connectivity to downgradient areas (laterally) of lower head in the shallower zone. Conversely, slightly downward gradients, such as those observed in well pair MW17/17D, may reflect unconfined conditions and/or a higher degree of connectivity to horizontally downgradient areas (laterally) of lower head in the deeper zone. Neutral gradients, such as that observed at well pair MW-28/28D, generally reflect unconfined conditions and a high degree of interconnectivity between the two zones and/or with downgradient, lower head areas.

2.2.5.1. Groundwater Flow

As previously discussed, the estimated groundwater flow direction is to the south and southeast toward the Bahia Tapón. Other characteristics of the groundwater at SWMU 20 include the following:

- Hydraulic gradient range = 0.002 to 0.005 ft/ft (based on water levels obtained from wells completed in the saprolite/shallow bedrock).
- Hydraulic conductivity (k value) is not currently available for SWMU 20, but a slug test is planned for the recommended pilot study. SWMU 4 has very similar geologic conditions (KTd adjacent to Qa, saprolite formation). Based on SWMU 4 slug tests: (average of eight wells screened in saprolite/shallow bedrock): k= 5.3 feet/day (1.87×10^{-3} centimeters (cm)/second).
- Assuming effective porosity (n_{eff}) of 0.18, the seepage velocity ranges from 0.059 to 0.147 feet/day (or about 21 to 54 feet/year). The average is 0.103 feet/day (or about 38 feet/year). The assumed effective porosity representative of the saprolite/shallow bedrock (value of 0.18 was derived from the effective porosities listed in Freeze and Cherry (1979), using the ranges expressed for silt (0.01 - 0.39) and clay (0.01 – 0.18) and professional judgement and experience from environmental work in fractured bedrock/saprolite.
- Based on their retardation coefficients (as discussed in Section 5), the average calculated groundwater flow velocity of 38 feet/year shown above yields estimated advective transport rates of about 2 feet/year to 31 feet/year for individual constituents of interest. Assuming a release year of 1960 (active facility), the travel duration of 54 years and observed plume length of approximately 1,550 feet yield an estimated maximum advective transport rate of 29 feet/year. This is consistent with the upper end of the range of transport rates for individual constituents of interest estimated from the average calculated groundwater flow rate.

2.2.5.2. General Groundwater Geochemistry

The general groundwater geochemistry at SWMU 20 is brackish. The following groundwater conditions were observed during the various field investigations at SWMU 20:

- DO: 0.35-3.59 milligrams/liter (mg/L)
- ORP: -65 to +264 mV
- pH ranged from 6.11 to 7.03
- Total Iron: 0.205 mg/L to 1.28 mg/L
- Dissolved Iron: 0.067J mg/L to 0.118 mg/L
- Total Manganese: 0.081J mg/L to 0.0869 mg/L
- Dissolved Manganese: 0.0041J mg/L to 0.079 mg/L
- Nitrate: 0.35 mg/L to 4.16 mg/L
- Sulfate: 167 mg/L to 235 mg/L
- Total Dissolved Solids (TDS): 1,100 mg/L to 6,570 mg/L
- Total Organic Carbon (TOC): 1.04 mg/L to 1.6J mg/L
- Dehalococcoides population: 0.2J cells/mL (Note that this value represents very low value with respect to reductive dechlorination potential)

2.2.6 Ecological Setting

The land around SWMU 20 was at one time maintained as cleared, but became re-vegetated since operations ceased. Terrestrial flora habitats are classified as thick thorn scrub. No federally protected species or preferred habitats were identified in the area. For more information on the ecological survey, see Appendix C of the Final PA/SI Report (CH2M, 2008) and in Section 7 in this RI Report.

2.3 SWMU 20 Timeline

This subsection presents a timeline of the historical investigations at PI-4 (SWMU 20) to help in understanding the rationale for the sampling approaches taken and the path forward determined upon completion of each investigation. **Table 2-2** lists the various studies and activities conducted at or including PI-4, and each of these investigations is summarized in the following paragraphs. PI-4 became designated as SWMU 20 when the site moved from the SI to the RI stage in 2012. An overview of the sampling that occurred during the previous investigations is summarized in **Table 2-3**. Specific details about sampling approach and results are presented in Sections 3 and 4. Sample locations and types from these historical investigations are shown in **Figure 2-12**. To aid in readability, throughout this report samples are referred to using abbreviated nomenclature comprising the sample type designation (i.e., surface soil sample [SS], subsurface soil sample [SB], and monitoring well [MW]) and sample number (e.g., 01, 21, etc.). For example, surface soil sample VEP4-SS23-0001 shown in the analytical data tables is referred to as SS23, and monitoring well/groundwater sample VEP4-GW01-0513 is referred to as MW-01 in text and figures.

2.3.1 Current Conditions Evaluation

The Description of Current Conditions Report (CH2M, 2001) summarizes the Aerial Photographic Analysis study (ERI, 2000) and discusses the conditions at PI-4 and other sites, based on an archive records search and interviews with former employees. The site was identified as PI-4 based on aerial photography (ERI, 2000; 2003) and was estimated to be approximately six acres in size.

2.3.2 Environmental Baseline Survey

The Environmental Baseline Survey (EBS) (NAVFAC, 2003) characterized and documented the environmental conditions on east Vieques in support of land transfer from the Navy to the DOI. The EBS identified the site as a series of trenches and disturbed ground, active between 1959 and 1964 (NAVFAC, 2003). **Figure 2-3** shows the locations of the features discussed below, based on information identified in the 1962 aerial photograph and/or presented in the EBS Report. The trenches, visible in the 1959 aerial photograph, are reported in the EBS to have been covered by 1962. An additional area of disturbed ground (apart from the trenches) is visible in the 1962 aerial photograph just south of the former helicopter maintenance area. Two rectangular bermed areas were identified during interviews as having been formerly used for fuel bladder storage. These are visible in the 1962 aerial photograph, as is the helicopter maintenance area. An area of disturbed ground/possible fill area appears in the southeast corner of the trenched area in the 1964 photograph. The interviews and records indicate that barracks and a mess hall were present at PI-4, although no buildings are currently present at the site (NAVFAC, 2003). Based on the configuration of the trenches and the presence of the concrete slabs and vault in the area of the trenches, it is possible the trenches were associated with a sanitary leach field for the barracks and mess.

During the EBS (2002), two surface soil samples (PI4-1 and PI4-2) were collected within the bermed area formerly used for fuel bladder storage (**Figure 2-12**). Both samples were analyzed for total petroleum hydrocarbons, diesel-range organics (TPH-DRO), and total petroleum hydrocarbons, gasoline-range organics (TPH-GRO). All results were non-detect.

2.3.3 Preliminary Assessment/Site Inspection (PA/SI)

To determine if there had been a CERCLA-related release at the site, during the PA/SI, co-located surface soil and subsurface soil samples were collected from 15 borings (SS01/SB01 through SS15/SB15), groundwater samples were collected from five monitoring wells (MW-01 through MW-05), and a grab water sample was collected from the concrete vault box, as shown on **Figure 2-12**.

The results of screening these data using a decision analysis process are presented in the PA/SI Report (CH2M, 2008). The conclusion of the PA/SI Report was that there was no soil contamination at concentrations that would pose a potentially unacceptable risk to human or ecological receptors or leaching concern for groundwater. It was further concluded that although groundwater contamination did not appear to be widespread or at appreciable

concentrations, the presence of an MCL exceedance of TCE in one well (MW-05 [**Figure 2-12**] at 9.3 µg/L) warranted additional study in an ESI.

2.3.4 Expanded Site Inspection (ESI)

The ESI was conducted at PI-4 in 2009 to determine if VOC concentrations were consistent with those measured in 2006 and to determine the extent of VOC contamination above MCLs in the assumed upgradient and downgradient directions from MW-05. Two new monitoring wells (MW-06 and MW-07 [**Figure 2-12**]) were installed during this investigation, and with concurrence among the ERP Technical Subcommittee, the ESI and all subsequent investigations at the site focused on VOCs, specifically PCE and its daughter products. This is because the historical data showed little to no other contaminants present and concentrations posing no unacceptable risks.

The results of the ESI are documented in the SI/ESI Report (CH2M, 2010b) and appeared to confirm the presence of localized and low concentrations of PCE and its daughter products. TCE was detected in well MW-05 at a concentration of 17 µg/L.

2.3.5 2010 Groundwater Sampling

At the time the SI/ESI Report was submitted in August 2010, a second round of groundwater sampling had just been conducted in July 2010 and the results were still pending at the time of submittal. The purpose of this sampling was to confirm the previous year's results, and it was conducted at all existing site monitoring wells at the time. This sampling event confirmed the historical results.

2.3.6 Supplemental ESI

Based on the ESI results, the Supplemental ESI (CH2M, 2011) was implemented to confirm:

- The area of groundwater contamination was localized
- The absence of a source area in the soil overlying the localized area of groundwater contamination

If these had been confirmed, an in situ pilot study using in situ chemical oxidation (ISCO) would have been conducted to determine if the concentrations of TCE (and potentially other VOCs) could be reduced to acceptable levels (i.e., concentrations at or below the MCLs and/or PRWQS).

Results from the analysis of soil collected during the Supplemental ESI confirmed a TCE source area is not present in soil in the vicinity of well MW-05. However, groundwater sampling results (from wells MW-05 and MW-08 through MW-12 [**Figure 2-12**]) determined that higher concentrations and a broader area of VOC groundwater contamination were present than originally identified. During the Supplemental ESI, subsurface soil samples were collected from five soil borings (SB-16 through SB-20) and seven monitoring wells (MW-08 through MW-14), as shown in Figure 2-12.

Therefore, in an attempt to find the downgradient extent of the TCE in groundwater and to determine whether the planned pilot study was still appropriate, two additional wells (MW-13 and MW-14 [**Figure 2-12**]) were installed to the south of the initial supplemental ESI wells. Sampling of these wells showed the highest TCE concentration detected to be in well MW-13 (87.7 µg/L). Based on this information, it was concluded the extent of contamination had not been delineated and, based on an enhanced understanding of the potential size of the area of groundwater contamination, the potential for a source area in soil elsewhere existed. Therefore, an RI was deemed warranted and the site was renamed SWMU 20. A SAP (CH2M, 2013) was prepared to further characterize the site and to specifically sample for the constituents of interest selected by the ERP Technical Subcommittee based on the historical investigations and presented in **Table 2-4**.

During the course of the Supplemental ESI, several small depressions were identified east of the "disturbed area" identified in the 1962 aerial photograph (**Figure 2-3**). Excavation of several of these areas was subsequently performed to determine the nature of the material within the depressions (see photographs 15 through 20 in **Appendix D**). As shown in the photographs, perforated steel plates were the only items found in the depressions.

The depressions were further evaluated during the RI, in accordance with the approach concurred upon by the Navy and regulatory agencies and included in the RI SAP, as described in Section 3.1.4. The associated data evaluation is discussed in Section 4, which includes reference to a figure showing all sample locations relative to the depressions (i.e., **Figure 4-1**). The metal debris encountered at SWMU 20 is innocuous, not unique to SWMU 20, and is commonly encountered elsewhere on Vieques. Further, there is no planned land use in this area and USFWS has no concerns with leaving the debris in place.

TABLE 2-1
Summary of Monitoring Well Groundwater Elevations
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Monitoring Well ID	Top-of-casing Elevation (ft amsl)	December 10, 2011		June 3, 2013		July 1, 2013		October 4, 2013		November 13, 2014	
		Depth to Water (ft below TOC)	GW Elevation (ft amsl)	Depth to Water (ft below TOC)	GW Elevation (ft amsl)	Depth to Water (ft below TOC)	GW Elevation (ft amsl)	Depth to Water (ft below TOC)	GW Elevation (ft amsl)	Depth to Water (ft below TOC)	GW Elevation (ft amsl)
MW-01	36.71	33.42	3.29	36.71	0.00	36.35	0.36	38.25	-1.54	37.75	-1.04
MW-02	41.54	37.32	4.22	40.71	0.83	40.43	1.11	40.45	1.09	41.69	-0.15
MW-03	43.57	40.03	3.54	43.47	0.10	43.08	0.49	42.86	0.71	43.20	0.37
MW-04	40.72	37.59	3.13	40.95	-0.23	40.45	0.27	41	-0.28	41.56	-0.84
MW-05	34.22	31.94	2.28	35.10	-0.88	34.61	-0.39	34.1	0.12	35.38	-1.16
MW-06_OLD	39.47	36.62	2.85	39.90	-0.43	39.46	0.01	39.14	0.33	NA	NA
MW-06	39.47	NA	NA	NA	NA	NA	NA	NA	NA	40.56	-1.09
MW-07	29.17	26.89	2.28	30.15	-0.98	29.54	-0.37	28.95	0.22	30.15	-0.98
MW-08	34.22	31.93	2.29	35.00	-0.78	34.58	-0.36	34.12	0.10	35.34	-1.12
MW-09	33.17	31.04	2.13	34.22	-1.05	33.65	-0.48	38.15	-4.98	34.34	-1.17
MW-10	33.99	31.81	2.18	34.86	-0.87	34.41	-0.42	33.96	0.03	35.14	-1.15
MW-11	34.51	32.13	2.38	35.35	-0.84	34.80	-0.29	34.25	0.26	35.59	-1.08
MW-12	34.35	32.06	2.29	35.10	-0.75	34.66	-0.31	34.27	0.08	35.55	-1.20
MW-13	34.28	32.58	1.70	35.03	-0.75	34.88	-0.60	34.54	-0.26	35.71	-1.43
MW-13D	33.46	NA	NA	NA	NA	33.90	-0.44	33.44	0.02	34.63	-1.17
MW-14	32.19	30.19	2.00	33.34	-1.15	32.80	-0.61	32.31	-0.12	33.43	-1.24
MW-15	38.58	NA	NA	39.06	-0.48	38.68	-0.10	38.41	0.17	39.81	-1.23
MW-16	35.70	NA	NA	36.60	-0.90	36.20	-0.50	35.95	-0.25	37.19	-1.49
MW-17	32.05	NA	NA	33.76	-1.71	33.33	-1.28	32.81	-0.76	33.78	-1.73
MW-17D	32.05	NA	NA	NA	NA	33.48	-1.43	33.18	-1.13	34.06	-2.01
MW-18	28.94	NA	NA	30.44	-1.50	29.91	-0.97	29.33	-0.39	30.35	-1.41
MW-19	28.35	NA	NA	29.91	-1.56	29.37	-1.02	28.77	-0.42	29.75	-1.40
MW-20	32.78	NA	NA	NA	NA	33.88	-1.10	33.49	-0.71	34.45	-1.67
MW-21	34.09	NA	NA	NA	NA	35.20	-1.11	34.9	-0.81	35.97	-1.88
MW-22	29.17	NA	NA	NA	NA	30.47	-1.30	30.04	-0.87	30.96	-1.79
MW-23	27.92	NA	NA	NA	NA	29.46	-1.54	29	-1.08	29.70	-1.78
MW-24	27.85	NA	NA	NA	NA	29.18	-1.33	28.7	-0.85	29.62	-1.77
MW-24D	28.31	NA	NA	NA	NA	NA	NA	NA	NA	29.86	-1.55
MW-25	19.00	NA	NA	NA	NA	NA	NA	20.02	-1.02	20.70	-1.70
MW-25D	18.82	NA	NA	NA	NA	NA	NA	NA	NA	20.15	-1.33
MW-26	19.95	NA	NA	NA	NA	NA	NA	20.97	-1.02	21.55	-1.60
MW-27	9.42	NA	NA	NA	NA	NA	NA	10.3	-0.88	10.78	-1.36
MW-28	8.01	NA	NA	NA	NA	NA	NA	8.25	-0.24	8.84	-0.83
MW-28D	7.11	NA	NA	NA	NA	NA	NA	NA	NA	7.95	-0.84
MW-29	15.35	NA	NA	NA	NA	NA	NA	15.76	-0.41	16.40	-1.05
MW-30	20.90	NA	NA	NA	NA	NA	NA	21.18	-0.28	22.02	-1.12
MW-31	10.80	NA	NA	NA	NA	NA	NA	NA	NA	11.16	-0.36
MW-32	3.76	NA	NA	NA	NA	NA	NA	NA	NA	4.53	-0.77
MW-33	3.31	NA	NA	NA	NA	NA	NA	NA	NA	4.13	-0.82

Notes:
Original MW-06 surface casing damaged and rebuilt in 2014.
NA - Not applicable

TABLE 2-2
Study Timeline
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Study/Activity	Author	Purpose of Study	Study Date(s)	Report Date
Aerial Photographic Analysis	Environmental Research, Inc. (ERI)	Support the ongoing Phase I RFI by evaluating historical aerial photographs for potential sources of contamination.	August 2000	August 2000
Current Conditions Evaluation	CH2M HILL	Support the Phase I RFI by providing information on the Naval Facility and to describe existing conditions at the 9 SWMUs, 3 AOCs, 12 PAOCs, and 23 PIs.	Site visit February 2000	February 2001
Environmental Baseline Survey (EBS)	Naval Facilities Engineering Command	Characterize the existing environmental conditions on east Vieques prior to the planned property transfer to the Department of Interior.	September 2002 through April 2003	April 2003 (Draft Final)
Preliminary Assessment/Site Inspection (PA/SI)	CH2M HILL	Release assessment at 12 Consent Order sites and PI/PAOC sites, including PI 4	January through February 2004	June 2008
Expanded Site Inspection (ESI)	CH2M HILL	Release assessment (or expanded release assessment) at 7 Consent Order Sites and 16 PI/PAOC sites identified for study in Draft Phase I RFI Report and the PA/SI Report	November 2008 through May 2009	August 2010
2010 Groundwater Sampling	CH2M HILL	Confirm previous year's results.	July 2010	none specific to 2010 groundwater sampling (activities and data summarized in RI Report)
Supplemental ESI	CH2M HILL	Confirm area of groundwater contamination as localized and absence of source area in soil. If confirmed, conduct pilot study.	November through December 2011	none specific to Supplemental ESI (activities and data summarized in RI Report)

TABLE 2-3
Historical Sample Summary
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Site	Investigation	Media Samples[1]	Analytes	Abbreviated Nomenclature	Sample Identification	Soil Sample Depth (ft bls)
PI 4	2002 EBS	2 SS	TPH-GRO and DRO		PI4-1, PI4-2	0 - 0.5
	2006 PA/SI	7 SS/SB	TCL VOCs, SVOCs, Pesticides, PCBs; TAL Metals	SS04/SB04, SS08/SB08 thru SS13/SB13	EPI04-SS04-0001/EPI04-SB04-0406, EPI04-SS08-0001/EPI04-SB08-0406 through EPI04-SS13-0001/EPI04-SB13-0406	0 - 1 (SS); 4 - 6 (SB); default depths in accordance with Work Plan
		6 SS/SB	TCL VOCs, SVOCs, Pesticides; TAL Metals	SS01/SB01 thru SS03/SB03, SS05/SB05 thru SS07/SB07	EPI04-SS01-0001/EPI01-SB01-0406 through EPI04-SS03-0001/EPI04-SB03-0406, EPI04-SS05-0001/EPI04-SB05-0406 through EPI04-SS07-0001/EPI04-SB07-0406	0 - 1 (SS); 4 - 6 (SB); default depths in accordance with Work Plan
		2 SS/SB	TCL VOCs, SVOCs; TAL Metals	SS14/SB14, SS15/SB15	EPI04-SS14-0001/EPI04-SB14-0406, EPI04-SS15-0001/EPI04-SB15-0406	0 - 0.5 (SS); 4 - 6 (SB); surface soil samples hit refusal (concrete; subsequently drilled through) at approximately 0.5 foot bls; default subsurface depth in accordance with Work Plan
		5 GW	TCL VOCs, SVOCs, Pesticides, PCBs; TAL Metals (total and dissolved)	MW-01, MW-02, MW-03, MW-04, MW-05	EPI04-GW01-06B, EPI04-GW02-06B, EPI04-GW03-06B, EPI04-GW04-06B, EPI04-GW05-06B	N/A
	2009 ESI	5 GW	TCL VOCs	MW-02 thru MW-06	VEP4-GW02-0309 through VEP4-GW06-0309	N/A
		2 GW	TCL VOCs, Chloride, TDS	MW-01 and MW-07	VEP4-GW01-0309, VEP4-GW07-0409	N/A
	2010	7 GW	TCL VOCs	MW-01 thru MW-07	VEP04-GW01-0710, VEP04-GW02-0710, VEP04-GW03-0710, VEP04-GW04-0710, VEP04-GW05-0710, VEP04-GW06-0710, VEP04-GW07-0710, VEP04-GW07P-0710	N/A
	2011 Supplemental ESI	5 SB	TCL VOCs, TOC	SB16 thru SB20	VEP4-SB16-1617-1111, VEP4-SB17-1011-1111, VEP4-SB18-1214-1111, VEP4-SB19-0607-1111, VEP4-SB20-0608-1111	SB16 16-17' bgs, SB17 10'-11' bgs, SB18 14'-14' bgs, SB19 06-07' bgs, SB20 06'-08' bgs
		10GW	TCL VOCs, TDS, TOC, Dehalococcoides (MW-05 only)	MW-05 thru MW-14	VEP4-GW05-1111, VEP4-GW06-1111, VEP4-GW07-1111, VEP4-GW08-1111, VEP4-GW09-1111, VEP4-GW10-1111, VEP4-GW11-1111, VEP4-GW12-1111, VEP4-GW13-1211, VEP4-GW14-1211	N/A

Notes:
1 SS = surface soil; SO = soil boring location or composite soil sample; SB = subsurface soil; GW = groundwater; WW = water

TABLE 2-4
Constituents of Interest in Groundwater
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

VOCs	RI SAP Rationale (Historical detections/exceedances)
trichloroethene (TCE)	MCL exceedance in MW-05, MW-08, MW-10, MW-12, MW-13, and MW-14
1,1-dichloroethene (1,1-DCE)	detected in MW-05
tetrachloroethene (PCE)	detected in MW-05, MW-08, MW-10, MW-12, and MW-13
vinyl chloride (VC)	detected in MW-05/daughter product
cis-1,2-dichloroethene (cis-1,2-DCE)	detected in MW-10/daughter product
trans-1,2-dichloroethene (trans-1,2-DCE)	daughter product

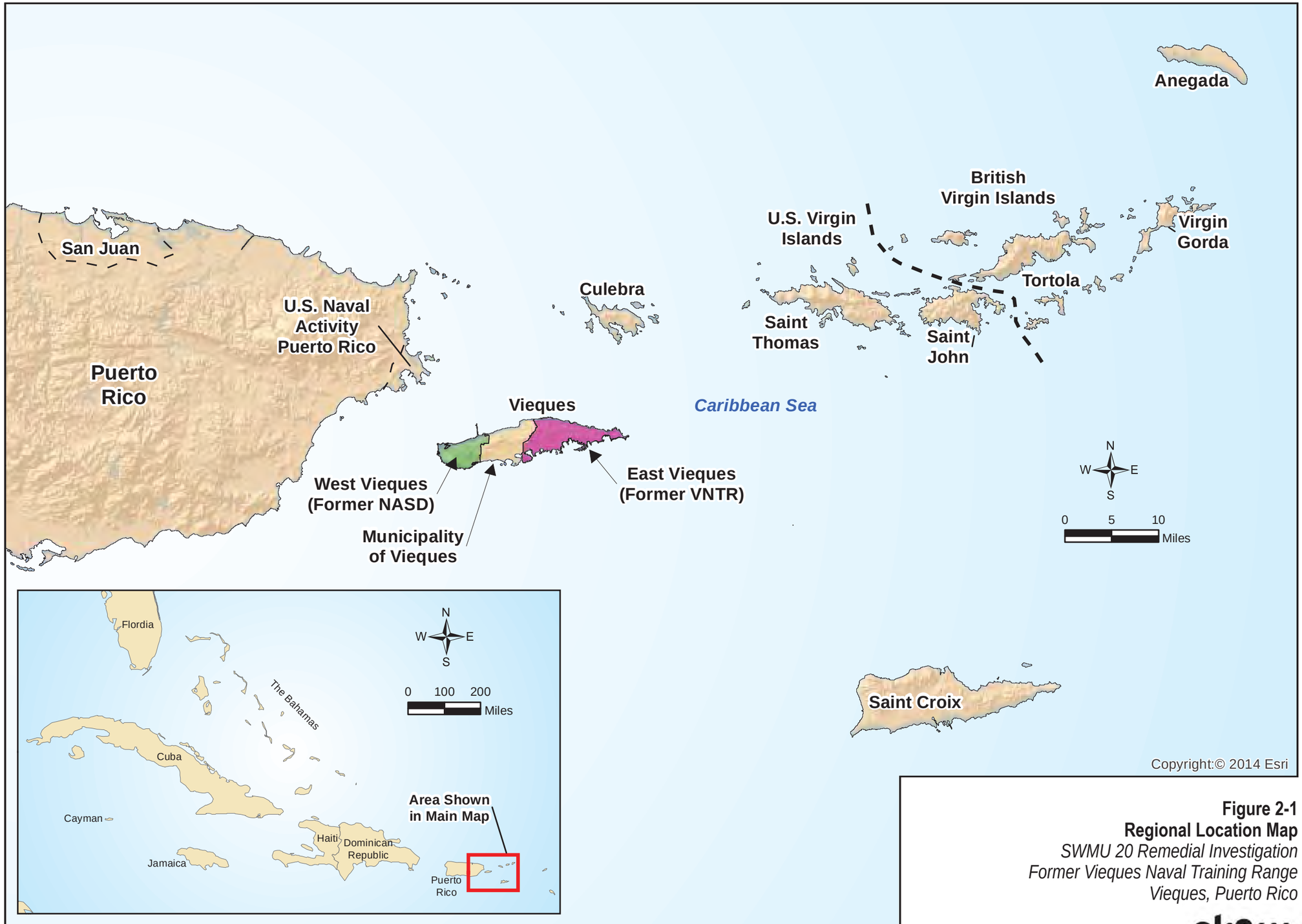
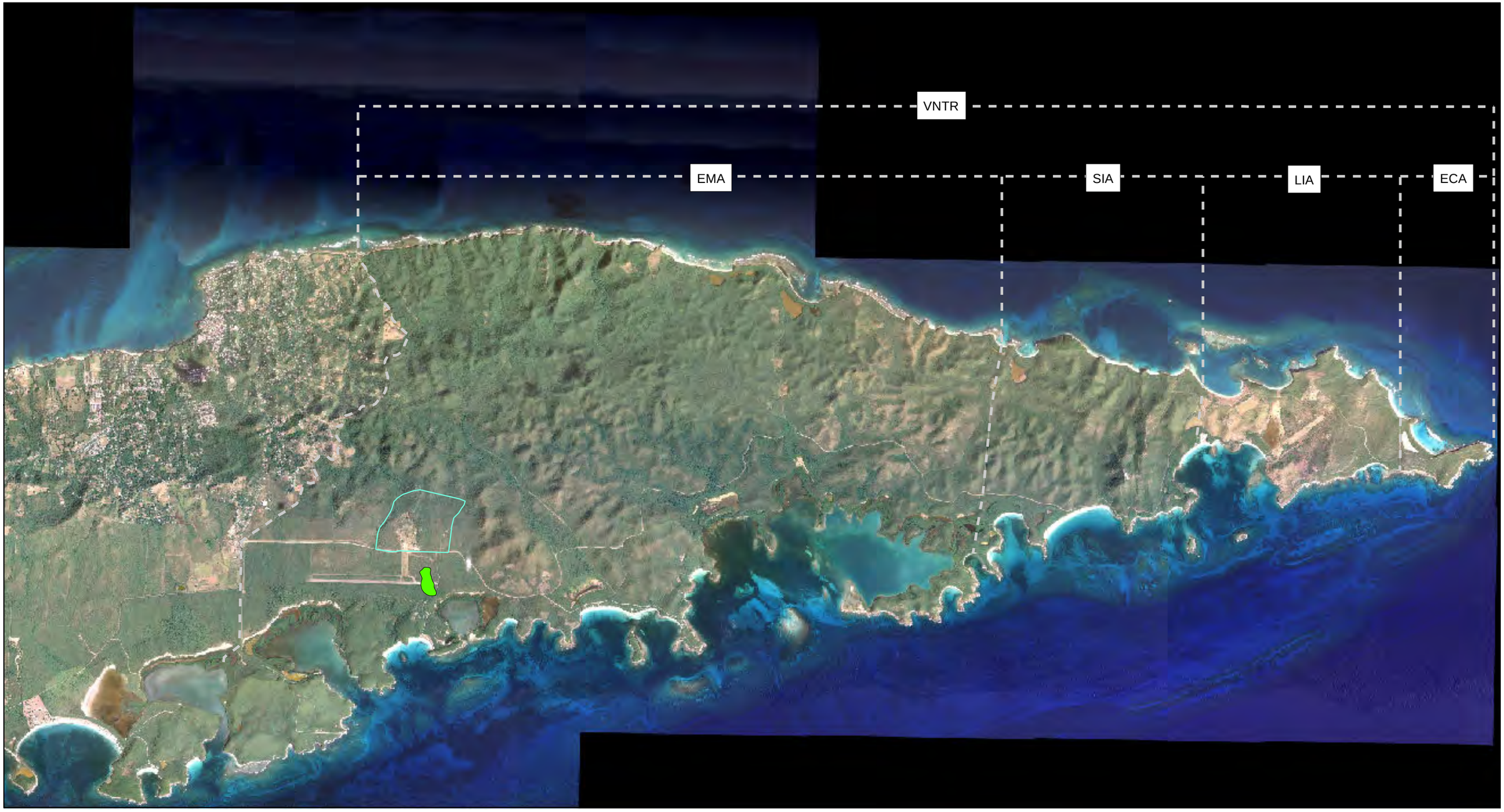


Figure 2-1
Regional Location Map
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

ch2m



Legend

- SWMU 20 site
- Camp Garcia

N
W E
S

0 2,250 4,500 9,000
Feet

Figure 2-2
Site Location Map
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

ch2m

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Legend

- Ground Surface Depressions
- Concrete Pad
- Concrete Vault Box
- Estimated Location of Bermed Area used for Fuel Bladder Storage
- Former Location of Structures
- Disturbed Areas (1962)

ERI Aerial Photographic Analysis (February 2003)

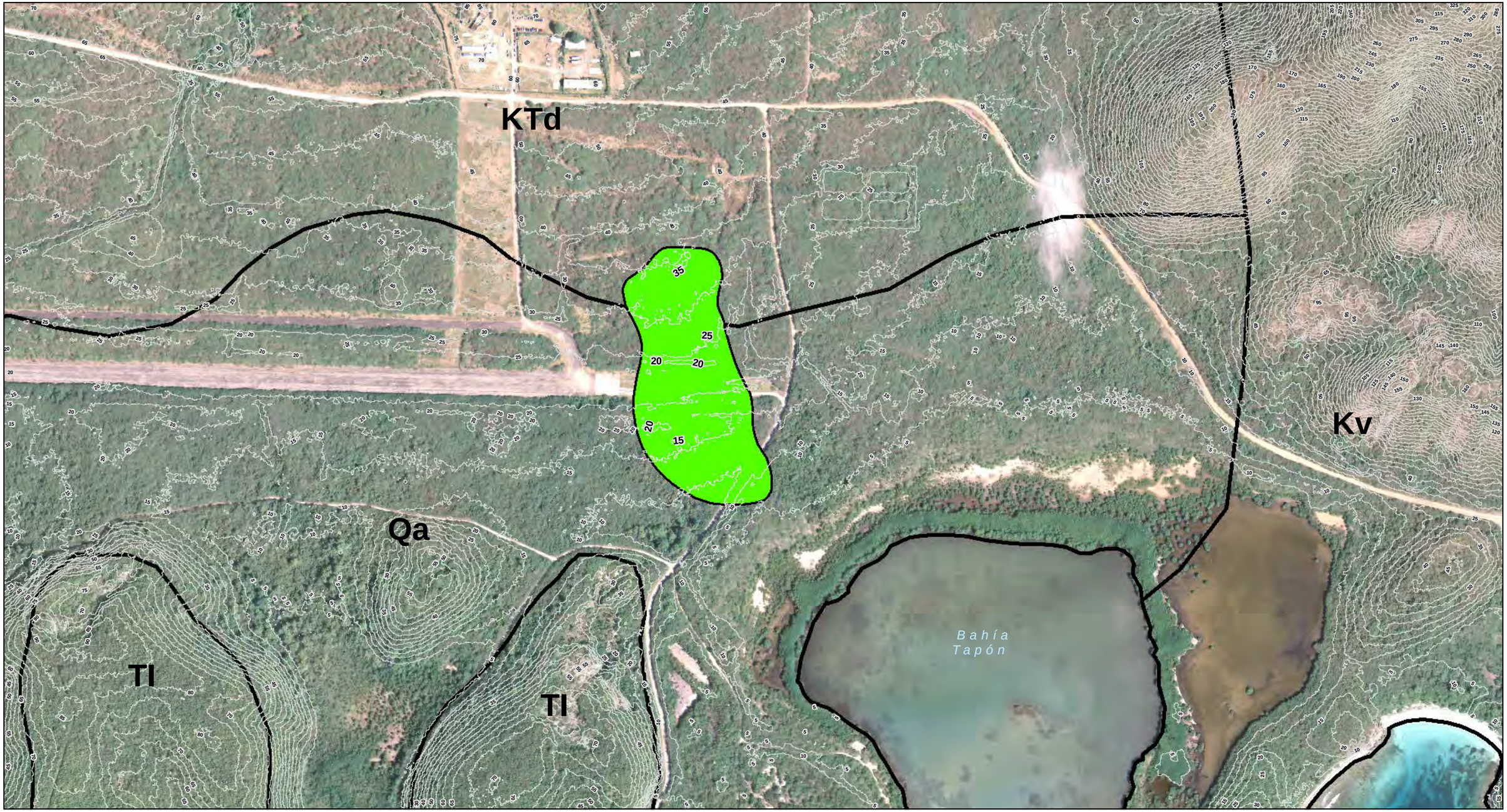
- Disturbed Ground/Possible Fill Area 1964
- Trench Scars 1959
- Trench/Possible Debris 1959

N
W E
S

0 62.5 125
Feet

Figure 2-3
Site Features
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

ch2m



Legend

Geologic Unit

SWMU 20 site

Geologic Unit Description

Qa - Alluvial Deposits

Tl - Marine Sedimentary Rocks

K Td - Granodiorite and Quartz Diorite

N
W E
S

0 500 1,000 Feet

Figure 2-4
Topography and Geology
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

ch2m

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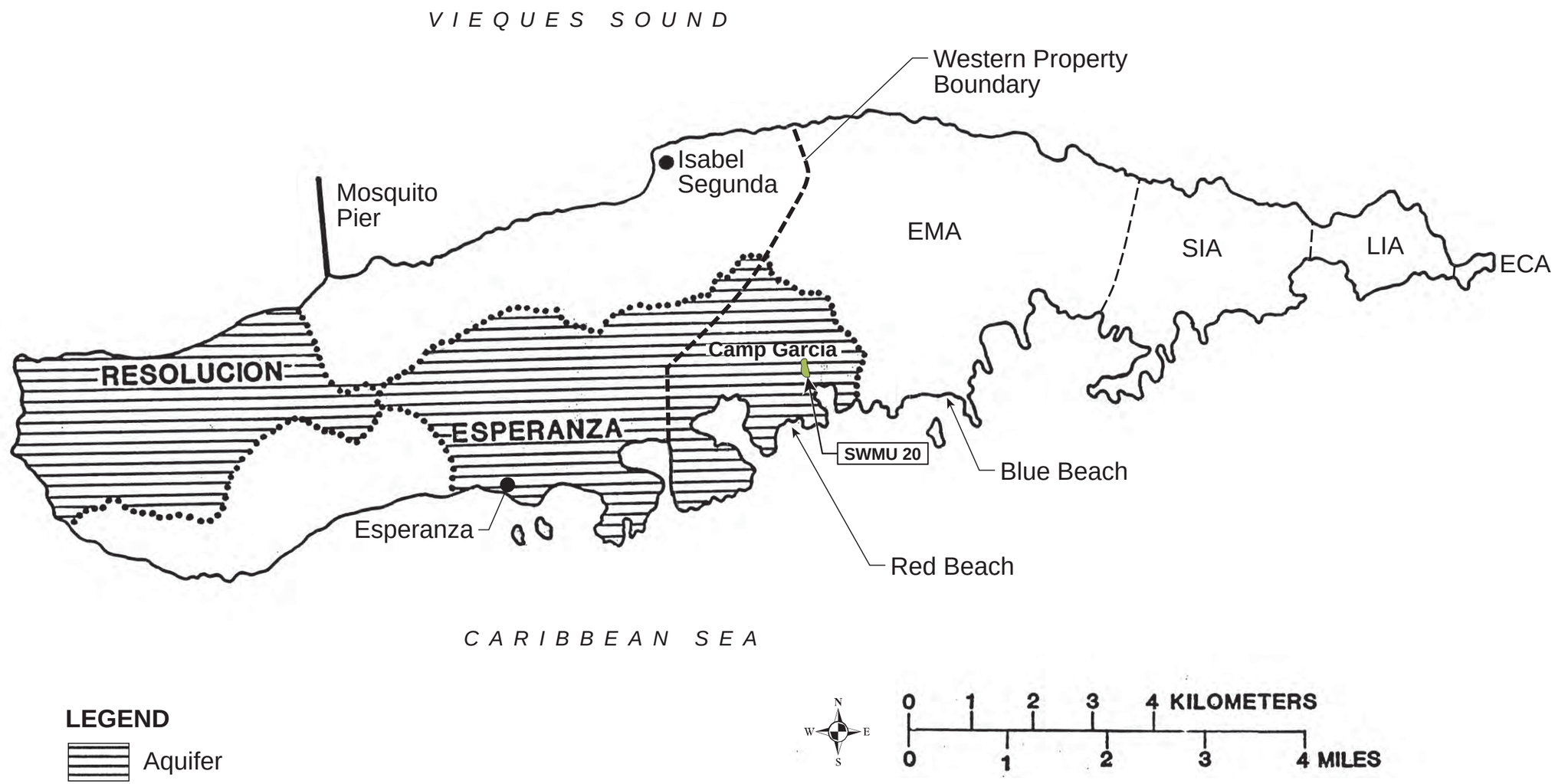
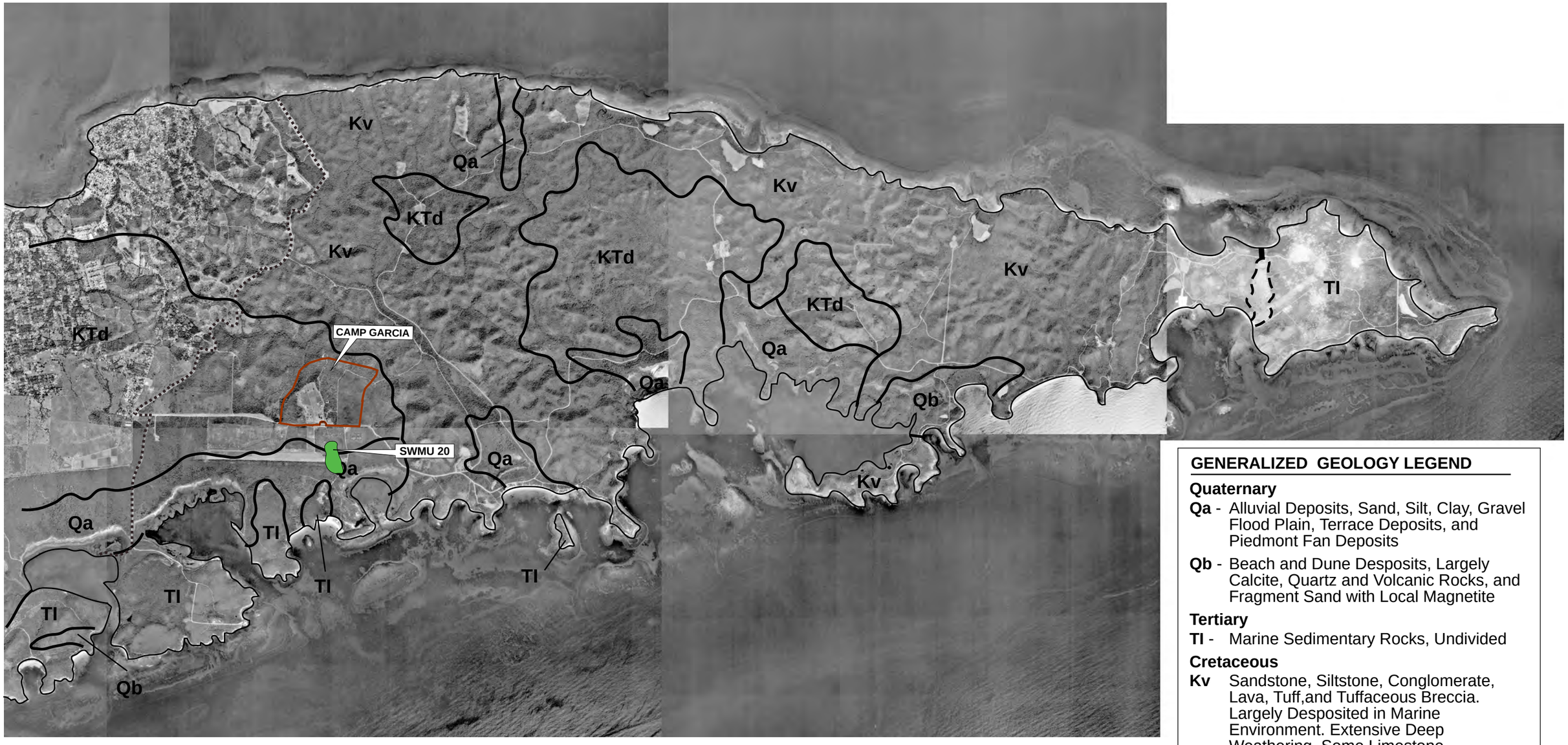


(Reference: Torres - Gonzalez, 1989)

Figure 2-5
Resolución and Esperanza Aquifers
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

ch2m



Base imagery is comprised of 1994 1-meter USGS Digital Ortho-imagery quarter quadrangles (DOQQs).

GENERALIZED GEOLOGY LEGEND

Quaternary

Qa - Alluvial Deposits, Sand, Silt, Clay, Gravel Flood Plain, Terrace Deposits, and Piedmont Fan Deposits

Qb - Beach and Dune Desposits, Largely Calcite, Quartz and Volcanic Rocks, and Fragment Sand with Local Magnetite

Tertiary

Tl - Marine Sedimentary Rocks, Undivided

Cretaceous

Kv Sandstone, Siltstone, Conglomerate, Lava, Tuff,and Tuffaceous Breccia. Largely Desposited in Marine Environment. Extensive Deep Weathering. Some Limestone.

KTd- Plutonic Rocks, Largely Grandiorite,and Quartz Diorite, Locally Deeply Weathered (from Torres-Gonzalez, 1989)

LEGEND

SWMU = Solid Waste Management Unit

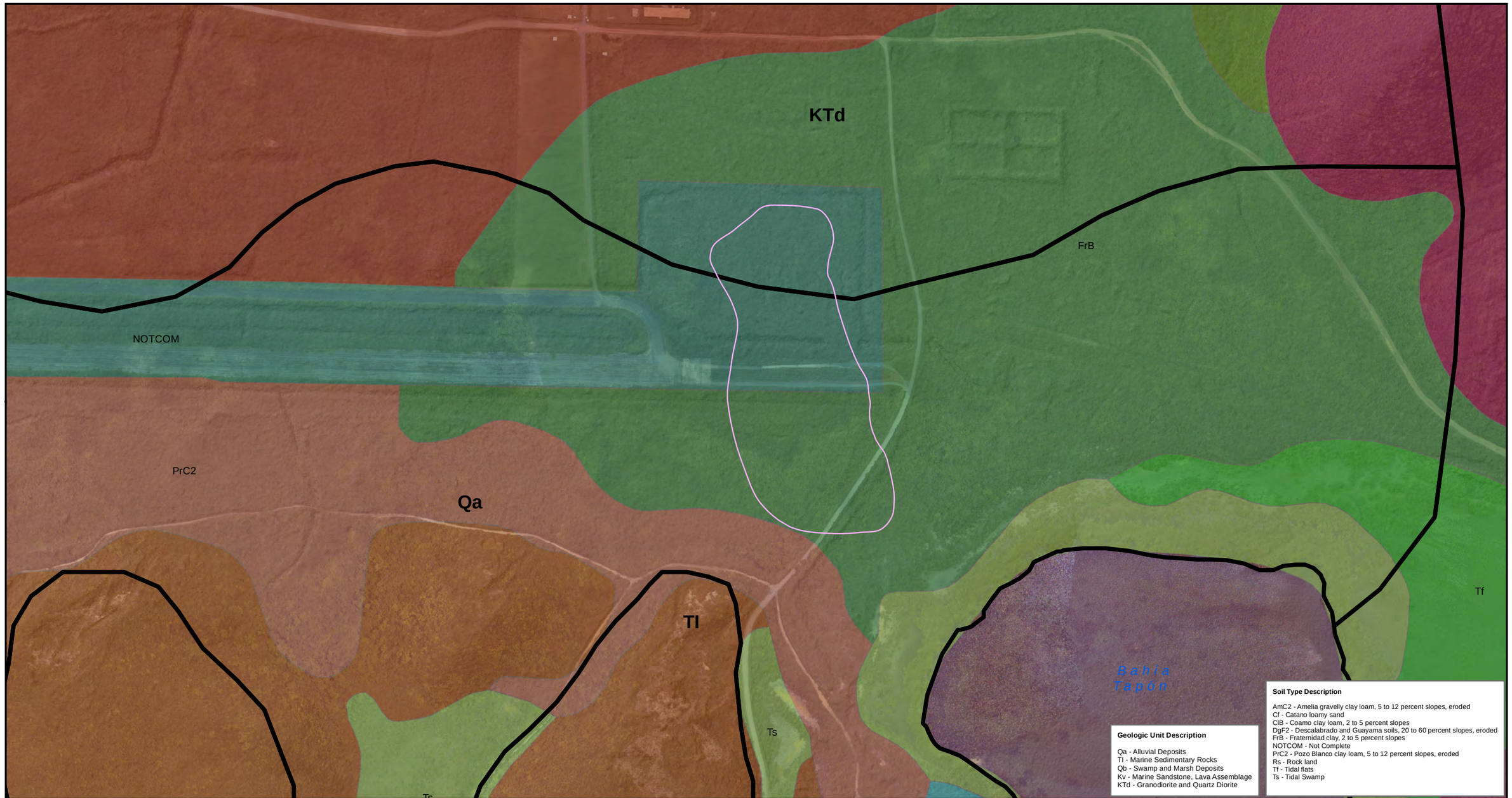
Scale in Miles

0 1/2 1 2

N

FIGURE 2-6
Generalized Geology of Former VNTR SWMU 20
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

ch2m



Legend

Geologic Unit

SWMU 20 Site

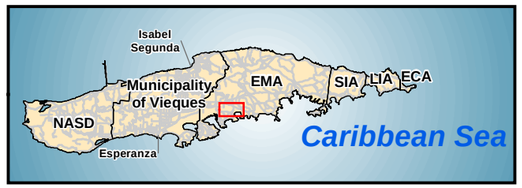
Soil Type

AmC2 Cf ClB DgF2 FrB NOTCOM PrC2 Rs Tf Ts

2005 Aerial Imagery
2005 Hillshade

Notes:
Soil Data Source - U.S. Department of Agriculture and Natural Resources Conservation Service

Coordinate System - NAD 1983 UTM Zone 20 (Meters)



N
W E
S

0 212.5 425
Feet

Figure 2-7
Soil Type and Geologic Unit Map
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

R:\USNavFacEngCom405450\Vieques\MapFiles\PI-4_Well_Survey\Internal_Figures\Figure 2-7 - Soil Type and Geological Unit Map.mxd 11/2/2015 CGauthier_ch2mhillen

ch2m

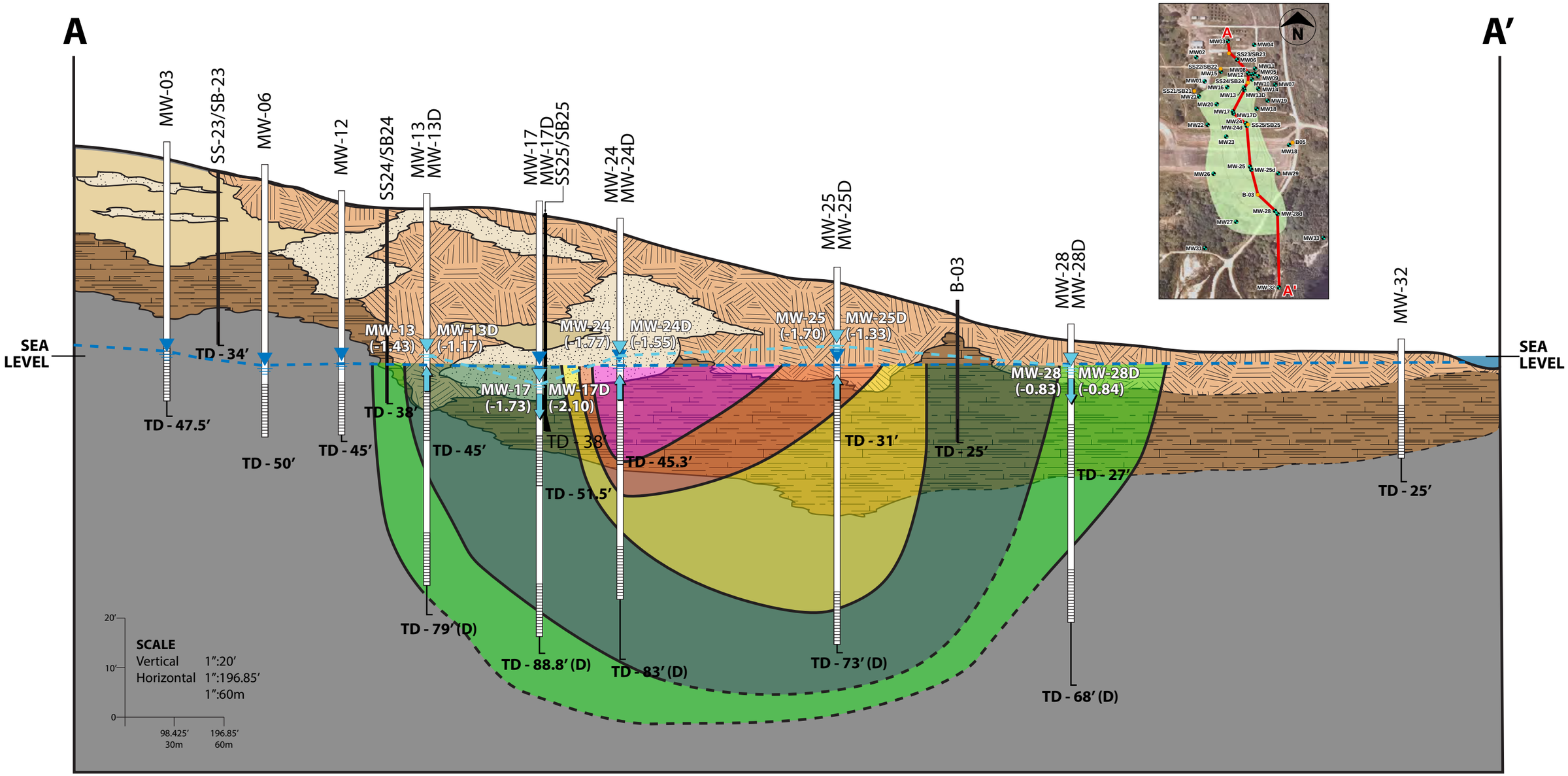
Reference: 1962 Aerial Photography

Legend

- Surface Soil/Subsurface Soil Sample Location
- Boring Location
- Monitoring Well
- Line of Cross-Section (A-A')
- Line of Cross-Section (B-B')
- 5 ppb and above TCE groundwater plume area

Figure 2-8
Location of Geologic Cross Section A-A' and B-B'
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

ES012711103507TPA F2-8_SWMU-20_CrossSections_Location_Map_rev2.ai 11-2-2015 DCD



LEGEND

- Sand
- Sand Mixed with Silt and Clay
- Silt and Clay
- Saprolite
- Saprock/ Granodiorite
- Terminal Depth
- **TD** = Total Depth
- **D** = Deep Well
- 10' Screen
- Lithologic Horizon Assumed, not confirmed
- Location of Monitoring Wells
- Location of Soil Borings
- Depth Groundwater Encountered in Shallow Wells
- Depth Groundwater Encountered in Deeper Wells (MW-13D, 17D, 24D, 25D, and 28D)
- Water level elevations shown at well clusters (MW-13/13D, 17/17D, 24/24D, 25/25D, and 28/28D) with vertical flow direction arrow

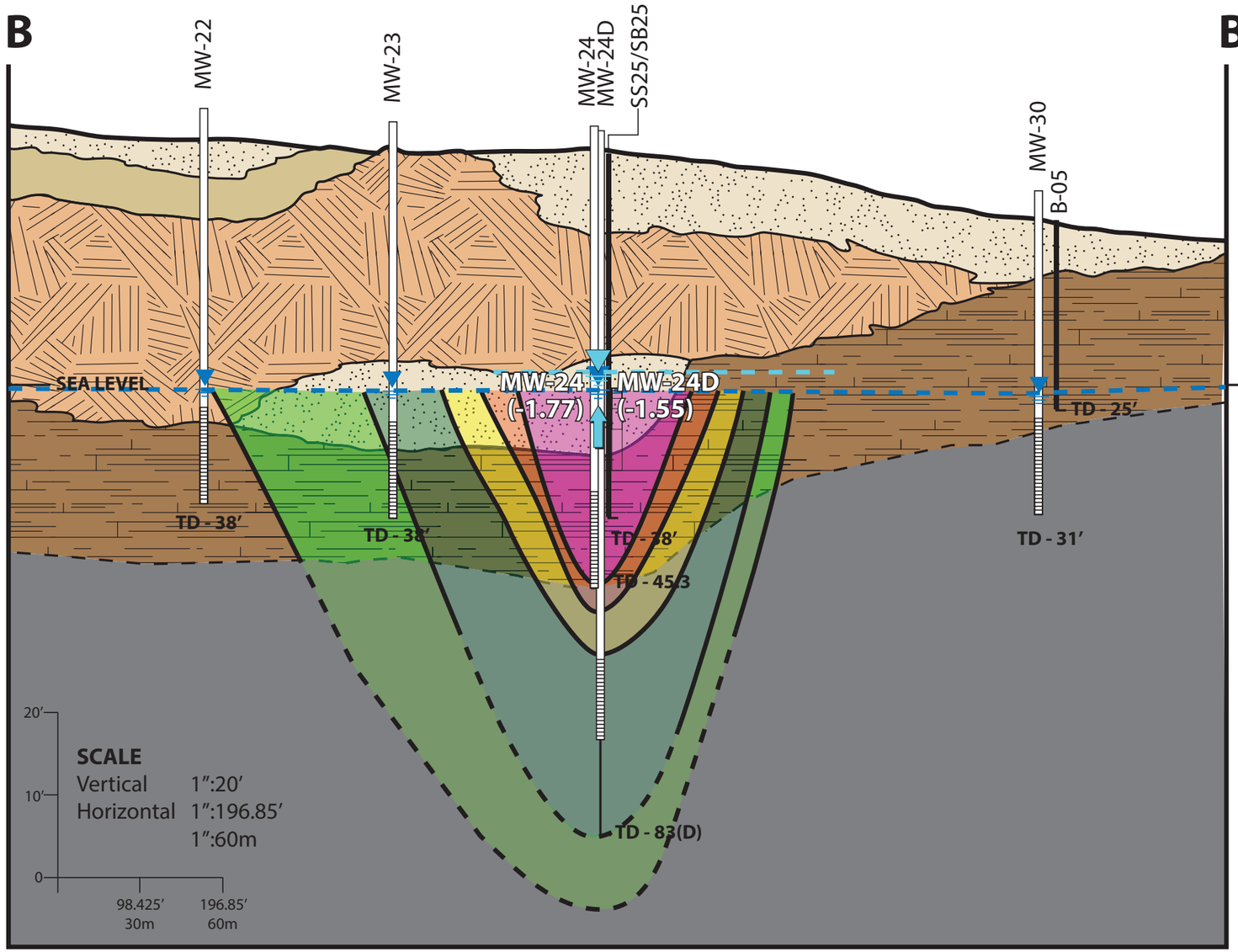
TCE Isoconcentrations

- 5-50 ppb
- 50-100 ppb
- 100-150 ppb
- 150-200 ppb
- 200-350 ppb

*SS25/SB25 in line with MW-24 and MW24D in projection
** Sea level as per NAD27
Potentiometric surface is based on water level data measured November 2013 event.

Figure 2-9
Geologic Cross Section A-A'
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

ch2m



* SS25/SB25 in line with MW-24 and MW24D in projection

** Sea level as per NAD27

Surface level assumed smooth and continuois

Potentiometric surface is based on water level data measured November 2013 event.

LEGEND

- Sand
- Sand Mixed with Silt and Clay
- Silt and Clay
- Saprolite
- Saprock/ Granodiorite
- Terminal Depth
- **TD** = Total Depth
- **D** = Deep Well
- 10' Screen
- Lithologic Horizon Assumed, not confirmed
- Depth Groundwater Encountered in Shallow Wells
- Depth Groundwater Encountered in Deeper Well (MW-24D)
- Water level elevations shown at well cluster (MW-24/24D) with vertical flow direction arrow
- Location of Soil Borings
- Location of Monitoring Wells

TCE Isoconcentrations

- 5-50 ppb
- 50-100 ppb
- 100-150 ppb
- 150-200 ppb
- 200-350 ppb

Figure 2-10
Geologic Cross Section B-B'
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

ch2m

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Legend

- Monitoring Well Location
- Potentiomentric Contours 7/1/13 (Dashed where inferred)

N
W E
S

0 100 200
Feet

1 inch = 200 feet

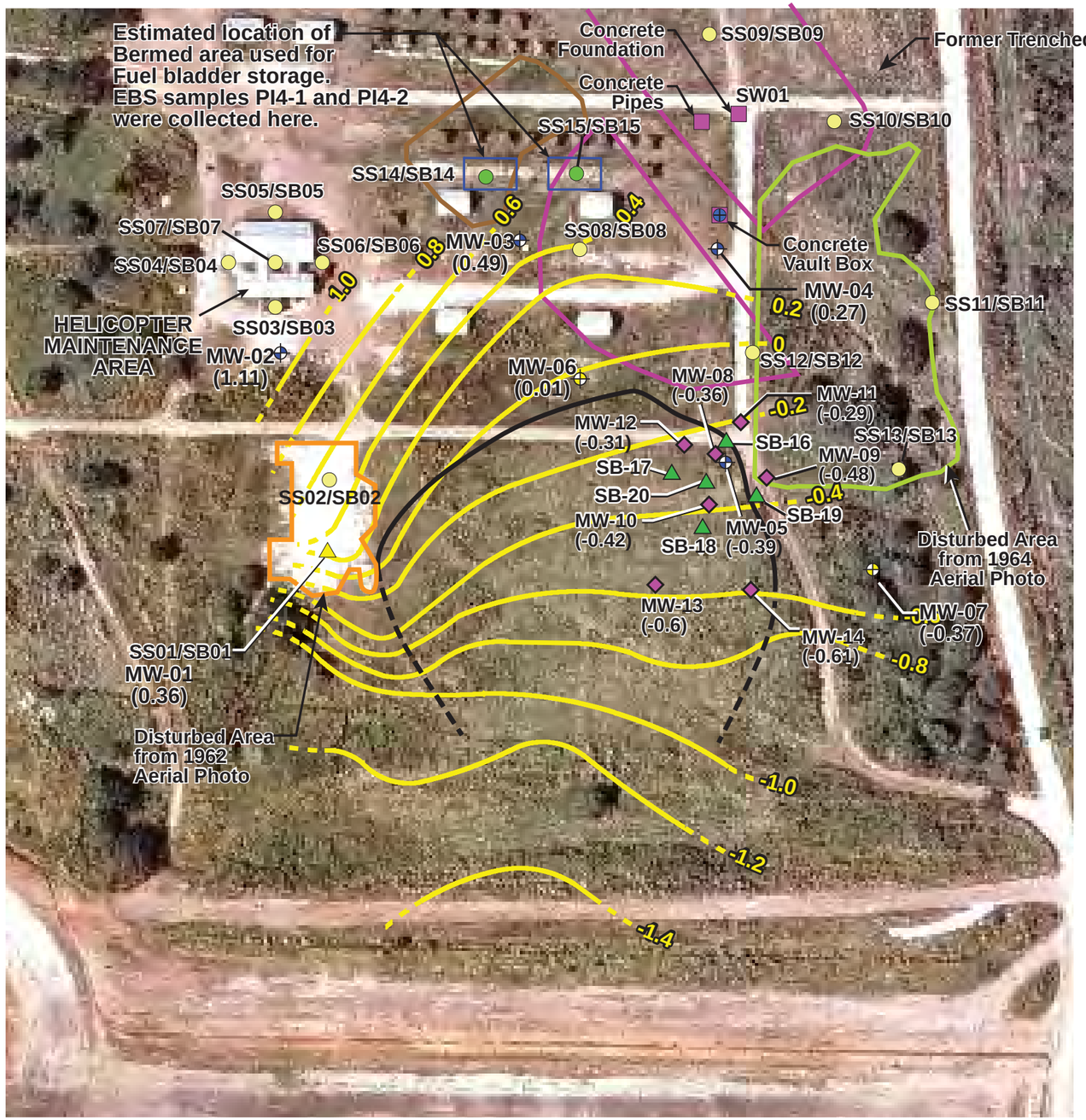
Figure 2-11
Groundwater Elevation Contours 07/01/13
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Note: The water levels for wells 13D and 17D were not used for contouring.
Aerial 2007

ch2m

PHOTO DATE 1962

PHOTO DATE 1983



LEGEND

- PA/SI Monitoring Well Location
- ESI Monitoring Well Location
- PA/SI Surface and Subsurface Soil Sample Location
- PA/SI Surface and Subsurface Soil Sample Location Co-located with EBS Surface Soil Sample Location
- PA/SI Surface Water Sample Location
- PA/SI Surface and Subsurface Soil Sample and Monitoring Well Location
- Supplemental ESI Subsurface Soil Sample Location
- Supplemental ESI Monitoring Well Location
- Disturbed Ground/Possible Fill Area 1964
- Trench Scars 1959
- Trench/Possible Debris 1959
- Estimated Potentiometric Contour from Water Levels taken on 7/1/13 Dashed Where Inferred
- 3.5
- (4.85) Water Level Elevations (AMSL)
- 5 ppb TCE Concentration Estimated Line

0 100 200 Feet

N W E S

Figure 2-12
Historical Sample Locations (before RI)
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

ch2m

SECTION 3

Summary of RI and Previous Investigations

Because investigations leading up to the RI are integral to a complete understanding of the nature and extent of contamination and associated risks, this section summarizes the procedures employed for data collection, analysis, and validation at SWMU 20 during the RI and previous investigations at the site. Details of previous field investigations at SWMU 20 (former PI-4) can be found in the PA/SI Report (CH2M, 2008) and SI/ESI Report (CH2M, 2010b). Details of the Supplemental ESI are included in this section since there was no formal report after that investigation, as the information gathered was used as justification and approach for the RI.

3.1 Soil Sampling

Information from all soil samples collected at the site during the RI and historical investigations was used to evaluate the nature and extent of contamination and associated risks. Therefore, this subsection summarizes the soil sampling conducted during the EBS, PA/SI, ESI, Supplemental ESI, and RI to aid in comprehensive understanding of the soil sample distribution used to achieve this objective. The locations of surface and subsurface soil samples collected during the RI and previous investigations are shown in **Figure 3-1.**

All surface and subsurface soil samples were collected in accordance with the Soil Sample Depth Selection Criteria (CH2M, 2010b), unless otherwise noted in **Tables 2-3 and 3-1** and further discussed in the subsections that follow.

During the Supplemental ESI and the RI, soil samples were logged in the field in accordance with the Unified Soils Classification System (USCS). Specifically, sample descriptions included soil type, USCS symbols, predominant and secondary grain sizes with relative proportions (Modified Wentworth Scale), color (Munsell Color System), and lithologic boundaries. Boring logs for the Supplemental ESI and the RI are provided in **Appendix A,** while the boring logs from previous investigations are in the respective reports.

More detail for each soil sampling event is provided in the following subsections, and the results are discussed in Section 4 (Nature and Extent of Contamination).

3.1.1 Environmental Baseline Survey

Two surface soils samples (PI4-1 and PI4-2) were collected and analyzed for total petroleum hydrocarbons (TPH) in 2002 (EBS) to investigate the two small bermed areas reportedly used for fuel bladder storage. No TPH was detected.

3.1.2 Preliminary Assessment/Site Inspection

A total of 15 co-located surface and subsurface soil samples were collected during the PA/SI (SS/SB01 through SS/SB15) to investigate areas identified in aerial photographs where activities had taken place that may have been sources of CERCLA-related releases. These borings were drilled using a direct push rig and continued until refusal, which ranged from 8 feet below land surface (bls) to 20 feet bls. Soil was screened continuously throughout each boring using an organic vapor monitor (OVM). No readings above background levels were observed.

- SS01/SB01 and SS02/SB02 were collected from the disturbed area in the 1962 aerial photo
- SS03/SB03 through SS07/SB07 were collected from the helicopter maintenance area
- SS08/SB08 through SS13/SB13 were collected from the former trenched area observed in 1959 aerial photo and disturbed area observed in 1964 aerial photo
- SS14/SB14 and SS15/SB15 were collected from the bermed areas used for fuel bladder storage in approximately the same locations as samples PI4-1 and PI4-2 collected during the EBS

The surface and subsurface soil samples collected from the six borings in the trenched and associated disturbed area and one sample from helicopter maintenance area were analyzed for target compound list (TCL) VOCs,

semivolatile organic compounds (SVOCs), pesticides, and polychlorinated biphenyls (PCBs); and target analyte list (TAL) metals. The surface and subsurface soil samples collected from the two borings in the bermed area were analyzed for TCL VOCs and SVOCs, and TAL metals. The surface and subsurface soil samples collected from the other four borings around and within the former helicopter maintenance area and the disturbed area south of the helicopter maintenance area were analyzed for TCL VOCs, SVOCs, and pesticides; and TAL metals.

3.1.3 Supplemental Expanded Site Inspection

Five subsurface soil samples (SB16 through SB20) were collected to determine if a TCE source area existed in the vicinity of MW-05, at that time believed to be the area of highest TCE concentrations in a relatively small plume. These five subsurface soil samples were analyzed for targeted VOCs. Because of the particular objective (i.e., solely to determine if there is a soil source), the soil sampling protocol for the ESI was different from the standard protocol. These five borings were drilled to the base of the unconsolidated zone, which was approximately 17 to 28 feet bgs. Split spoon soil samples were collected continuously from ground surface to the base of the unconsolidated zone and screened with an OVM. One soil sample from each boring was submitted to an offsite laboratory for analysis of TCE and its parent and degradation products. Samples were also analyzed for TOC. Since VOC readings were not above background levels on the OVM, soil samples were collected from the base of the unconsolidated zone at depths ranging from as shallow as 6-8 feet at SB-20 to as deep as 16-17 feet at SB-16. At each of these five locations, the drill rig bored down through saprolite to depths ranging from 42 to 50 feet until refusal was encountered. No VOC readings above background on the OVM were observed within the saprolite.

3.1.4 Remedial Investigation

As described in the RI SAP (CH2M, 2013), a co-located surface soil and a subsurface soil sample (SS16/SB16 and SS17/SB17) were collected at each of the two deep bedrock well locations (MW-13D and MW-17D), which were installed adjacent to the two most contaminated shallow bedrock wells. These soil samples were collected to determine if there was a potential continuing source of VOC contamination in the vadose zone at these locations.

In addition, RI groundwater data were used in conjunction with an understanding of groundwater flow (based on plume configuration) and knowledge of the historical structures, activities, and features to determine potential locations of the release(s) (other than those already sampled during previous investigations) responsible for the VOC groundwater contamination. Based on preliminary RI groundwater data, and after discussion and concurrence among the ERP Technical Subcommittee members, five additional soil borings were drilled and soil samples were collected (SS21/SB21-SS25/SB25) to determine if there was a residual source in those areas, as follows:

- SS21/SB21 - Southwestern-most sample location to help ensure there was no source near the western boundary of the plume
- SS22/SB22 - Sample location adjacent to north-central portion of plume; a drainage pipe was observed in this area and the adjacent monitoring well contained a trace amount of TCE
- SS23/SB23 - Northern-most sample location, adjacent to another drainage pipe observed near former structures
- SS24/SB24 - Southeastern-most sample location, where several small, apparently man-made surface depressions were observed. This sample, together with the existing samples just north and south of this location, were intended to determine whether this was a potential source area. See photo documentation of this event in **Appendix D**.
- SS25/SB25: At the request of the EPA, additional soil samples were collected directly adjacent to the location where the highest groundwater concentration was observed (MW-24)

As described in the RI SAP (CH2M, 2013), all surface and subsurface soil samples were collected in accordance with the Soil Sample Depth Selection Criteria (CH2M, 2010b), whereby surface soil samples were collected using a stainless steel hand auger or split-spoon sampler, from 0 to 1 foot bls. Subsurface soil samples were collected

within the 1 to 6 foot bls interval where visual and/or instrument screening suggested the presence of contamination. In the absence of observed or suggested contamination, the subsurface soil samples were collected from the 4 to 6 foot bls interval. No contamination was observed during the RI field investigation, so subsurface soil samples were collected from the 4 to 6 foot depth interval.

For the purposes of determining the potential presence of a soil source during the RI, rather than for risk assessment purposes, continuous soil sampling was continued from 6 feet to the base of the unconsolidated zone or the water table, whichever was shallower. The RI SAP called for additional soil sample(s) to be collected for analysis below the 6-foot depth if visual or instrument screening suggested the presence of deeper contamination, to assist in delineating the vertical extent of contamination. No contamination was observed during the RI field investigation, so no soil samples deeper than 6 feet were collected for analysis.

Soil samples were logged in the field in accordance with the USCS. Specifically, sample descriptions include soil type, USCS symbols, predominant and secondary grain sizes with relative proportions (Modified Wentworth Scale), color (Munsell Color System), and lithologic boundaries. Samples were also submitted to an offsite laboratory for analysis of the target VOCs (TCE, 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE, PCE, vinyl chloride [VC], and 1,4-dioxane) and TOC, as presented in **Table 3-1**; VOC data were validated in accordance with the protocol defined in the SAP (CH2M, 2013).

3.2 Drilling and Monitoring Well Installation and Sampling

Information from all wells installed at the site during the RI and historical investigations was used to evaluate the nature and extent of contamination and/or associated risks. Therefore, this subsection summarizes the well installation and sampling conducted during the PA/SI, ESI, Supplemental ESI, and RI to aid in comprehensive understanding of the well configuration used to achieve this objective. The locations of the 33 shallow monitoring wells, 11 borehole groundwater grab samples, and five deep monitoring wells installed at SWMU 20 are shown in **Figure 3-2**. All groundwater sample nomenclature and analyses are shown on **Table 3-1**. A summary of the monitoring well construction details, including survey data, is provided in **Table 3-2**. Monitoring wells were installed in accordance with the *Master Standard Operating Procedures, Protocols, and Plans, Standard Operating Procedures [SOPs] D-1 and D-2* (CH2M, 2010a).

The well boreholes were advanced with post-hole diggers to a depth of at least 4 feet bgs to provide clearance of underground utilities, then drilled with hollow-stem augers to the appropriate depth. Select well boreholes (e.g. MW-13D, MW-17D) were continuously sampled and logged following RI SAP protocol as discussed in Section 3.1. However, in the later phase of the RI field investigation the focus of the drilling shifted to finding the extent of the TCE plume and continuous soil samples were not collected. These locations were still logged to add lithologic information to the data collected from the extensive drilling program conducted previously at SWMU 20.

The network of monitoring wells at SWMU 20 now includes 33 shallow bedrock wells and five deep bedrock wells. The shallow bedrock wells are screened between about -3 to -13 feet amsl; the deep bedrock wells are screened between about -30 to -40 feet amsl. More detail for each well installation event is provided in the following subsections, and the results are discussed in Section 4 (Nature and Extent of Contamination).

3.2.1 Preliminary Assessment/Site Inspection

MW-01 through MW-05 were installed in 2006 (PA/SI) for an overall characterization of the site at locations of potential releases based on historical activities. Details of the well installation and sampling during the PA/SI are presented in the PA/SI Report (CH2M, 2008). During the PA/SI sampling event, all groundwater samples were analyzed for TCL VOCs, SVOCs, pesticides, and PCBs; and TAL inorganics. A grab water sample from a vault containing water was analyzed for the same parameters as groundwater samples plus explosives. While one VOC (cis-1,2-DCE at a concentration of 0.13J µg/L) and metals were detected, it is important to note that the vault has been removed since the sample was taken, so any potential exposure pathway has been eliminated. Therefore, the vault water is not included in further discussion. MW-04 is located immediately downgradient of this location and none of the constituents of interest (PCE, TCE, or daughter products) have ever been detected there. Multiple

lines of evidence indicate soil around the vault where the low concentration of cis-1,2-DCE was detected is not an ongoing source of groundwater contamination. For example, no VOCs were detected in MW-04, immediately downgradient of the former vault. Additional details related to the vault are discussed in the PA/SI Report (CH2M, 2008).

Relatively low levels (i.e., below MCLs) of several VOCs were detected in groundwater, with a single exceedance of the TCE MCL of 5 µg/L. TCE was detected in well MW-05 at a concentration of 9.3 µg/L.

3.2.2 Expanded Site Inspection

As noted in Section 2.3 and in accordance with the SI/ESI SAP (CH2M, 2009), two additional monitoring wells were installed in 2009 to determine the extent of VOC contamination above MCLs in the presumed upgradient and downgradient direction from MW-05: one (MW-06) approximately 200 feet upgradient and one (MW-07) approximately 200 feet downgradient of MW-05. The locations of MW-06 and MW-07 (**Figure 3-2**) were based on the results of the synoptic water-level measurements collected from wells MW-01 through MW-05 on December 29, 2008 and concurred upon during the ERP Technical Subcommittee site visit in January 2009. Details of the well installation and sampling during the ESI are presented in the SI/ESI Report (CH2M, 2010b).

Both new monitoring wells and the five existing wells were sampled for TCL VOCs. Based on the evaluation conducted in the PA/SI and with concurrence among the ERP Technical Subcommittee, the ESI and all subsequent investigations at the site focused on specific (target) VOCs, specifically PCE and its daughter products. This is because the historical data showed little to no other contaminants present and no site-related contaminant concentrations posing unacceptable risks.

3.2.3 2010 Groundwater Sampling

Another round of groundwater sampling was conducted in 2010 on all existing site wells (MW-01 through MW-07) to confirm the results observed during the ESI.

3.2.4 Supplemental Expanded Site Inspection

Five additional monitoring wells (MW-08 through MW-12) were installed in 2011 as part of a planned pilot study; all wells were sampled for the target VOCs.

Five shallow bedrock wells were installed in November 2011 in the vicinity of MW-05, at the time the well with the highest concentration of TCE at the site. These wells were installed as part of the then-planned pilot study in that area of the site. The total depth and the screened interval of the new wells installed during the Supplemental ESI were similar to that of adjacent well MW-05 (i.e., first encountered water in saturated zone).

Subsequent sampling results determined that higher concentrations and a broader area of contamination were present than originally identified. Therefore, in an attempt to find the downgradient extent of the TCE in groundwater and to determine whether the planned pilot study was still appropriate, two additional wells (MW-13 and MW-14) were installed further south in December 2011. Sampling of these wells showed the highest TCE concentration detected to be in well MW-13 (87.7 µg/L). Because the additional wells did not complete the extent delineation, the pilot study was not conducted and the site proceeded to an RI.

3.2.5 Remedial Investigation

Nineteen shallow monitoring wells (MW-15 through MW-33) and five deep monitoring wells (MW-13D, 17D, 24D, 25D, and 28D) were installed in 2013 and 2014 during the RI to delineate the lateral and vertical extents of groundwater contamination.

Shallow Bedrock wells

Figure 3-2 presents the locations of 16 shallow bedrock monitoring wells (MW-15 through MW-30) that were installed in 2013 and the three additional shallow bedrock monitoring wells (MW-31 through MW-33) that were

installed in 2014. The screened interval of the shallow bedrock wells installed during both the RI were similar to those of previously installed shallow bedrock monitoring wells (i.e., first encountered water in saturated zone).

As part of the RI SAP (CH2M, 2013), five shallow wells (MW-15 through MW-19) were anticipated to complete the lateral delineation, with three to be installed along the southern extent of the area previously characterized, and two installed northwest (upgradient) of MW-13, the location of the highest TCE concentration (87.7 µg/L) known at that time. These wells were installed in May 2013, and a screening approach was used to help delineate the TCE plume and select locations of other monitoring wells. Samples were collected from the five newly installed wells (MW-15 through MW-19) and sent to the laboratory for rush turnaround time (TAT) analysis. Even higher TCE concentrations were observed in one of the new downgradient wells (MW-17). Following the decision protocol in the RI SAP, additional monitoring well locations were proposed, discussed, adjusted as warranted, and concurred upon by the ERP Technical Subcommittee. These screening level results collected from 12 monitoring wells MW-15 thru MW-24, MW-13D, and MW-17D were collected between May 23, 2013 through June 26, 2013 and were not validated, and therefore not used in either the nature and extent discussion (Section 4) or risk assessments (Section 6 and Section 7) of this RI because more definitive data were subsequently collected in these 12 monitoring wells between June 5, 2013 through July 24, 2013. Via this process, five additional shallow monitoring wells (MW-20 through MW-24) were installed in June 2013, and these new wells were also screened using rush TAT. The results of this screening found the highest concentrations of TCE at the site to date in MW-24. At this point the ERP Technical Subcommittee agreed that a change in strategy was warranted to better provide delineation of the TCE plume.

In order to assist in the decision making about where to install additional permanent monitoring wells, 11 grab groundwater samples (GP01 through GP11 as shown in **Figure 3-2**) were collected from borings to help refine the limits of the TCE plume and shallow bedrock monitoring wells were installed at locations concurred upon by the ERP Technical Subcommittee. For each borehole grab sample, a hollow stem auger was used to drill into groundwater, and a grab sample was collected from the open borehole. No validation was conducted on the samples since they were qualitative in nature. The boring logs for these boreholes are included in **Appendix A**, and the borings are included on the cross-section figures where applicable. The results of these grab groundwater samples were used to help select the locations of another five shallow monitoring wells (MW-25 through MW-30), the results from which were used to select the locations of the final three shallow monitoring wells (MW-31 through MW-33).

Deep Bedrock Wells

Two deep bedrock wells (MW-13D and MW-17D) were installed in the first mobilization of the RI field investigation in 2013, and three additional deep bedrock wells (MW-24D, MW-25D, and MW-28D) were installed in the second mobilization of RI in 2014. The former two wells were installed adjacent to MW-13 and MW-17 because they were the two wells that contained the highest TCE concentrations upon completion of the ESI and early delineation activities of the RI. The latter three were installed adjacent to MW-24, MW-25, and MW-28, respectively, once the shallow bedrock contamination had been sufficiently delineated in order to ensure the vertical extent of groundwater contamination was sufficiently delineated.

Deep well installation was performed in accordance with the RI SAP using the steel isolation casing method to reduce the potential for shallow contamination from impacting the deeper bedrock. Monitoring wells were installed with a drill rig and developed in general accordance with the *Master Standard Operating Procedures, Protocols, and Plans, SOPs D-1 and D-2* (CH2M, 2010a). However, based on experience gained during installation of wells MW-13D and MW-17D, the caliper had been determined to be the geophysical tool that provides the most useful information for selecting screen intervals for deep wells; the other downhole tools (i.e., temperature, resistivity, heat pulse, video) did not provide useful information for selecting deep well screen intervals. Therefore, with concurrence by the ERP Technical Subcommittee, the caliper (along with observations such as borehole water production during drilling) was used to select the screen interval for deep wells MW-24D, MW-25D, and MW-28D. Geophysics logs and video logs are provided in **Appendix C**.

Screening level groundwater samples collected from two deep bedrock wells (MW-13D and MW-17D) were analyzed with next-day TAT. This data was collected for screening purposes and not validated, but was presented to the ERP Technical Subcommittee during a conference call.

3.2.6 Monitoring Well Development

Well development logs are included in **Appendix E**. All well development water was containerized in 55-gallon drums for characterization and disposal. New monitoring wells were developed in accordance with Master SOPs, and no deviations were noted in the well development logs.

As part of the RI SAP the existing shallow bedrock wells (MW-01 through MW-14) would have been redeveloped if turbidity readings did not stabilize to within approximately 10 percent of each other over three consecutive readings during low-flow sampling (assuming the well has sufficient capacity to sustain low-flow purging and sampling). The development protocol in the well installation SOP was followed for existing wells being redeveloped with no deviations.

3.2.7 Monitoring Well Purging and Sampling

During groundwater sampling, indicator parameters were monitored using a flow through cell to help determine when it was appropriate to collect the groundwater samples. Low flow sampling technique was performed using a Monsoon or Hurricane pump to purge the well while minimizing agitation of VOCs in accordance with SOP B-1. No deviations from the Supplemental ESI or RI SAPs were noted in the Groundwater Sampling Logs, provided in **Appendix F**, except for the following noted during 2013 RI:

- At MW-10 after the parameters had been stable for some time, oxidation-reduction potential (ORP) began to drop. This was noted as likely being an instrument (YSI) issue rather than a real change in ORP, and the groundwater sample was collected.
- At MW-22, unable to get turbidity under 30 nephelometric turbidity units (NTU) despite purging more than three times the well volume and for longer than four hours; therefore, sample was collected.

Given the substantial number of groundwater samples collected across the site and over time, these deviations from the SOP are insignificant with respect to the RI objectives.

Groundwater samples were collected from each well in accordance with the well installation and sampling protocols contained in the Master SOPs (CH2M, 2010a).

During the Supplemental ESI, all new shallow bedrock wells (MW-08 through MW-14) plus three existing wells (MW-05 through MW-07) were sampled for constituents of interest, the target VOCs (TCE, 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE, PCE, and VC). Natural attenuation (geochemical) parameters, comprising TOC, methane, ethane, ethene, volatile fatty acids (acetic, butyric, lactic, propionic, and pyruvic acids), dehalococcoides, alkalinity, TDS, chloride, nitrate, nitrite, sulfate, and sulfide, were also analyzed from existing well MW-05.

With the exception of bacteria samples, groundwater samples were collected in accordance with the *Master Standard Operating Procedures, Protocols, and Plans, SOP B-1* (CH2M, 2010a). Samples for population of Dehalococcoides sp. and presence of the TCE R-Dase, BAV 1 R-Dase, and VC R-Dase functional genes were collected using bio-trap samplers. The samplers were deployed for at least 30 days prior to removal.

During 2013 RI sampling, water quality parameters comprising pH, temperature, specific conductivity, ORP, turbidity, dissolved oxygen (DO), total iron, ferrous iron (II), and dissolved manganese (II) were measured. As shown in **Table 3-1**, samples from 29 wells were submitted to the laboratory for analysis of site constituents of interest, the select VOCs (TCE, 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE, PCE, and VC). Three additional wells for these select VOCs plus natural attenuation parameters. Because of the potential for 1,4-dioxane to be a co-contaminant with chlorinated hydrocarbons (if used as a solvent stabilizer), all 32 existing wells were analyzed for 1,4-dioxane in 2013 RI sampling.

During the 2014 RI sampling, groundwater samples were collected from each of the three new shallow monitoring wells (MW-31 through MW-33), along with selected existing shallow monitoring wells (MW-10, MW-13, MW-14, MW-16 through MW-30) and all five existing deep wells (MW-13D, MW-17D, MW-24D, MW-25D, and MW-28D). Only wells within and downgradient of the TCE plume boundary were sampled in 2014.

Groundwater sampling logs for the Supplemental ESI and RI are provided in **Appendix F**, and photo documentation of the RI groundwater sampling is provided in **Appendix D**.

3.2.8 Groundwater Level Measurements

Groundwater level measurements were obtained from monitoring wells at SWMU 20 on five occasions (**Table 2-1**) as part of the RI: December 2011 (MW-01 through MW-14), June 2013 (MW-01 through MW-19), July 2013 (MW-01 through MW-24), October 2013 (MW-01 through MW-30), and November 2014 (MW-01 through MW-33). Evaluation of the groundwater-level data is discussed in Section 2.2.5.

3.3 Surveying

The locations and elevations of all monitoring wells (existing and newly installed) were surveyed by ECLS, a licensed surveyor, in accordance with the Attachment H-7 of the Master SOPs (CH2M, 2010a). Monitoring well locations were established using a Trimble R-4 GPS/RTK Network System, a Leica TCR 407 total station and a Sokkia C3 2 level. Checks were made into the Garcia Rebar and Garcia Cross control points. Raw survey data collected in UTM Zone 20 Coordinates NAD83/PRVD02. Previously installed monitoring wells were surveyed for elevation during those respective investigations. Information about the five monitoring wells installed as part of the PA/SI and the two monitoring wells installed as part of the ESI can be found in in Appendix L of the PA/SI (CH2M, 2008) and Appendix G of the SI/ESI (CH2M, 2010b).

Three different survey events were conducted by ECLS during the RI:

- June 2013 (MW-01 through MW-20)
- September 2013 (MW-01 through MW-30)
- November 2014 (MW-31 through MW-33, MW-06, MW-24D, MW-25D, MW-28D)

Wells MW-01 through MW-20 were surveyed twice to help confirm anomalous groundwater elevations were the result of differential tidal influences and not inaccurate survey elevations. All locations of RI soil borings were determined using Real Time Kinematic (RTK) Global Positioning System (GPS) coordinates, accurate to approximately 2 centimeters, depending on ambient conditions such as canopy cover.

Survey data for the monitoring wells are contained in **Appendix G**.

3.4 Decontamination of Sampling Equipment and Investigation-derived Waste Management

Equipment decontamination followed SOPs in the Master SOPs (CH2M, 2010a), SOPs E1 and E2.

Investigation-Derived Waste (IDW) generated during the Supplemental ESI and RI field investigations included both soil cuttings and groundwater from well development and sampling. Liquid and solid IDW resulting from these investigations were sampled for full toxicity characteristic leaching procedure (TCLP) and RCI and the constituents of interest. The protocol followed was that if the analytical results of IDW sampling showed non-detections or concentrations below risk-based limits, a request would be made to dispose of the soil and water at the site rather than transporting it for offsite disposal. If liquid and solid IDW exceeded risk-based limits, it would be managed and disposed of in accordance with the Master Waste Management Plan (CH2M, 2010b).

During the Supplemental ESI, analytical results of the soil and liquid IDW samples were then used to prepare a technical memorandum (CH2M, 2012a) documenting the onsite disposal of nonhazardous cuttings and generated liquids. This was approved by the EPA in an email, concurring with the recommendation to return the soil and

liquid IDW to the ground surface at SWMU 20. Therefore, in two separate events on September 24, 2012 and November 13, 2012, liquid IDW (19 drums) and solid IDW (21 drums) from the Supplemental ESI were placed back on the site.

During the RI Field Investigation, significantly more wells (24) were installed within an area with much higher TCE concentrations directly within the TCE hotspot. Liquid (70 drums) and solid IDW (78 drums) were once again characterized as described previously, and the solid IDW was once again replaced on the surface at SWMU 20 based on the analytical results. However, the liquid IDW contained elevated TCE concentrations, so the liquid IDW was emptied from the drums using a vacuum truck and disposed of at a certified landfill (Peñuelas Valley Landfill) in Puerto Rico. The groundwater was siphoned out of the drums that were consolidated in an area north of monitoring well MW-11; care was taken to discharge the groundwater more than 25 feet from any well in the area. The soil in drums was also consolidated, dumped, and spread at this location. The IDW soil was from well installation could not be returned to the borings because the monitoring wells were installed in them.

The management and disposal of historical IDW generated during the PA/SI and ESI investigations is discussed in the PA/SI Report (CH2M, 2008) and SI/ESI SAP (CH2M, 2009), respectively.

3.5 Data Evaluation

Soil and groundwater analytical data collected during the RI and previous site investigations were used to characterize the nature and extent of contamination and to assess potential risks to human health and the environment at SWMU 20. The Analytical Data Summary provided in **Appendix H** includes the RI and previous site investigations, except the EBS. Information on the evaluation of the data quality from the RI and historical field investigations to meet the Data Quality Objectives is discussed in the following subsections.

3.5.1 Data Validation

Third-party validation was performed on all of the analytical data reports from the RI and previous investigations conducted at the site, except for the EBS. Validation provides proper perspective on data availability and usability for assessing nature and extent and risks. Data Qual, Inc. of St. Louis, Missouri provided data validation services for data collected in the 2009 ESI, 2011 Supplemental ESI, and in the 2013/2014 RI. Environmental Data Quality, Inc. (EDQI) performed data validation on the data collected during the PA/SI.

RI data validation and DQE were conducted in accordance with the RI SAP (CH2M, 2013); similarly, data validation and DQE for the PA/SI, ESI, and Supplemental ESI were conducted in accordance with their respective SAPs. Supplemental ESI and RI Data Validation Reports are included in **Appendix I**. Supplemental ESI and RI DQE Reports are provided in **Appendix J**. Historical Data Validation Reports and DQE Reports for the PA/SI and ESI are included as appendices in the PA/SI (CH2M, 2008) and SI/ESI (CH2M, 2010b), respectively.

Areas of review (when applicable to the method) include holding time compliance, calibration, verification, blank results, matrix spike precision and accuracy, method accuracy as demonstrated by laboratory confirmation samples, field duplicate results, surrogate recoveries, internal standard performance, and interference checks.

This data review and validation process was independent of the laboratory's checks and focused on the usability of the data to support the project data interpretation and decision-making processes. Data that were not within acceptance limits were appended with a qualifying flag.

The DQEs conducted historically for SWMU 20 are the following:

EBS (2002)

Although EBS data were not subject to third-party validation, the data still underwent some validation processes. The results of laboratory quality assurance (QA)/QC samples were compared to limits specified by the analytical methodology and/or laboratory SOPs. These QA/QC samples included blanks, calibrations, and matrix spike (MS)/matrix spike duplicate (MSDs). No QA/QC exceedances were noted. These historical data are available for use as reported. In addition, because the two sample locations were resampled during the PA/SI, absence of validation for EBS data is inconsequential.

PA/SI (2006)

Appendix N, Section N.14 of the PA/SI (CH2M, 2008) discusses the evaluation of the PI-4 data quality for those samples collected as part of the PA/SI (2006). As detailed in Section N.14, the PI-4 data collected during the PA/SI (2006) are acceptable for use in evaluating environmental conditions at PI-4, including whether a CERCLA-related release has occurred and, if so, whether it warrants further investigation or action. As such, they are acceptable for their use in the RI.

ESI (2009)

Appendix M, Section M.7 of the SI/ESI (CH2M, 2010b) discusses the evaluation of the PI-4 data quality for those samples collected as part of the ESI (2009). Based on the DQE of the ESI analytical data, 99 percent of the data are usable for the intended purpose. As such, they are acceptable for their use in the RI.

Groundwater Sampling Event (2010), Supplemental ESI (2011), RI (2013/2014)

Appendix I of this RI Report discusses the evaluation of the PI-4/SWMU 20 data quality for those samples collected as part of the Groundwater Sampling Event (2010), Supplemental ESI (2011), and RI (2013/2014). Based on the DQE of the data collected from 2010-2014, approximately 96 percent of the data are usable for the intended purpose. As such, they are acceptable for their use in the RI.

In summary, appropriate evaluations were performed on the quality of the data collected to date at SWMU 20, and the comprehensive data set is available for characterizing the nature and extent and assessing the risks at the site.

3.5.2 Regulatory Standards and Risk-Based Screening Values

The processes used to evaluate risks to human and ecological receptors and the consideration of a constituent as a COC are discussed in Sections 6 and 7. However, to determine the nature of soil and groundwater contamination at SWMU 20, analytes were compared, as applicable, to the following screening values:

- Soil sample results were screened against:
  - EPA regional screening levels (RSLs) for residential soil (EPA, 2015), based on a target HQ of 0.1 for non-carcinogenic effects
  - Site-specific soil screening levels (SSLs), Migration to Groundwater – Site-specific Dilution Attenuation Factor (DAF) of 1 calculated as per EPA guidance (EPA, 1996)
  - Ecological (Eco) Screening Levels (ESLs) (surface soil only)
  - East Vieques background (BKG) soil inorganics upper tolerance limits (UTL) (CH2M, 2007)
- Groundwater sample results were screened against:
  - EPA RSLs for Tap Water (EPA, 2015), based on a target HQ of 0.1 for non-carcinogenic effects
  - Federal Safe Drinking Water Act (Title 40 of the CFR, Part 141) primary MCLs and secondary MCLs
  - PRWQS Class SG

TABLE 3-1
RI Field Investigation Sample Summary
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Site	Investigation Date	Media Samples[1]	Analytes	Abbreviated Nomenclature	Sample Identification	Soil Sample Depth (ft bls)
SWMU 20	2013	2 SS/SB	PCE, TCE, 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE, VC, 1,4-dioxane, TOC	SS16/SB16 and SS17/SB17	VEP4-SS16-0001/VEP4-SB16-0406, VEP4-SS17-0001/VEP4-SB17-0406, VEP4-SS17P-0001	0 - 1 (SS); 4 - 6 (SB); default depths in accordance with RI SAP.
		11 Grab GW[2]	TCE	GP-01 thru GP-11	VEP4-GP01-2530-073013, VEP04-GP02-2529-073013, VEP04-GP03-2024-073013, VEP04-GP04-2024-073013, VEP04-GP05-2024-080113, VEP04-GP06-2125-080713, VEP04-GP07-2529-080713, VEP4-GP08-2024-080913, VEP4-GP09-2024-081213, VEP4-GP10-2024-081313, VEP4-GP11-2024-081413	N/A
		12 Screening GW[2]	PCE, TCE, 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE, VC	MW-13D, MW-15, MW-16, MW-17, MW-17D, MW-18 thru MW-24	VEP04-GW13D-0513, VEP4-GW15-052313, VEP4-GW16-051613, VEP4-GW17-052913, VEP4-GW17D-062613, VEP4-GW18-052113, VEP4-GW19-051413, VEP4-GW20-061013, VEP4-GW21-062113, VEP4-GW22-061913, VEP4-GW23-061913, VEP4-GW24-062013.	N/A
		29 GW	PCE, TCE, 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE, VC, 1,4-dioxane	MW-01 thru MW-14, MW-17, MW-19 thru MW-30, MW-13D and MW-17D	VEP4-GW01-0513,VEP04-GW02-0513, VEP04-GW03-0513, VEP04-GW04-0513, VEP04-GW05-0513, VEP04-GW05P-0513, VEP04-GW06-0513, VEP04-GW07-0513, , VEP4-GW08-0513,VEP04-GW08P-0513, VEP4-GW09-0513, VEP4-GW10-0513, VEP4-GW11-0513, VEP4-GW12-0513, VEP4-GW13-0513, VEP04-GW13P-0513, VEP04-GW13D-0513, VEP4-GW14-0513, VEP4-GW17-0613, VEP4-GW17D-0713, VEP4-GW19-0613, VEP4-GW20-0613, VEP4-GW21-0713, VEP4-GW22-0713, VEP4-GW23-0713, VEP4-GW24-0713,VEP4-GW25-0913, VEP4-GW26-0913, VEP4-GW27-0913, VEP4-GW28-1013, VEP4-GW29-1013, VEP4-GW30-0913.	N/A
		3 GW	PCE, TCE, 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE, VC, 1,4-dioxane, alkalinity, sulfate, nitrate, methane, Chloride, TDS, TOC	MW-15, MW-16, MW-18	VEP4-GW15-0613, VEP4-GW16-0613, VEP4-GW18-0613	N/A
	2014	26 GW	PCE, TCE, 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE, VC	MW-10, MW-13, MW-13D, MW-14, MW-16, MW-17, MW-17D, MW-18 thru MW-24, MW-24D, MW-25, MW-25D, MW-26 thru MW-28, MW-28D, MW-29 thru MW-33	VEP4-GW10-0914, VEP4-GW13-0914, VEP4-GW13D-0914, VEP04-GW13P-0914, VEP4-GW14-0914, VEP4-GW16-0914, VEP4-GW17-0914, VEP4-GW17D-0914, VEP4-GW18-0914, VEP4-GW19-0914, VEP4-GW20-0914, VEP4-GW21-0914, VEP4-GW22-0914, VEP4-GW22P-0914, , VEP4-GW23-0914, VEP4-GW24-0914,VEP04-GW24P-0914, VEP4-GW24D-0914, VEP4-GW25-0914, VEP4-GW25D-0914, VEP4-GW26-0914, VEP4-GW27-0914, VEP4-GW28-0914, VEP4-GW28D-0914, VEP4-GW29-0914, VEP4-GW30-0914. VEP4-GW31-0914. VEP4-GW32-0914. VEP4-GW33-0914.	N/A
		5 SS/SB	PCE, TCE, 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE, VC, TOC	SS21/SB21 thru SS25/SB25	VEP4-SS21-0001/VEP4-SB21-0406, VEP4-SS21P-0001, VEP4-SS22-0001/VEP4-SB22-0406, VEP4-SS23-0001/VEP4-SB23-0406, VEP4-SS24-0001/VEP4-SB24-0406, VEP4-SS25-0001/VEP4-SB25-0406	0 - 1 (SS); 4 - 6 (SB); default depths in accordance with RI SAP.

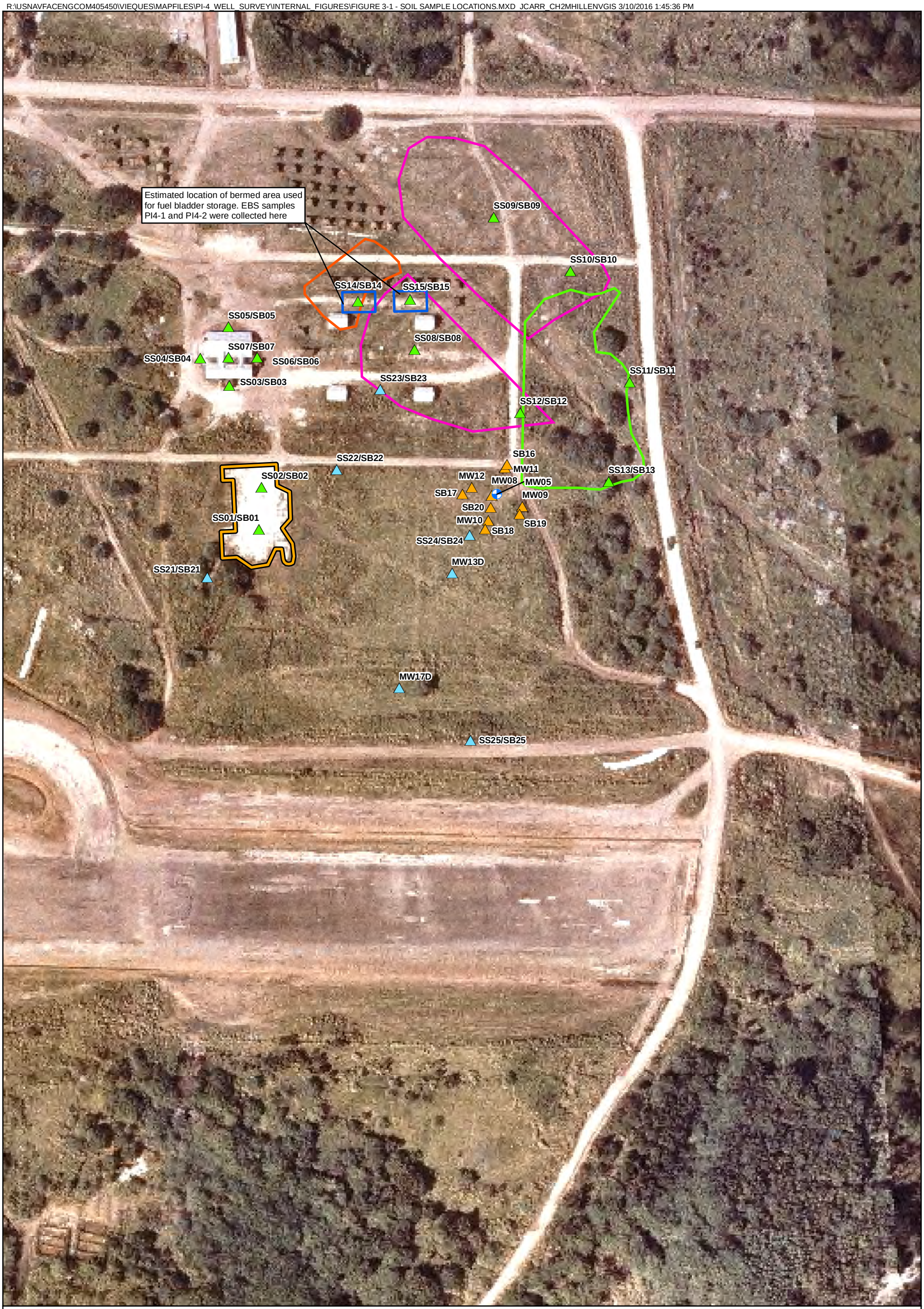
Notes:
1 SS = surface soil; SO = soil boring location or composite soil sample; SB = subsurface soil; GW = groundwater; WW = water
2 Screening purposes only, data not validated.

TABLE 3-2
Summary of Monitoring Well Construction Details
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Well ID	Date Installed	Ground Elevation (ft amsl)	Top of Casing Elevation (ft amsl)	Boring Depth (ft bls)	Well Depth (ft bls)	Screen Interval Depth (ft bls)	Screen Interval Depth (ft amsl)		Depth to Bentonite (ft bls)	Depth to Sand Pack (ft bls)	Northing UTM NAD 83 Meter	Easting UTM NAD 83 Meters
							From	To				
MW-01	1/30/2006	33.71	36.71	50.0	49.0	39-49	-5.29	-15.29	35	37	2004888.37	244618.63
MW-02	2/2/2006	38.54	41.54	47.0	46.5	36.5-46.5	2.04	-7.96	32.5	34.5	2004956.61	244596.59
MW-03	1/23/2006	40.57	43.57	47.5	47.0	37-47	3.57	-6.43	33	35	2004999.98	244683.21
MW-04	1/27/2006	37.72	40.72	49.0	48.0	38-48	-0.28	-10.28	34	36	2004990.81	244755.52
MW-05	1/23/2006	31.22	34.22	45.9	43.0	33-43	-1.78	-11.78	29	31	2004909.43	244753.80
MW-06 (OLD)	3/13/2009	36.47	39.47	50.0	50.0	40-50	-3.53	-13.53	36	38	2004949.15	244708.45
MW-06	9/19/2014	36.54	39.54	50.0	50.0	35-45	1.54	-8.46	31	33	2004949.53	244708.26
MW-07	3/18/2009	26.17	29.17	39.0	39.0	29-39	-2.83	-12.83	25	27	2004879.79	244813.99
MW-08	11/3/2011	31.22	34.22	50.0	45.0	34-44	-2.75	-12.75	28	30	2004908.87	244750.71
MW-09	11/9/2011	30.17	33.17	42.0	42.0	30-40	0.03	-9.97	25	28	2004902.78	244768.25
MW-10	11/16/2011	30.99	33.99	43.0	43.0	32.5-42.5	-1.53	-11.53	26	29	2004894.86	244748.87
MW-11	11/17/2011	31.51	34.51	45.0	45.0	34-44	-2.33	-12.33	27.3	29.5	2004924.57	244758.32
MW-12	11/17/2011	31.35	34.35	48.0	45.0	34-44	-2.48	-12.48	27.8	29.8	2004913.48	244739.38
MW-13	12/2/2011	31.28	34.28	45.0	45.0	33.5-43.5	-2.22	-12.22	29.5	31.5	2004871.55	244728.42
MW-13D	6/24/2013	30.46	33.46	79.0	73.0	63-73	-32.54	-42.54	58.8	60.5	2004865.20	244728.45
MW-14	12/2/2011	29.19	32.19	44.0	44.0	31.5-41.5	-2.31	-12.31	26	28	2004869.81	244767.14
MW-15	5/23/2013	35.58	38.58	48.3	48.0	38-48	-2.42	-12.42	33.4	35.5	2004915.98	244664.73
MW-16	5/17/2013	32.70	35.70	52.3	52.0	42-52	-9.30	-19.30	37.3	40	2004874.07	244680.65
MW-17	5/29/2013	29.05	32.05	51.5	51.2	41-51	-11.95	-21.95	32	36.5	2004806.64	244697.47
MW-17D	6/24/2013	29.05	32.05	88.8	86.0	76-86	-46.95	-56.95	70	74	2004800.39	244698.59
MW-18	5/21/2013	25.94	28.94	45.3	45.0	35-45	-9.06	-19.06	29.1	32	2004812.79	244762.84
MW-19	5/17/2013	25.35	28.35	39.3	39.0	29-39	-3.65	-13.65	22	26.8	2004836.68	244793.28
MW-20	6/10/2013	29.78	32.78	49.8	49.5	39.5-49.5	-9.72	-19.72	33.5	36	2004825.30	244652.63
MW-21	6/21/2013	31.09	34.09	60.8	60.5	50.5-60.5	-19.41	-29.41	45.5	47.5	2004847.96	244604.45
MW-22	6/19/2013	26.17	29.17	38.3	38.0	28-38	-1.83	-11.83	24	26	2004770.30	244627.35
MW-23	6/19/2013	24.92	27.92	38.3	38.0	28-38	-3.08	-13.08	24	26	2004737.80	244678.76
MW-24	6/20/2013	24.85	27.85	45.3	45.0	35-45	-10.15	-20.15	31	33	2004772.95	244732.40
MW-24D	9/12/2014	25.31	28.31	83.0	71.0	61-71	-35.69	-45.69	57	59	2004775.66	244730.91
MW-25	8/28/2013	16.00	19.00	31.0	31.0	21-32	-5.00	-15.00	17.9	20	2004649.23	244740.07
MW-25D	9/12/2014	15.82	18.82	73.0	71.0	61-71	-45.18	-55.18	56	58	2004646.89	244740.36
MW-26	8/20/2013	16.95	19.95	31.0	31.0	19.4-29.4	-2.45	-12.45	15.5	17.8	2004636.96	244631.82
MW-27	8/28/2013	6.42	9.42	31.0	31.0	20.4-30.4	-13.98	-23.98	15.5	18.2	2004497.99	244733.17
MW-28	8/29/2013	5.01	8.01	27.0	27.0	16-26	-10.99	-20.99	11	13.5	2004521.00	244803.93
MW-28D	9/12/2014	4.11	7.11	68.0	55.0	45-55	-40.89	-50.89	42	44	2004519.99	244801.50
MW-29	8/28/2013	12.35	15.35	28.0	28.0	17-27	-4.65	-14.65	12	14.8	2004631.55	244822.34
MW-30	8/30/2013	17.90	20.90	31.0	31.0	20-30	-2.10	-12.10	9.6	14.8	2004710.06	244853.76
MW-31	9/2/2014	7.80	10.80	32.0	31.0	21-31	-13.20	-23.20	17	19	2004424.74	244623.36
MW-32	9/11/2014	0.76	3.76	25.0	20.0	10-20	-9.24	-19.24	6	8	2004325.79	244817.01
MW-33	9/9/2014	0.31	3.31	15.0	15.0	5-15	-4.69	-14.69	2	3.5	2004459.58	244945.38

ft amsl = feet above mean sea level (NGVD 1929)
ft bls = feet below land surface
Northing and Easting coordinates in UTM meters
* Coordinates were obtained by CH2M HILL in 2007 using a hand held GPS unit.

R:\USNAVFACENGCOM405450\VIEQUES\MAPFILES\PI-4_WELL_SURVEY\INTERNAL_FIGURES\FIGURE 3-1 - SOIL SAMPLE LOCATIONS.MXD JCARR CH2MHILLENVGIS 3/10/2016 1:45:36 PM



Legend

- Monitoring Well
- PA/SI Surface and Subsurface Soil Sample Location
- Supplemental ESI Subsurface Soil Sample Location
- RI Surface and Subsurface Soil Sample Location

ERI Aerial Photographic Analysis (February 2003)

- Disturbed Ground/Possible Fill Area 1964
- Trench Scars 1959
- Trench/Possible Debris 1959
- Estimated Location of Bermed Area used for Fuel Bladder Storage
- Disturbed Areas (1962)

N W E S

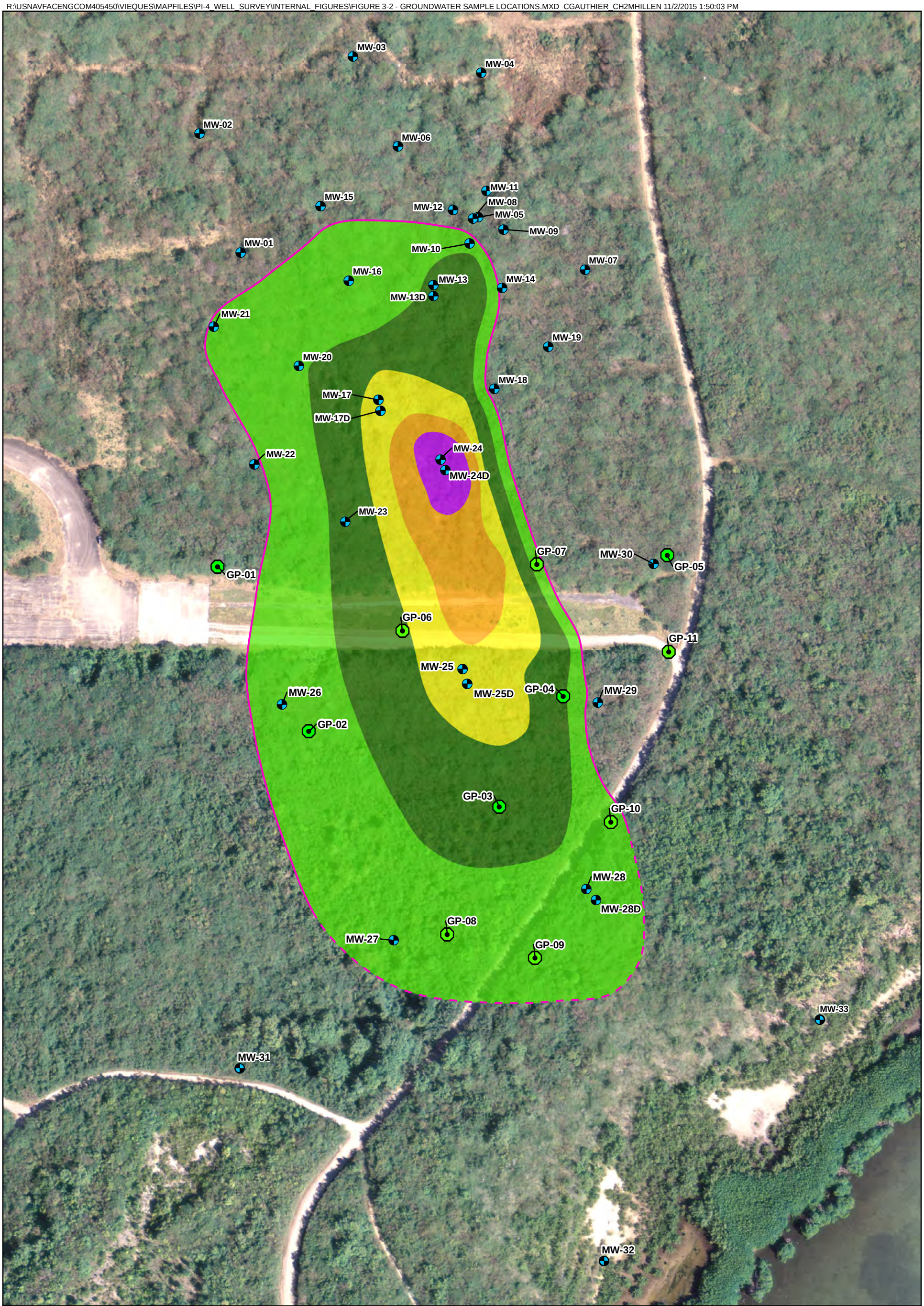
0 85 170 Feet

1962 Aerial Photo

Figure 3-1
Soil Sample Locations
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

ch2m

R:\USNAVFACENGCOM405450\VIEQUES\MAPFILES\PI-4_WELL_SURVEY\INTERNAL_FIGURES\FIGURE 3-2 - GROUNDWATER SAMPLE LOCATIONS.MXD CGAUTHIER CH2MHILLEN 11/2/2015 1:50:03 PM



Legend

- Monitoring Well Location
- Grab Groundwater Location
- 5 ppb TCE Isoconcentration Line 2013 Sampling (dashed where inferred)

Isoconcentration

- 5-50 ppb
- 50-100 ppb
- 100-150 ppb
- 150-200 ppb
- 200-250 ppb

N W E S

0 85 170 Feet

Figure 3-2
Groundwater Sample Locations
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

ch2m

SECTION 4

Nature and Extent of Contamination

This section discusses the nature and extent of contamination detected in SWMU 20 media. While the discussion includes all constituents detected at the site, it focuses primarily on the COPCs identified during the pre-RI investigations at SWMU 20, namely the chlorinated VOCs. Inorganic constituents exceeding background levels and organic constituents that are potential contaminants are identified, with particular emphasis on those constituents that exceed regulatory screening values. It is noted here that although background is incorporated into the evaluation of the nature and extent of contamination in order to distinguish background inorganics concentrations from those potentially attributable to contamination, background is not considered in the risk assessment process (Section 6 – Human Health and Section 7 – Ecological) until the risk calculations are completed. In other words, all detected constituents above screening levels are considered in the risk assessments, regardless of whether they exceed background.

Analytical results are summarized in **Tables 4-1 through 4-4** (surface soil, subsurface soil, grab [screening-level] groundwater, and groundwater, respectively). The tables also identify screening value exceedances (including background values for inorganics). **Appendix H** contains the raw analytical data for the validated soil and groundwater samples from the PA/SI, ESI, Supplemental ESI, and the RI.

The screening values provided in **Tables 4-1 through 4-4** are those listed in Section 3.5.2 and documented in the Master Quality Assurance Project Plan (QAPP) (CH2M, 2007), revised in accordance with any updates to the published values.

The spatial distribution of samples collected at SWMU 20 (**Figure 4-1**) provides sufficient coverage of the environmental media at the site to assess the nature and extent of contamination and associated risks.

In total, 26 surface soil, 30 subsurface soil, and 120 groundwater samples were collected at SWMU 20 (including duplicates and temporal samples, as outlined in the following sections) during the various investigations that generated the data that met the RI objectives.

4.1 Soil

Tables 4-1 and 4-2 show the VOCs, SVOCs, pesticides, PCBs, inorganics and wet chemistry parameters that were detected in the surface and subsurface soil at SWMU 20 and identify screening value exceedances, as applicable. **Figure 4-2** (surface soil) and **Figure 4-3** (subsurface soil) present the exceedances that are discussed in the following subsections.

4.1.1 Volatile Organic Compounds

Only two VOCs (acetone and carbon disulfide) were detected in surface soil and in just one surface soil sample (SS03) (**Table 4-1**), both at estimated concentrations more than an order of magnitude below screening criteria. It is possible that these trace amounts were laboratory artifacts rather than site-related contaminants, especially because they were not detected in the subsurface soil sample (SB03) at that location, the adjacent surface and subsurface soil samples (SS/SB04, 05, 06, and 07), or in the groundwater collected immediately downgradient (MW-02). No VOCs were detected in the subsurface soil (**Table 4-2).**

As shown in **Figure 4-1**, there is a wide distribution of soil samples at upgradient, potential source area locations, and within the TCE groundwater plume. No TCE (or parent/daughter product) was detected in any soil sample collected during the RI or any previous investigation, which indicates a TCE source is not present in the soil at SWMU 20. The groundwater plume configuration (as shown in **Figure 4-1** and discussed in Section 4.2) provides additional evidence of the absence of a continuing soil source because the area of highest groundwater concentrations is located several hundred feet downgradient of the plume's northern extent.

4.1.2 Semivolatile Organic Compounds

Only one SVOC (bis(2-ethylhexyl)phthalate) was detected in surface soil and in just one surface soil sample (SS14) (**Table 4-1**), at an estimated concentration an order of magnitude or more below screening criteria. No SVOCs were detected in subsurface soil.

4.1.3 Pesticides/PCBs

Six pesticides and one PCB were detected in surface soil and five pesticides were detected in subsurface soil (**Tables 4-1 and 4-2**, respectively). While several detections were above a screening criterion, the concentrations are similar to concentrations detected at other Vieques sites (CH2M, 2010b), which suggests these concentrations are attributable to normal pesticide use and not a CERCLA-related release. Pesticides and herbicides were commonly applied to the soil at Department of Defense (DoD) facilities to control pests and weeds, which may have resulted in residual pesticides and herbicides in environmental media. The legal application of pesticides and herbicides is not a CERCLA-related release and is, therefore, not subject to regulation under CERCLA.

The PCB (Aroclor-1260) detected in the one surface soil sample (SS12) was at a concentration (28J µg/kg) approximately equal to the SSL of 27 µg/kg. However, no PCBs were detected in subsurface soil (including the subsurface soil sample co-located with SS12) and no PCBs were detected in groundwater immediately downgradient of SS12 (MW-05).

4.1.4 Metals

Metals detected at SWMU 20 may be either site-related (i.e., associated with releases from operations) or non-site related (i.e., naturally occurring, background). In addition to risk-based criteria, concentrations of metals detected at SWMU 20 (**Tables 4-1 and 4-2**) were compared to the background soil inorganic dataset compiled for the former VNTR (CH2M, 2007) to help distinguish site-related metals concentrations from background. Note, the following discussion references the background UTL values, which are provided in **Tables 4-1 and 4-2**.

Seven inorganics (antimony, arsenic, barium, copper, cyanide, lead, and selenium) were detected in surface and/or subsurface soil above screening criteria and background UTLs. Antimony was detected in three surface soil samples (SS08, SS11, and SS12) and five subsurface soil samples (SB08, SB09, SB11, SB12, and SB15) at concentrations ranging from 0.32J milligrams per kilogram (mg/kg) to 0.82J mg/kg, above the SSL (0.27 mg/kg). There is no background UTL for antimony. Two of the samples were from the eastern disturbed area and two were from the bermed area for fuel bladder storage. No antimony was detected in groundwater, including wells MW-3, MW-4, and MW-5 which are adjacent to and/or downgradient of these sample locations.

Arsenic exceeded background and a screening criterion (Residential RSL of 0.68 mg/kg and SSL of 0.29 mg/kg) in one surface soil sample (SS01), at a concentration of 3.2 mg/kg. While the detected concentration is above the background UTL value of 1.6 mg/kg, arsenic was detected at concentrations as high as 5 mg/kg during the background study. While that value was considered an outlier at the time (solely based on an arbitrary threshold value for identifying outliers), it may in fact be representative of actual background arsenic concentrations. The East Vieques Background Soil Inorganics Report (CH2M, 2007) discusses how outliers were determined; they are simply mathematical outliers (i.e., at a statistically-derived concentration above the rest of the constituent concentrations), and states that outliers may actually be representative of true background concentrations. This is why for any metal, conclusions are not drawn solely upon whether the concentrations at the site are above the calculated background UTL; multiple lines of evidence (e.g., is the metal expected be present as a release based on historical site use; what does the spatial distribution suggest; how do the concentrations compare with concentrations observed elsewhere in similar lithologies; were comparable concentrations seen in the outlier dataset, etc.) are used. Of note, the most common outlier identified in the background dataset was calcium (see Table 9 of the Background Report). Since there would not have been a “release” of calcium, those outlier calcium concentrations are surely associated with background. They were removed from the dataset simply due to the statistical threshold that was established. Therefore, it is likely that the outliers identified for the other metals are actually representative of true background, especially considering the sample locations were specifically selected

to be outside of known or suspected areas of contamination. Further, no arsenic was detected in groundwater, including well MW-01 which is located directly beneath SS01.

Barium exceeded background (147 mg/kg) and a screening criterion (SSL of 82 mg/kg) in one surface soil sample (SS14), at a concentration of 168 mg/kg. However, barium was detected in only one well (MW-05) and its concentration was below the MCL and Adjusted Tap Water RSL. Additionally, barium was no detected in monitoring well MW-03, which is located directly downgradient of the SS14 location.

Copper was found in one subsurface soil sample (SB11) at 111 mg/kg, exceeding the background UTL (66 mg/kg) and a screening criterion (SSL of 46 mg/kg). However, copper was not detected in groundwater above its MCL, Puerto Rico Water Quality Class SG criterion, or Adjusted Tap Water RSL.

Cyanide exceeded the UTL background (0.33 mg/kg) and a screening criterion (Residential RSL of 0.27 mg/kg) in two surface soil samples (0.54J mg/kg at SS01 and 0.72J mg/kg at SS04). It is worth noting that all of these values are the same order of magnitude, and all are well below both the SSL (2 mg/kg) and the ecological screening value (ESV) (15 mg/kg) screening criterion for this constituent. It is unlikely the cyanide concentrations are associated with a CERCLA-related release at the site, especially because there is no likely source at the site; cyanide is commonly associated with the mining, electroplating, photo-developing, and the manufacture of plastics, none of which occurred at SWMU 20. It may be associated with pesticides but, as discussed in Section 4.1.3, the presence of pesticides in site soil is attributable to normal pesticide application.

Lead exceeded the surface soil background UTL (5.4 mg/kg) and a screening criterion (SSL of 14 mg/kg) in one sample (28.8J mg/kg at SS01). However, no lead was detected in groundwater, including well MW-01, which is located immediately beneath SS01.

Selenium exceeded the background UTL (0.51 mg/kg) and screening criteria (SSL of 0.26 mg/kg and ESV of 0.52 mg/kg) in seven surface soil samples (SS03, SS06, SS08, SS11, SS12, SS13, and SS14) at concentrations ranging from 0.54J mg/kg to 0.78J mg/kg. It also exceeded the same background UTL and SSL in five subsurface soil samples (SB04, SB10, SB11, SB14, and SB15) at concentrations ranging from 0.54J mg/kg to 0.74J mg/kg. However, selenium was not detected in groundwater above its MCL, Puerto Rico Water Quality Class SG criterion, or Adjusted Tap Water RSL. In the East Vieques background study, three (KTd, Kv, and Qa) of the four soil types were combined when developing background soil UTLs (SWMU 20 is in the KTd type). The maximum detected surface soil concentration at SWMU 20 (0.78 mg/kg) is not that elevated relative to the UTL for this group (0.51 mg/kg; ratio is about 1.50). However, detection limits for selenium in the background study soil samples were generally in the 3 to 5 mg/kg range for these soil types. The East Vieques background UTL for the fourth (Tl) soil type, which also occurs in the vicinity of SWMU 20, is 1.30 mg/kg (which is also the UTL for the combined set [all soil types]) and is higher than the maximum surface soil concentration at SWMU 20. Further, maximum background concentrations of selenium in the KTd (0.73 mg/kg) and Qa (2.00 mg/kg) soil types from West Vieques are similar to (KTd; ratio of 1.07) or greater than (Qa; ratio of 0.39) the maximum site concentration. These data support the conclusion that selenium concentrations detected in surface soils at SWMU 20 (maximum of 0.78 mg/kg) are within the range of background.

It is unlikely the selenium concentrations are associated with a CERCLA-related release at the site, especially because there is no likely source at the site; selenium is commonly associated with the production of electronics, glass, paints, inks, rubber, and pharmaceuticals, none of which occurred at SWMU 20. It may be associated with pesticides but, as discussed in Section 4.1.3, the presence of pesticides in site soil is attributable to normal pesticide application. Further, the selenium concentrations are relatively low (slightly above the background UTL) and consistent across the site.

4.2 Groundwater

As discussed in Section 3, grab groundwater samples were collected from a number of borings and wells for screening purposes. These samples were used to help select locations of permanent or additional wells. The data associated with these grab samples are presented in **Table 4-3**, but are not included in further discussion because they were superseded by validated data from permanent wells. **Table 4-4** shows the validated groundwater data

for SWMU 20 and identifies screening value exceedances. The nature and extent of groundwater contamination based on these data is discussed in the following subsections.

4.2.1 Volatile Organic Compounds

Twelve VOCs were detected in groundwater at SWMU 20 (**Figure 4-4**): 1,1-dichloroethene (1,1-DCE), 1,4-dichlorobenzene, acetone, benzene, carbon disulfide, chloroform, chloromethane, cis-1,2-dichloroethene, PCE, toluene, TCE, and vinyl chloride (**Table 4-4**).

As discussed earlier in this RI Report, the data collected during multiple investigations identified TCE (and related VOCs) in groundwater as the only substantial concern at SWMU 20. TCE was detected above the MCL of 5 µg/L in 20 monitoring wells during the investigations. TCE was also detected above the Adjusted Tap Water RSL of 0.28 µg/L in 29 monitoring wells during the investigations. For TCE, the PRWQS Class SG criterion is the same as the MCL.

Figure 4-5 shows the screening criteria exceedances of TCE (and related VOCs). The highest concentrations of TCE were detected at MW-24 (334 µg/L). In addition, PCE was detected just above the MCL (5 µg/L) in this well at a concentration of 5.87 µg/L. This value also exceeded the PRWQS Class SG (5 µg/L) and the Tap Water RSL (4.1 µg/L) for PCE. Daughter products of TCE degradation have also been detected, though infrequently, in site wells. These detections comprise cis-1,2-DCE (maximum 1.43 µg/L in MW-27), 1,1-DCE (maximum 1.29J µg/L in MW-24), and vinyl chloride (maximum 0.23J µg/L in MW-27), with the latter exceeding the Tap Water RSL (0.019 µg/L) but not the MCL (2 µg/L) or the PRWQS Class SG (0.25 µg/L). Vinyl chloride was also found to exceed the Tap Water RSL in 2009 at MW-06 with a concentration of 0.027J µg/L, but it was not detected in subsequent sampling events at this well in 2010, 2011, and 2013. **Figure 4-6** displays the indicator parameters measured in various wells that can be used to help evaluate natural attenuation processes in groundwater at the site (Section 5.2).

The TCE plume core (hotspot), defined as concentrations above about 100 µg/L, is approximately three acres in size, as shown in **Figure 4-5**, with TCE concentrations between 100 and maximum of 334 µg/L. Overall TCE plume dimensions that exceed 5 µg/L is approximately 18 acres in size. The vertical impact of groundwater contamination has been partially delineated and extends from depths of approximately 30 feet to depths of at least to a depth of 70 feet bgs over portions of the site. Comparison of contaminant concentrations in shallow/deep bedrock well pairs (i.e., MW-13/13D, MW-17/17D, MW-24/24D, MW-25/25D, and MW-28/28D) indicates that concentrations generally decrease with depth, and suggests that the horizontal area of contamination, or plume footprint, is smaller in deep bedrock than in shallow bedrock. Although the overall groundwater flow in the bedrock and plume migration is toward the sea, because flow is through fractures, tangential flow on the small scale is possible such that the plume size and shape may be slightly different in the deeper aquifer than represented. However, the ocean is the ultimate discharge point (i.e., lowest hydraulic head). Therefore, because of the close proximity of SWMU 20 to the ocean, the overall groundwater flow direction at the site will be toward the ocean.

1,4-dichlorobenzene was detected in three samples at estimated concentrations of 0.013J µg/L (MW-05), 0.011 J µg/L (MW-06), and 0.012 J µg/L (MW-07), well below all screening criteria shown in **Table 4-4** (MCL, PRWQS Class SG, Adjusted Tap Water RSL), although a number of the non-detect results were reported at a value above that Tap Water RSL.

Acetone was detected at a maximum of 390 µg/L at MW-04, a concentration well below the Tap Water RSL of 1,400 µg/L. There is no MCL or PRWQS Class SG criterion for this constituent.

Benzene was detected at a maximum concentration of 0.67 µg/L in MW-01, just above the Tap Water RSL (0.45 µg/L) but an order of magnitude lower than the MCL and PRWQS Class SG criterion of 5 µg/L.

Carbon disulfide was found in just two samples at a maximum concentration of 1 µg/L at MW-04, well below Tap Water RSL of 81 µg/L (there is no MCL or PRWQS Class SG criterion for this constituent).

Chloroform was detected in four samples above the Tap Water RSL (0.22 µg/L), at a maximum concentration of 0.99 µg/L in MW-02), but this was an order of magnitude lower than the MCL (80 µg/L) and the PRWQS Class SG criterion of 57 µg/L.

Chloromethane was detected at 0.37J µg/L at MW-07, a concentration well below the Tap Water RSL of 19 µg/L. There is no MCL or PRWQS Class SG criterion for this constituent.

Because none of the non-TCE-related constituents was found consistently in site wells or at concentrations above MCLs/PRWQS criteria or that pose unacceptable risk during early investigations at SWMU 20, the contaminants targeted for sampling in subsequent investigations were focused (i.e., TCE, 1,1-DCE, cis-1,2-DCE, PCE, and VC).

4.2.2 Semivolatile Organic Compounds

SVOCs were not detected in groundwater from monitoring wells MW-01 through MW-05, which were analyzed for the full TCL SVOC list.

4.2.3 Pesticides/PCBs

Pesticides and PCBs were not detected in groundwater at SWMU 20.

4.2.4 Metals

An upgradient well(s) does not exist at SWMU 20 to use for comparisons of groundwater metals, but the absence of an upgradient well(s) does not hinder the interpretation of the data because other information, such as soil data, other constituents detected or not detected, and the constituent type, can be used to help interpret the site-specific groundwater inorganics data.

- Total and dissolved chromium concentrations exceeded the Adjusted Tap Water RSL (which is based on hexavalent chromium, which is unlikely to have been released at the site) at five monitoring wells, with a maximum concentration of 22.3 µg/L (MW-04). However, none of the chromium concentrations detected in groundwater at the site exceeded the MCL. Further, as shown in **Tables 4-1 and 4-2**, chromium was not detected in surface or subsurface soil above background, which further suggests its presence in groundwater is attributable to background.
- One total cobalt concentration (but not dissolved) exceeded the Adjusted Tap Water RSL at one monitoring well, with a concentration of 2.6J µg/L (MW-05). However, as shown in **Tables 4-1 and 4-2**, cobalt was not detected in any surface or subsurface soil samples above the background UTL, which suggests its presence in groundwater is attributable to background.
- Total and/or dissolved manganese concentrations were detected above the Adjusted Tap Water RSL at three monitoring wells, with a maximum concentration of 86.9 µg/L (MW-01). However, as shown in **Tables 4-1 and 4-2**, manganese was not detected in any surface or subsurface soil samples above the background UTL, which suggests its presence in groundwater is attributable to background.
- A total vanadium concentration was detected in one of the five monitoring wells sampled at a concentration of 22.1 ug/L. Dissolved vanadium concentrations were detected above the Adjusted Tap Water RSL in all five monitoring wells, with a maximum concentration of 22.4J µg/L (MW-01). However, as shown in **Tables 4-1 and 4-2**, vanadium was not detected in any surface or subsurface soil samples above the background UTL, which suggests its presence in groundwater is attributable to background.

In summary, none of the metals concentrations detected in SWMU 20 groundwater are likely attributable to releases from historic site-related activities. This is consistent with the findings for SWMU 20 soil, where no metal was found at concentrations likely attributable to historic site-related activities. Metal detections in groundwater exhibited no apparent spatial pattern that would indicate a metals plume and none of the concentrations of the same metals in soil exceeded its background UTL.

TABLE 4-1
Validated Surface Soil Exceeded Analytical Data 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	Adjusted Residential Soil RSLs (June 2015)	SSLs (Risk-Based if no MCL-Based) (January 2015)	Vieques ESVs Soil	Vieques East Background UTL Zone KTd SS	Vieques East Background UTL Zone Qa SS	EPI04-MW13D	EPI04-MW17D		EPI04-SO01	EPI04-SO02	EPI04-SO03	EPI04-SO04	EPI04-SO05	
Sample ID						VEP4-SS16-0001	VEP4-SS17-0001	VEP4-SS17P-0001	EPI04-SS01-0001	EPI04-SS02-0001	EPI04-SS03-0001	EPI04-SS04-0001	EPI04-SS05-0001	EPI04-SS05P-0001
Sample Date						05/30/13	06/05/13	06/05/13	01/26/06	01/26/06	01/26/06	01/26/06	01/26/06	01/26/06
Chemical Name										**[KTd]**				
Volatile Organic Compounds (µg/kg)														
Acetone	6,100,000	2,900	--	--	--	NA	NA	NA	13 U	10 U	28 J	12 U	11 U	11 U
Carbon disulfide	77,000	240	--	--	--	NA	NA	NA	13 U	10 U	10 J	12 U	11 U	11 U
Semivolatile Organic Compounds (µg/kg)														
bis(2-Ethylhexyl)phthalate	39,000	1,400	30,000	--	--	NA	NA	NA	370 UJ	360 U	350 U	350 U	350 U	350 U
Pesticide/Polychlorinated Biphenyls (µg/kg)														
4,4'-DDD	2,300	7.2	583	--	--	NA	NA	NA	3.7 U	3.6 U	3.5 U	3.5 U	3.5 U	3.5 U
4,4'-DDE	2,000	54	114	--	--	NA	NA	NA	3.8	2.2 J	12	1.2 J	2.7 J	4.7
4,4'-DDT	1,900	77	100	--	--	NA	NA	NA	1.4 J	3.6 U	3.1 J	3.5 U	1.4 J	27
Aroclor-1260	240	27	8,000	--	--	NA	NA	NA	NA	NA	NA	35 U	NA	NA
delta-BHC	300	0.14	226	--	--	NA	NA	NA	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
Endosulfan I	47,000	1,400	6.32	--	--	NA	NA	NA	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
gamma-Chlordane	1,700	15	11	--	--	NA	NA	NA	0.69 J	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
Total Metals (mg/kg)														
Aluminum	7,700	30,000	--	35,000	35,000	NA	NA	NA	5,720 J	9,040 J	7,450 J	8,220	6,770 J	6,930 J
Antimony	3.1	0.27	78	--	--	NA	NA	NA	6.7 U	6.5 U	6.4 U	6.4 U	6.4 U	6.4 U
Arsenic	0.68	0.29	18	1.6	1.6	NA	NA	NA	**3.2 J**	1.1 U	1.1 U	0.35 J	1.1 U	1.1 U
Barium	1,500	82	330	147	212	NA	NA	NA	33 J	45.4 J	52.1 J	55.7	52.7 J	53.3 J
Beryllium	16	3.2	40	0.27	0.27	NA	NA	NA	0.55 U	0.54 U	0.53 U	0.53 U	0.53 U	0.53 U
Cadmium	7.1	0.38	32	2.2	2.2	NA	NA	NA	0.55 U	0.54 U	0.53 U	0.53 U	0.53 U	0.53 U
Calcium	--	--	--	8,840	11,900	NA	NA	NA	171,000 J	15,400 J	7,200 J	2,770	2,700 J	2,850 J
Chromium	0.3	100,000	64	72	72	NA	NA	NA	14.1 J	12.7 J	10.1 J	9.1	9 J	8.8 J
Cobalt	2.3	0.27	13	16	16	NA	NA	NA	5.6 U	8.3 J	9 J	9.7	9.1 J	9.8 J
Copper	310	46	70	66	53	NA	NA	NA	19.9 J	43.5 J	32.1 J	33.2	37.1 J	37.6 J
Cyanide	0.27	2	15.8	0.33	0.33	NA	NA	NA	**0.54 J**	2.7 U	2.7 U	**0.72 J**	2.7 U	2.7 U
Iron	5,500	350	--	38,100	38,100	NA	NA	NA	14,200 J	16,100 J	15,000 J	13,600	14,100 J	14,200 J
Lead	400	14	120	5.4	5.4	NA	NA	NA	28.8 J	7.3 J	4.1 J	2.7 J	3.2 J	2.7 J
Magnesium	--	--	--	3,710	22,200	NA	NA	NA	27,000 J	5,030 J	1,770 J	1,510	1,430 J	1,540 J
Manganese	180	28	220	1,630	1,630	NA	NA	NA	265 J	444 J	567 J	584	572 J	573 J
Nickel	150	26	38	22	22	NA	NA	NA	5.3 J	7.2 J	4.3 U	4.3 U	4.3 U	4.2 U
Potassium	--	--	--	5,270	5,270	NA	NA	NA	805 J	950 J	849 J	1,150 J	1,040 J	1,030 J
Selenium	39	0.26	0.52	0.51	0.51	NA	NA	NA	7.8 U	3.8 UJ	0.55 J	3.7 U	0.38 J	0.45 J
Vanadium	39	86	130	144	144	NA	NA	NA	37.9 J	49.7 J	56.1 J	49.5	51 J	50.7 J
Zinc	2,300	370	120	32	32	NA	NA	NA	23.9 J	27.3 J	16.7 J	16.7 J	19.5 J	18 J
Wet Chemistry (mg/kg)														
Total organic carbon (TOC)	--	--	--	--	--	8,600	8,330	NA	NA	NA	NA	NA	NA	NA

Notes:
Bold text indicates exceedance of Adjusted Residential Soil RSLs
Underline indicates exceedance of SSLs
Shading indicates exceedance of ESVs
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
J - Analyte present, value may or may not be accurate or precise
NZ-01 - Estimated result; one or more QC criteria recovered outside acceptance limits (for unvalidated data)
U - Nondetect

mg/kg - Milligrams per kilogram
µg/kg - Micrograms per kilogram
*** For metals data, an exceedance is not considered if the result is less than background.*

TABLE 4-1
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SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	Adjusted Residential Soil RSLs (June 2015)	SSLs (Risk-Based if no MCL-Based) (January 2015)	Vieques ESVs Soil	Vieques East Background UTL Zone KTd SS	Vieques East Background UTL Zone Qa SS	EPI04-SO06	EPI04-SO07	EPI04-SO08		EPI04-SO09	EPI04-SO10	EPI04-SO11	EPI04-SO12	EPI04-SO13
Sample ID						EPI04-SS06-0001	EPI04-SS07-0001	EPI04-SS08-0001	EPI04-SS08P-0001	EPI04-SS09-0001	EPI04-SS10-0001	EPI04-SS11-0001	EPI04-SS12-0001	EPI04-SS13-0001
Sample Date						01/26/06	01/25/06	01/25/06	01/25/06	01/24/06	01/24/06	01/25/06	01/24/06	01/25/06
Chemical Name										**[KTd]**				
Volatile Organic Compounds (µg/kg)														
Acetone	6,100,000	2,900	--	--	--	10 U	10 U	10 U	11 U	10 U	10 U	11 U	10 U	12 U
Carbon disulfide	77,000	240	--	--	--	10 U	10 U	10 U	11 U	10 U	10 U	11 U	10 U	12 U
Semivolatile Organic Compounds (µg/kg)														
bis(2-Ethylhexyl)phthalate	39,000	1,400	30,000	--	--	360 U	370 U	350 U	350 U	370 U	360 U	360 U	360 U	370 U
Pesticide/Polychlorinated Biphenyls (µg/kg)														
4,4'-DDD	2,300	7.2	583	--	--	2.1 J	3.1 J	3.5 U	3.5 U	3.7 U	3.6 U	3.6 U	3.6 U	3.7 U
4,4'-DDE	2,000	54	114	--	--	620	36	29	27	9.1	84	26	180	5.9
4,4'-DDT	1,900	77	100	--	--	100	7.8	3.1 J	5.3	1.4 J	2.8 J	3.6	22	3.7 U
Aroclor-1260	240	27	8,000	--	--	NA	NA	35 U	35 U	37 U	36 U	36 U	28 J	37 U
delta-BHC	300	0.14	226	--	--	0.75 J	1.9 U	1.8 U	1.8 U	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U
Endosulfan I	47,000	1,400	6.32	--	--	3.7 U	1.9 U	1.8 U	1.8 U	1.9 U	0.44 J	1.8 U	1.8 U	1.9 U
gamma-Chlordane	1,700	15	11	--	--	1 J	1.9 U	1.8 U	1.8 U	0.79 J	1.8 U	1.8 U	1.8 U	0.57 J
Total Metals (mg/kg)														
Aluminum	7,700	30,000	--	35,000	35,000	6,100 J	8,540 J	12,200	12,300	9,970 J	8,820 J	10,800	8,290	8,590 J
Antimony	3.1	0.27	78	--	--	6.6 U	6.7 U	0.62 J	0.75 J	6.8 U	6.5 U	0.82 J	0.58 J	6.6 U
Arsenic	0.68	0.29	18	1.6	1.6	1.1 U	1.1 U	0.58 J	0.39 J	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Barium	1,500	82	330	147	212	52.1 J	50.9 J	57.4	58.3	64.9 J	57.3 J	80.5	62.9	63.1 J
Beryllium	16	3.2	40	0.27	0.27	0.55 U	0.56 U	0.039 J	0.53 U	0.56 U	0.54 U	0.54 U	0.07 J	0.55 U
Cadmium	7.1	0.38	32	2.2	2.2	0.55 U	0.56 U	0.15 J	0.53 U	0.56 U	0.54 U	0.54 U	0.11 J	0.55 U
Calcium	--	--	--	8,840	11,900	4,610 J	7,410 J	5,290	6,860	10,000 J	10,900 J	11,200	6,060	11,000 J
Chromium	0.3	100,000	64	72	72	10.2 J	10 J	7.2	8.3	11.8 J	11.9 J	13	9.6	13 J
Cobalt	2.3	0.27	13	16	16	8.3 J	9.1 J	13.2	12.5	9.6 J	9.2 J	11.4	9.1	11.7 J
Copper	310	46	70	66	53	39.3 J	38.8 J	34.9	36.2	43 J	34 J	42.1	32.4	31.9 J
Cyanide	0.27	2	15.8	0.33	0.33	2.7 U	2.8 U	2.6 U	2.7 U	2.8 U	2.7 U	2.7 U	2.7 U	2.8 U
Iron	5,500	350	--	38,100	38,100	14,400 J	16,000 J	24,700	24,100	17,300 J	15,900 J	19,200	15,900	16,900 J
Lead	400	14	120	5.4	5.4	7.6 J	6.8 J	5	2.9	3.5 J	3.9 J	6.6	2.8	3.4 J
Magnesium	--	--	--	3,710	22,200	1,380 J	2,070 J	8,730	7,820	4,000 J	2,910 J	3,720	2,720	2,870 J
Manganese	180	28	220	1,630	1,630	514 J	365 J	549	540	432 J	501 J	638	536	707 J
Nickel	150	26	38	22	22	4.4 U	4.5 U	4.3 J	4.7 J	5.6 J	4.7 J	5.7 J	4.6 J	5.2 J
Potassium	--	--	--	5,270	5,270	753 J	823 J	1,500 J	1,630 J	1,030 J	1,120 J	1,540 J	1,030 J	1,110 J
Selenium	39	0.26	0.52	0.51	0.51	0.54 J	0.44 J	0.59 J	3.7 U	4 UJ	3.8 U	0.56 J	0.68 J	0.61 J
Vanadium	39	86	130	144	144	55.5 J	57.5 J	64.7	63.8	63.8 J	62.3 J	73	54.2	68.5 J
Zinc	2,300	370	120	32	32	38.7 J	22.7 J	28.6	28.6	18.7 J	19.4 J	27	20.4	13.8 J
Wet Chemistry (mg/kg)														
Total organic carbon (TOC)	--	--	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
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Shading indicates exceedance of ESVs
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NA - Not analyzed
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NZ-01 - Estimated result; one or more QC criteria recovered outside acceptance limits (for unvalidated data)
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Sample ID						EPI04-SS14-0006	EPI04-SS15-0006	VEP4-SS21-0001	VEP4-SS21P-0001	VEP4-SS22-0001	VEP4-SS23-0001	VEP4-SS24-0001	VEP4-SS25-0001
Sample Date						01/31/06	01/31/06	09/17/14	09/17/14	09/16/14	09/22/14	09/18/14	09/22/14
Chemical Name									**[KTd]**				**[Qa]**
Volatile Organic Compounds (µg/kg)													
Acetone	6,100,000	2,900	--	--	--	14 U	14 U	NA	NA	NA	NA	NA	NA
Carbon disulfide	77,000	240	--	--	--	14 U	14 U	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (µg/kg)													
bis(2-Ethylhexyl)phthalate	39,000	1,400	30,000	--	--	130 J	360 U	NA	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyls (µg/kg)													
4,4'-DDD	2,300	7.2	583	--	--	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	2,000	54	114	--	--	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	1,900	77	100	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	240	27	8,000	--	--	NA	NA	NA	NA	NA	NA	NA	NA
delta-BHC	300	0.14	226	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	47,000	1,400	6.32	--	--	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	1,700	15	11	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Total Metals (mg/kg)													
Aluminum	7,700	30,000	--	35,000	35,000	13,300	14,400	NA	NA	NA	NA	NA	NA
Antimony	3.1	0.27	78	--	--	6.6 U	6.6 U	NA	NA	NA	NA	NA	NA
Arsenic	0.68	0.29	18	1.6	1.6	0.83 J	0.86 J	NA	NA	NA	NA	NA	NA
Barium	1,500	82	330	147	212	168	99.1	NA	NA	NA	NA	NA	NA
Beryllium	16	3.2	40	0.27	0.27	0.55 U	0.55 U	NA	NA	NA	NA	NA	NA
Cadmium	7.1	0.38	32	2.2	2.2	0.55 U	0.55 U	NA	NA	NA	NA	NA	NA
Calcium	--	--	--	8,840	11,900	21,100	12,500	NA	NA	NA	NA	NA	NA
Chromium	0.3	100,000	64	72	72	14.3	13.6	NA	NA	NA	NA	NA	NA
Cobalt	2.3	0.27	13	16	16	14.9	10	NA	NA	NA	NA	NA	NA
Copper	310	46	70	66	53	52.8	51	NA	NA	NA	NA	NA	NA
Cyanide	0.27	2	15.8	0.33	0.33	0.23 J	2.7 U	NA	NA	NA	NA	NA	NA
Iron	5,500	350	--	38,100	38,100	20,100	20,200	NA	NA	NA	NA	NA	NA
Lead	400	14	120	5.4	5.4	2.3 J	2 J	NA	NA	NA	NA	NA	NA
Magnesium	--	--	--	3,710	22,200	4,590	4,600	NA	NA	NA	NA	NA	NA
Manganese	180	28	220	1,630	1,630	968	427	NA	NA	NA	NA	NA	NA
Nickel	150	26	38	22	22	8.2	7.1	NA	NA	NA	NA	NA	NA
Potassium	--	--	--	5,270	5,270	2,420 J	1,590 J	NA	NA	NA	NA	NA	NA
Selenium	39	0.26	0.52	0.51	0.51	0.78 J	3.8 U	NA	NA	NA	NA	NA	NA
Vanadium	39	86	130	144	144	86.1	78.4	NA	NA	NA	NA	NA	NA
Zinc	2,300	370	120	32	32	24.8 J	26.5 J	NA	NA	NA	NA	NA	NA
Wet Chemistry (mg/kg)													
Total organic carbon (TOC)	--	--	--	--	--	NA	NA	9,910	NA	30,400 NZ-01	27,800	11,600	24,000

Notes:
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NA - Not analyzed
J - Analyte present, value may or may not be accurate or precise
NZ-01 - Estimated result; one or more QC criteria recovered outside acceptance limits (for unvalidated data)
U - Nondetect

mg/kg - Milligrams per kilogram
µg/kg - Micrograms per kilogram
*** For metals data, an exceedance is not considered if the result is less than background.*

TABLE 4-2
Validated Subsurface Soil Exceeded Analytical Data 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	Adjusted Residential Soil RSLs (June 2015)	SSLs (Risk-Based if no MCL-Based) (January 2015)	Vieques East Background UTL Zone KTd SB	Vieques East Background UTL Zone Qa SB	EPI04-MW08	EPI04-MW09	EPI04-MW10	EPI04-MW11	
Sample ID					VEP4-SB16-1617-1111	VEP4-SB19-0607-1111	VEP4-SB18-1214-1111	VEP4-SB20-0608-1111	VEP4-SB20P-0608-1111
Sample Date					11/03/11	11/08/11	11/15/11	11/10/11	11/10/11
Depth of Soil Sample Below Land Surface					16 - 17'	6 - 7'	12 - 14'	6 - 8'	6 - 8'
Chemical Name					**[KTd]**				
Volatile Organic Compounds (µg/kg)									
No Detections									
Semivolatile Organic Compounds (µg/kg)									
No Detections									
Pesticide/Polychlorinated Biphenyls (µg/kg)									
4,4'-DDD	2,300	7.2	--	--	NA	NA	NA	NA	NA
4,4'-DDE	2,000	54	--	--	NA	NA	NA	NA	NA
4,4'-DDT	1,900	77	--	--	NA	NA	NA	NA	NA
Endrin aldehyde	1,900	92	--	--	NA	NA	NA	NA	NA
gamma-Chlordane	1,700	15	--	--	NA	NA	NA	NA	NA
Total Metals (mg/kg)									
Aluminum	7,700	30,000	35,000	35,000	NA	NA	NA	NA	NA
Antimony	3.1	0.27	--	--	NA	NA	NA	NA	NA
Arsenic	0.68	0.29	1.6	1.6	NA	NA	NA	NA	NA
Barium	1,500	82	147	212	NA	NA	NA	NA	NA
Beryllium	16	3.2	0.27	0.27	NA	NA	NA	NA	NA
Cadmium	7.1	0.38	2.2	2.2	NA	NA	NA	NA	NA
Calcium	--	--	8,840	11,900	NA	NA	NA	NA	NA
Chromium	0.3	100,000	72	72	NA	NA	NA	NA	NA
Cobalt	2.3	0.27	16	16	NA	NA	NA	NA	NA
Copper	310	46	66	53	NA	NA	NA	NA	NA
Cyanide	0.27	2	0.89	0.89	NA	NA	NA	NA	NA
Iron	5,500	350	38,100	38,100	NA	NA	NA	NA	NA
Lead	400	14	3.3	3.3	NA	NA	NA	NA	NA
Magnesium	--	--	3,710	22,200	NA	NA	NA	NA	NA
Manganese	180	28	1,630	1,630	NA	NA	NA	NA	NA
Nickel	150	26	22	22	NA	NA	NA	NA	NA
Potassium	--	--	2,000	2,000	NA	NA	NA	NA	NA
Selenium	39	0.26	0.51	0.51	NA	NA	NA	NA	NA
Sodium	--	--	2,250	2,250	NA	NA	NA	NA	NA
Vanadium	39	86	144	144	NA	NA	NA	NA	NA
Zinc	2,300	370	32	32	NA	NA	NA	NA	NA
Wet Chemistry (mg/kg)									
Total organic carbon (TOC)	--	--	--	--	6,070 J	925 J	362 J	1,320 J	NA

Notes:
Bold text indicates exceedance of Adjusted Residential Soil RSLs
Underline indicates exceedance of SSLs
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
J - Analyte present, value may or may not be accurate or precise
U - Nondetect
mg/kg - Milligrams per kilogram
µg/kg - Micrograms per kilogram
*** For metals data, an exceedance is not considered if the result is less than background.*

TABLE 4-2
Validated Subsurface Soil Exceeded Analytical Data 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	Adjusted Residential Soil RSLs (June 2015)	SSLs (Risk-Based if no MCL-Based) (January 2015)	Vieques East Background UTL Zone KTd SB	Vieques East Background UTL Zone Qa SB	EPI04-MW12	EPI04-MW13D	EPI04-MW17D	EPI04-SO01	EPI04-SO02	EPI04-SO03	EPI04-SO04
Sample ID					VEP4-SB17-1011-1111	VEP4-SB16-0406	VEP4-SB17-0406	EPI04-SB01-0406	EPI04-SB02-0406	EPI04-SB03-0406	EPI04-SB04-0406
Sample Date					11/11/11	05/30/13	06/05/13	01/26/06	01/26/06	01/26/06	01/26/06
Depth of Soil Sample Below Land Surface					10 - 11'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'
Chemical Name								**[KTd]**			
Volatile Organic Compounds (µg/kg)											
No Detections											
Semivolatile Organic Compounds (µg/kg)											
No Detections											
Pesticide/Polychlorinated Biphenyls (µg/kg)											
4,4'-DDD	2,300	7.2	--	--	NA	NA	NA	3.5 U	3.4 U	3.5 U	3.8 U
4,4'-DDE	2,000	54	--	--	NA	NA	NA	3.5 U	3.4 U	1.5 J	3.8 U
4,4'-DDT	1,900	77	--	--	NA	NA	NA	3.5 U	3.4 U	3.5 U	3.8 U
Endrin aldehyde	1,900	92	--	--	NA	NA	NA	3.5 U	3.4 U	3.5 U	3.8 U
gamma-Chlordane	1,700	15	--	--	NA	NA	NA	0.49 J	0.45 J	1.8 U	2 U
Total Metals (mg/kg)											
Aluminum	7,700	30,000	35,000	35,000	NA	NA	NA	9,060 J	6,660 J	7,240 J	7,350
Antimony	3.1	0.27	--	--	NA	NA	NA	6.4 U	6.3 U	6.3 U	6.9 U
Arsenic	0.68	0.29	1.6	1.6	NA	NA	NA	1.1 U	1 U	1.1 U	1.2 U
Barium	1,500	82	147	212	NA	NA	NA	46.9 J	42.4 J	44.7 J	51.8
Beryllium	16	3.2	0.27	0.27	NA	NA	NA	0.53 U	0.52 U	0.52 U	0.58 U
Cadmium	7.1	0.38	2.2	2.2	NA	NA	NA	0.53 U	0.52 U	0.52 U	0.58 U
Calcium	--	--	8,840	11,900	NA	NA	NA	14,100 J	2,050 J	3,180 J	2,760
Chromium	0.3	100,000	72	72	NA	NA	NA	16.2 J	10.8 J	11.3 J	10.6
Cobalt	2.3	0.27	16	16	NA	NA	NA	7.9 J	8.1 J	7.5 J	7.7
Copper	310	46	66	53	NA	NA	NA	45 J	39.3 J	44.9 J	41.7
Cyanide	0.27	2	0.89	0.89	NA	NA	NA	2.7 U	2.6 U	2.6 U	2.9 U
Iron	5,500	350	38,100	38,100	NA	NA	NA	21,400 J	15,000 J	17,100 J	15,700
Lead	400	14	3.3	3.3	NA	NA	NA	1.6 J	1.1 J	2.3 J	1.4 J
Magnesium	--	--	3,710	22,200	NA	NA	NA	4,890 J	2,580 J	2,360 J	2,510
Manganese	180	28	1,630	1,630	NA	NA	NA	308 J	322 J	309 J	395
Nickel	150	26	22	22	NA	NA	NA	6.6 J	5.8 J	4.5 J	5
Potassium	--	--	2,000	2,000	NA	NA	NA	531 U	523 U	526 U	577 U
Selenium	39	0.26	0.51	0.51	NA	NA	NA	3.7 U	3.7 U	3.7 U	0.54 J
Sodium	--	--	2,250	2,250	NA	NA	NA	470 J	523 U	526 U	577 U
Vanadium	39	86	144	144	NA	NA	NA	99.4 J	60.3 J	65.6 J	61.7
Zinc	2,300	370	32	32	NA	NA	NA	18.7	13.9 J	15 J	15.7 J
Wet Chemistry (mg/kg)											
Total organic carbon (TOC)	--	--	--	--	3,020	2,530	5,610	NA	NA	NA	NA

Notes:
Bold text indicates exceedance of Adjusted Residential Soil RSLs
Underline indicates exceedance of SSLs
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
J - Analyte present, value may or may not be accurate or precise
U - Nondetect
mg/kg - Milligrams per kilogram
µg/kg - Micrograms per kilogram
*** For metals data, an exceedance is not considered if the result is less than background.*

TABLE 4-2
Validated Subsurface Soil Exceeded Analytical Data 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	Adjusted Residential Soil RSLs (June 2015)	SSLs (Risk-Based if no MCL-Based) (January 2015)	Vieques East Background UTL Zone KTd SB	Vieques East Background UTL Zone Qa SB	EPI04-SO05	EPI04-SO06	EPI04-SO07	EPI04-SO08		EPI04-SO09	EPI04-SO10	EPI04-SO11
Sample ID					EPI04-SB05-0406	EPI04-SB06-0406	EPI04-SB07-0406	EPI04-SB08-0406	EPI04-SB08P-0406	EPI04-SB09-0406	EPI04-SB10-0406	EPI04-SB11-0406
Sample Date					01/26/06	01/26/06	01/25/06	01/25/06	01/25/06	01/24/06	01/24/06	01/25/06
Depth of Soil Sample Below Land Surface					4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'
Chemical Name					**[KTd]**							
Volatile Organic Compounds (µg/kg)												
No Detections												
Semivolatile Organic Compounds (µg/kg)												
No Detections												
Pesticide/Polychlorinated Biphenyls (µg/kg)												
4,4'-DDD	2,300	7.2	--	--	3.5 U	3.7 U	1.2 J	3.5 U	3.5 U	0.89 J	3.6 U	3.8 U
4,4'-DDE	2,000	54	--	--	3.5 U	2.7 J	1.1 J	71	47	44	50	0.79 J
4,4'-DDT	1,900	77	--	--	3.5 U	2.2 J	3.7 U	8.5	11	56	1.9 J	3.8 U
Endrin aldehyde	1,900	92	--	--	3.5 U	3.7 U	3.7 U	1.5 J	3.5 U	3.5 U	3.6 U	3.8 U
gamma-Chlordane	1,700	15	--	--	0.65 J	0.5 J	0.48 J	1.8 U	1.8 U	1.8 U	1.1 J	1.9 U
Total Metals (mg/kg)												
Aluminum	7,700	30,000	35,000	35,000	7,370 J	12,400 J	8,380 J	8,620	8,000	12,000	12,200 J	16,700
Antimony	3.1	0.27	--	--	6.3 U	6.7 U	6.7 U	0.52 J	0.44 J	0.61 J	6.5 U	0.79 J
Arsenic	0.68	0.29	1.6	1.6	1 U	1.1 U	1.1 U	0.54 J	1.1 U	1.1 U	1.1 U	1.1 U
Barium	1,500	82	147	212	44.4 J	84.3 J	55.8 J	47.3	42.3	61.1	75.1 J	106
Beryllium	16	3.2	0.27	0.27	0.53 U	0.56 U	0.56 U	0.53 U	0.53 U	0.54 U	0.54 U	0.56 U
Cadmium	7.1	0.38	2.2	2.2	0.53 U	0.56 U	0.56 U	0.53 U	0.53 U	0.54 U	0.54 U	0.56 U
Calcium	--	--	8,840	11,900	2,310 J	3,040 J	2,550 J	2,980	2,970	4,750	9,410 J	5,060
Chromium	0.3	100,000	72	72	11.4 J	11.6 J	11.2 J	9.6	11	11.7 J	13.1 J	18.1
Cobalt	2.3	0.27	16	16	7.4 J	11.1 J	9.3 J	9.3	8	10.2 J	9.5 J	15.8
Copper	310	46	66	53	48.8 J	57.5 J	48.4 J	39.3	40.2	43.5	39.4 J	111
Cyanide	0.27	2	0.89	0.89	2.6 U	2.8 U	2.8 U	2.6 U	2.7 U	2.7 U	2.7 U	2.8 U
Iron	5,500	350	38,100	38,100	16,800 J	20,500 J	18,500 J	17,600	17,600	17,800	18,300 J	30,000
Lead	400	14	3.3	3.3	1 U	1.4 J	1.5 J	1.2	1.1	4.3 J	1.6 J	1.8
Magnesium	--	--	3,710	22,200	2,930 J	3,250 J	3,080 J	4,020	3,330	3,900	3,110 J	7,810
Manganese	180	28	1,630	1,630	374 J	504 J	594 J	382	368	441	445 J	730
Nickel	150	26	22	22	5.9 J	9.7 J	6.7 J	4.6 J	4.4 J	5.9 J	5.3 J	11.5 J
Potassium	--	--	2,000	2,000	527 U	555 U	556 U	805 J	715 J	858 J	1,050 J	806 J
Selenium	39	0.26	0.51	0.51	3.7 U	0.49 J	3.9 U	3.7 U	3.7 U	3.8 U	0.59 J	0.74 J
Sodium	--	--	2,250	2,250	527 U	555 U	556 U	528 U	532 U	538 U	542 U	565 U
Vanadium	39	86	144	144	62.7 J	70.3 J	75.3 J	59.3	61.8	61.9	67 J	113
Zinc	2,300	370	32	32	18.3 J	17.4 J	17.2 J	14.2	13.7	17.6 J	16.6 J	38.2
Wet Chemistry (mg/kg)												
Total organic carbon (TOC)	--	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
Bold text indicates exceedance of Adjusted Residential Soil RSLs
Underline indicates exceedance of SSLs
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
J - Analyte present, value may or may not be accurate or precise
U - Nondetect
mg/kg - Milligrams per kilogram
µg/kg - Micrograms per kilogram
*** For metals data, an exceedance is not considered if the result is less than background.*

TABLE 4-2
Validated Subsurface Soil Exceeded Analytical Data 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	Adjusted Residential Soil RSLs (June 2015)	SSLs (Risk-Based if no MCL-Based) (January 2015)	Vieques East Background UTL Zone KTd SB	Vieques East Background UTL Zone Qa SB	EPI04-SO12	EPI04-SO13	EPI04-SO14		EPI04-SO15	EPI04-SO21	EPI04-SO22
Sample ID					EPI04-SB12-0406	EPI04-SB13-0406	EPI04-SB14-0406	EPI04-SB14P-0406	EPI04-SB15-0406	VEP4-SB21-0406	VEP4-SB22-0406
Sample Date					01/24/06	01/25/06	02/14/06	02/14/06	02/14/06	09/17/14	09/16/14
Depth of Soil Sample Below Land Surface					4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'
Chemical Name					**[KTd]**						
Volatile Organic Compounds (µg/kg)											
No Detections											
Semivolatile Organic Compounds (µg/kg)											
No Detections											
Pesticide/Polychlorinated Biphenyls (µg/kg)											
4,4'-DDD	2,300	7.2	--	--	3.5 U	3.8 U	NA	NA	NA	NA	NA
4,4'-DDE	2,000	54	--	--	220	3.8 U	NA	NA	NA	NA	NA
4,4'-DDT	1,900	77	--	--	6.1	3.8 U	NA	NA	NA	NA	NA
Endrin aldehyde	1,900	92	--	--	3.5 U	3.8 U	NA	NA	NA	NA	NA
gamma-Chlordane	1,700	15	--	--	1.8 U	2 U	NA	NA	NA	NA	NA
Total Metals (mg/kg)											
Aluminum	7,700	30,000	35,000	35,000	9,980	10,100 J	6,820	6,950	11,900	NA	NA
Antimony	3.1	0.27	--	--	0.6 J	6.9 U	0.2 J	0.27 J	0.32 J	NA	NA
Arsenic	0.68	0.29	1.6	1.6	1.1 U	1.2 U	1 U	1 U	1.1 U	NA	NA
Barium	1,500	82	147	212	57.6	68.6 J	52.4 J	45.9 J	62.6 J	NA	NA
Beryllium	16	3.2	0.27	0.27	0.034 J	0.58 U	0.52 U	0.52 U	0.54 U	NA	NA
Cadmium	7.1	0.38	2.2	2.2	0.079 J	0.58 U	0.52 U	0.52 U	0.54 U	NA	NA
Calcium	--	--	8,840	11,900	2,810	4,530 J	3,080	3,900	3,740	NA	NA
Chromium	0.3	100,000	72	72	14	12.4 J	10.2 J	9.1 J	10.5 J	NA	NA
Cobalt	2.3	0.27	16	16	10.8	11.5 J	7.6 J	7.6 J	11.3 J	NA	NA
Copper	310	46	66	53	44.2	56.3 J	41.1 J	41.5 J	65.9 J	NA	NA
Cyanide	0.27	2	0.89	0.89	2.7 U	2.9 U	2.6 U	2.6 U	0.21 J	NA	NA
Iron	5,500	350	38,100	38,100	18,700	18,700 J	14,600	13,900	18,100	NA	NA
Lead	400	14	3.3	3.3	1.5	1.5 J	1 J	1.2 J	1.4 J	NA	NA
Magnesium	--	--	3,710	22,200	2,930	4,900 J	2,340	2,450	3,550	NA	NA
Manganese	180	28	1,630	1,630	499	626 J	367 J	328 J	507 J	NA	NA
Nickel	150	26	22	22	6.7 J	8.8 J	4.6 J	4.5 J	6 J	NA	NA
Potassium	--	--	2,000	2,000	670 J	883 J	521 U	519 U	742	NA	NA
Selenium	39	0.26	0.51	0.51	3.8 U	4 U	0.54 J	0.57 J	0.71 J	NA	NA
Sodium	--	--	2,250	2,250	540 U	636 J	521 U	519 U	539 U	NA	NA
Vanadium	39	86	144	144	72.7	76.2 J	55.8 J	51.3 J	61.3 J	NA	NA
Zinc	2,300	370	32	32	16.7	22.8 J	19.6 J	17.1 J	20.2 J	NA	NA
Wet Chemistry (mg/kg)											
Total organic carbon (TOC)	--	--	--	--	NA	NA	NA	NA	NA	5,160	8,210

Notes:
Bold text indicates exceedance of Adjusted Residential Soil RSLs
Underline indicates exceedance of SSLs
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
J - Analyte present, value may or may not be accurate or precise
U - Nondetect
mg/kg - Milligrams per kilogram
µg/kg - Micrograms per kilogram
*** For metals data, an exceedance is not considered if the result is less than background.*

TABLE 4-2
Validated Subsurface Soil Exceeded Analytical Data 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	Adjusted Residential Soil RSLs (June 2015)	SSLs (Risk-Based if no MCL-Based) (January 2015)	Vieques East Background UTL Zone KTd SB	Vieques East Background UTL Zone Qa SB	EPI04-SO23	EPI04-SO24	EPI04-SO25
Sample ID					VEP4-SB23-0406	VEP4-SB24-0406	VEP4-SB25-0406
Sample Date					09/22/14	09/18/14	09/22/14
Depth of Soil Sample Below Land Surface					4 - 6'	4 - 6'	4 - 6'
Chemical Name					**[KTd]**		**[Qa]**
Volatile Organic Compounds (µg/kg)							
No Detections							
Semivolatile Organic Compounds (µg/kg)							
No Detections							
Pesticide/Polychlorinated Biphenyls (µg/kg)							
4,4'-DDD	2,300	7.2	--	--	NA	NA	NA
4,4'-DDE	2,000	54	--	--	NA	NA	NA
4,4'-DDT	1,900	77	--	--	NA	NA	NA
Endrin aldehyde	1,900	92	--	--	NA	NA	NA
gamma-Chlordane	1,700	15	--	--	NA	NA	NA
Total Metals (mg/kg)							
Aluminum	7,700	30,000	35,000	35,000	NA	NA	NA
Antimony	3.1	0.27	--	--	NA	NA	NA
Arsenic	0.68	0.29	1.6	1.6	NA	NA	NA
Barium	1,500	82	147	212	NA	NA	NA
Beryllium	16	3.2	0.27	0.27	NA	NA	NA
Cadmium	7.1	0.38	2.2	2.2	NA	NA	NA
Calcium	--	--	8,840	11,900	NA	NA	NA
Chromium	0.3	100,000	72	72	NA	NA	NA
Cobalt	2.3	0.27	16	16	NA	NA	NA
Copper	310	46	66	53	NA	NA	NA
Cyanide	0.27	2	0.89	0.89	NA	NA	NA
Iron	5,500	350	38,100	38,100	NA	NA	NA
Lead	400	14	3.3	3.3	NA	NA	NA
Magnesium	--	--	3,710	22,200	NA	NA	NA
Manganese	180	28	1,630	1,630	NA	NA	NA
Nickel	150	26	22	22	NA	NA	NA
Potassium	--	--	2,000	2,000	NA	NA	NA
Selenium	39	0.26	0.51	0.51	NA	NA	NA
Sodium	--	--	2,250	2,250	NA	NA	NA
Vanadium	39	86	144	144	NA	NA	NA
Zinc	2,300	370	32	32	NA	NA	NA
Wet Chemistry (mg/kg)							
Total organic carbon (TOC)	--	--	--	--	41,600	5,350	15,600

Notes:
Bold text indicates exceedance of Adjusted Residential Soil RSLs
Underline indicates exceedance of SSLs
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
J - Analyte present, value may or may not be accurate or precise
U - Nondetect
mg/kg - Milligrams per kilogram
µg/kg - Micrograms per kilogram
*** For metals data, an exceedance is not considered if the result is less than background.*

TABLE 4-3
Unvalidated Grab Groundwater Results
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	MCL	Puerto Rico Water Quality Class SG	Adjusted Tap Water RSLs (June 2015)	EPI04-DP01	EPI04-DP02	EPI04-DP03	EPI04-DP04	EPI04-DP05	EPI04-DP06	EPI04-DP07
Sample ID				VEP4-GP01-2530-073013	VEP4-GP02-2529-073113	VEP4-GP03-2024-080113	VEP4-GP04-2024-073113	VEP4-GP05-2024-080113	VEP4-GP06-2125-080713	VEP4-GP07-2529-080713
Sample Date				07/30/13	07/31/13	08/01/13	07/31/13	08/01/13	08/07/13	08/07/13
Chemical Name										
Volatile Organic Compounds (µg/l)										
1,1-Dichloroethene	7	7	28	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	70	--	3.6	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	5	5	4.1	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	5	5	0.28	**1.83**	**3.34**	**21.3**	**2.62**	**0.8**	**40**	**28.5**
Semivolatile Organic Compounds (µg/l)										
No Detections										

C:\Users\jmcmanus\Documents___NAVFAC__working\SWMU 20 RI Report\Tables\[Table 4-3 - Unvalidated Grab Groundwater Data.xlsx], , 01/00/1900

Notes:
Shading indicates exceedance of MCL
Bold box indicates exceedance of Puerto Rico Water Quality Class SG
Bold text indicates exceedance of Adjusted Tap Water RSLs
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
D - Compound identified in an analysis at a secondary dilution factor
J - Analyte present, value may or may not be accurate or precise
U - The material was analyzed for, but not detected
µg/l - Micrograms per liter

TABLE 4-3
Unvalidated Grab Groundwater Results
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID Sample ID Sample Date	MCL	Puerto Rico Water Quality Class SG	Adjusted Tap Water RSLs (June 2015)	EPI04-DP08 VEP4-GP08-2024-080913 08/09/13	EPI04-DP09 VEP4-GP09-2024-081213 08/12/13	EPI04-DP10 VEP4-GP10-2024-081313 08/13/13	EPI04-DP11 VEP4-GP11-2024-081413 08/14/13	EPI04-MW13D VEP4-GW13D-062613 06/26/13	EPI04-MW15 VEP4-GW15-052313 05/23/13	EPI04-MW16 VEP4-GW16-051613 05/16/13	EPI04-MW17 VEP4-GW17-052913 05/29/13
Chemical Name											
Volatile Organic Compounds (µg/l)											
1,1-Dichloroethene	7	7	28	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.33 J
cis-1,2-Dichloroethene	70	--	3.6	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U
Tetrachloroethene	5	5	4.1	NA	NA	NA	NA	0.69 J	0.5 U	0.27 J	2.76
Trichloroethene	5	5	0.28	**3.16**	**0.63**	**5.18**	0.5 U	**44.4**	**1.5**	**12.2**	**112**
Semivolatile Organic Compounds (µg/l)											
No Detections											

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Notes:
Shading indicates exceedance of MCL
Bold box indicates exceedance of Puerto Rico Water Quality Class SG
Bold text indicates exceedance of Adjusted Tap Water RSLs
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
D - Compound identified in an analysis at a secondary dilution factor
J - Analyte present, value may or may not be accurate or precise
U - The material was analyzed for, but not detected
µg/l - Micrograms per liter

TABLE 4-3
Unvalidated Grab Groundwater Results
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	MCL	Puerto Rico Water Quality Class SG	Adjusted Tap Water RSLs (June 2015)	EPI04-MW17D	EPI04-MW18	EPI04-MW19	EPI04-MW20	EPI04-MW21	EPI04-MW22	EPI04-MW23	EPI04-MW24
Sample ID				VEP4-GW17D-062613	VEP4-GW18-052113	VEP4-GW19-051413	VEP4-GW20-061013	VEP4-GW21-062113	VEP4-GW22-061913	VEP4-GW23-061913	VEP4-GW24-062013
Sample Date				06/26/13	05/21/13	05/14/13	06/10/13	06/21/13	06/19/13	06/19/13	06/20/13
Chemical Name											
Volatile Organic Compounds (µg/l)											
1,1-Dichloroethene	7	7	28	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.38 J	1.06
cis-1,2-Dichloroethene	70	--	3.6	0.59 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.59	0.6 J
Tetrachloroethene	5	5	4.1	1.06	0.5 U	0.5 U	1.22	0.5 U	0.5 U	0.47 J	3.38
Trichloroethene	5	5	0.28	**63.9**	**2.87**	**2.74**	**45.9**	**4.07**	**0.94**	**51.4**	**166 D**
Semivolatile Organic Compounds (µg/l)											
No Detections											

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Notes:
Shading indicates exceedance of MCL
Bold box indicates exceedance of Puerto Rico Water Quality Class SG
Bold text indicates exceedance of Adjusted Tap Water RSLs
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
D - Compound identified in an analysis at a secondary dilution factor
J - Analyte present, value may or may not be accurate or precise
U - The material was analyzed for, but not detected
µg/l - Micrograms per liter

TABLE 4-4
Validated Groundwater Exceedances 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	MCL	Puerto Rico Water Quality Class SG	Adjusted Tap Water RSLs (June 2015)	EPI04-MW01				EPI04-MW02			
Sample ID				EPI04-GW01-06B	VEP4-GW01-0309	VEP04-GW01-0710	VEP4-GW01-0513	EPI04-GW02-06B	VEP4-GW02-0309	VEP04-GW02-0710	VEP4-GW02-0513
Sample Date				04/04/06	03/25/09	07/28/10	05/14/13	04/04/06	03/25/09	07/29/10	05/16/13
Chemical Name											
Volatile Organic Compounds (µg/l)											
1,1-Dichloroethene	7	7	28	0.5 U	0.05 U	0.025 U	0.5 U	0.5 U	0.05 U	0.025 U	0.5 U
1,4-Dichlorobenzene	75	63	0.48	0.5 U	0.05 U	0.025 U	NA	0.5 U	0.05 U	0.025 U	NA
Acetone	--	--	1,400	5 U	6 U	2.7 J	NA	5 U	6 U	3.2 U	NA
Benzene	5	5	0.45	0.5 U	0.05 U	**0.67**	NA	0.5 U	0.05 U	0.025 U	NA
Carbon disulfide	--	--	81	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA
Chloroform	80	57	0.22	0.5 U	1 U	**0.65 J**	NA	**0.99**	**0.4 J**	0.5 U	NA
Chloromethane	--	--	19	0.5 U	2 U	1 U	NA	0.5 U	2 UJ	1 U	NA
cis-1,2-Dichloroethene	70	--	3.6	0.5 UJ	1 U	0.5 U	0.5 U	0.5 U	1 U	0.5 U	0.5 U
Tetrachloroethene	5	5	4.1	0.5 U	0.05 U	0.025 U	0.5 U	0.5 U	0.05 U	0.025 UJ	0.5 U
Toluene	1,000	1,000	110	0.12 J	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA
Trichloroethene	5	5	0.28	**0.48 J**	1 U	0.5 U	0.2 U	0.5 U	1 U	0.5 U	0.2 U
Vinyl chloride	2	0.25	0.019	0.5 U	0.15 U	0.05 U	0.2 U	0.5 U	0.15 U	0.05 U	0.2 U
Semivolatile Organic Compounds (µg/l)											
No Detections											
Pesticide/Polychlorinated Biphenyls (µg/l)											
No Detections											
Total Metals (µg/l)											
Aluminum	--	--	2,000	200 U	NA	NA	NA	265	NA	NA	NA
Barium	2,000	--	380	200 U	NA	NA	NA	200 U	NA	NA	NA
Calcium	--	--	--	110,000	NA	NA	NA	111,000	NA	NA	NA
Chromium	100	100	0.035	**1.3 J**	NA	NA	NA	**1.3 J**	NA	NA	NA
Cobalt	--	--	0.6	50 U	NA	NA	NA	0.41 J	NA	NA	NA
Copper	1,300	1,300	80	11.7 J	NA	NA	NA	25 U	NA	NA	NA
Iron	--	--	1,400	100 U	NA	NA	NA	205	NA	NA	NA
Magnesium	--	--	--	86,800	NA	NA	NA	83,800	NA	NA	NA
Manganese	--	--	43	**86.9**	NA	NA	NA	21.2	NA	NA	NA
Nickel	--	610	39	1.7 J	NA	NA	NA	1.3 J	NA	NA	NA
Potassium	--	--	--	2,260 J	NA	NA	NA	5,000 U	NA	NA	NA
Selenium	50	50	10	2.7 J	NA	NA	NA	2.1 J	NA	NA	NA
Sodium	--	--	--	260,000	NA	NA	NA	273,000	NA	NA	NA
Vanadium	--	--	8.6	**22.1 J**	NA	NA	NA	50 U	NA	NA	NA
Dissolved Metals (µg/l)											
Aluminum, Dissolved	--	--	2,000	200 U	NA	NA	NA	235	NA	NA	NA
Barium, Dissolved	2,000	--	380	56.7 J	NA	NA	NA	87.2 J	NA	NA	NA
Cadmium, Dissolved	5	5	0.92	5 U	NA	NA	NA	0.15 J	NA	NA	NA
Calcium, Dissolved	--	--	--	114,000	NA	NA	NA	120,000	NA	NA	NA
Chromium, Dissolved	100	100	0.035	**0.88 J**	NA	NA	NA	**0.81 J**	NA	NA	NA
Cobalt, Dissolved	--	--	0.6	50 U	NA	NA	NA	0.49 J	NA	NA	NA
Copper, Dissolved	1,300	1,300	80	8.8 J	NA	NA	NA	25 U	NA	NA	NA
Iron, Dissolved	--	--	1,400	100 U	NA	NA	NA	118	NA	NA	NA
Magnesium, Dissolved	--	--	--	89,200	NA	NA	NA	90,200	NA	NA	NA
Manganese, Dissolved	--	--	43	**79.2**	NA	NA	NA	18.8	NA	NA	NA
Mercury, Dissolved	2	0.05	0.57	0.2 U	NA	NA	NA	0.051 J	NA	NA	NA
Nickel, Dissolved	--	610	39	1.6 J	NA	NA	NA	1.2 J	NA	NA	NA
Potassium, Dissolved	--	--	--	2,310 J	NA	NA	NA	2,510 J	NA	NA	NA
Selenium, Dissolved	50	50	10	3.6 J	NA	NA	NA	3.2 J	NA	NA	NA
Sodium, Dissolved	--	--	--	262,000	NA	NA	NA	285,000	NA	NA	NA
Vanadium, Dissolved	--	--	8.6	**22.4 J**	NA	NA	NA	**19 J**	NA	NA	NA

TABLE 4-4
Validated Groundwater Exceedances 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	MCL	Puerto Rico Water Quality Class SG	Adjusted Tap Water RSLs (June 2015)	EPI04-MW01				EPI04-MW02			
Sample ID				EPI04-GW01-06B	VEP4-GW01-0309	VEP04-GW01-0710	VEP4-GW01-0513	EPI04-GW02-06B	VEP4-GW02-0309	VEP04-GW02-0710	VEP4-GW02-0513
Sample Date				04/04/06	03/25/09	07/28/10	05/14/13	04/04/06	03/25/09	07/29/10	05/16/13
Chemical Name											
Wet Chemistry (mg/l)											
Alkalinity	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Chloride	--	--	--	NA	270	NA	NA	NA	NA	NA	NA
Methane	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate	10	10	3.2	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Total dissolved solids (TDS)	--	--	--	1,370	1,100	NA	NA	1,380	NA	NA	NA
Total organic carbon (TOC)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Dechlorinating Bacteria (cells/ml)											
Dehalococcoides	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Functioning Genes (cells/ml)											
No Detections											

Notes:
Shading indicates exceedance of MCL
Bold box indicates exceedance of Puerto Rico Water Quality Class SG
Bold text indicates exceedance of Adjusted Tap Water RSLs
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
D - Result of a dilution (laboratory qualifier)
H1 - Analyzed outside of recommended holding time (laboratory qualifier)
J - Analyte present, value may or may not be accurate or precise
M - Sample matrix interfered with the quantitation of the analyte; the parameters DL/LOD/LOQ have been raised (laboratory qualifier)
N - MS/MSD accuracy and/or precision outside acceptance criteria (laboratory qualifier)
R - Rejected result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
cells/ml - Cells per milliliter
mg/l - Milligrams per liter
µg/l - Micrograms per liter

TABLE 4-4
Validated Groundwater Exceedances 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	MCL	Puerto Rico Water Quality Class SG	Adjusted Tap Water RSLs (June 2015)	EPI04-MW03				EPI04-MW04			
Sample ID				EPI04-GW03-06B	VEP4-GW03-0309	VEP04-GW03-0710	VEP4-GW03-0513	EPI04-GW04-06B	VEP4-GW04-0309	VEP04-GW04-0710	VEP4-GW04-0513
Sample Date				04/04/06	03/26/09	07/29/10	05/16/13	04/05/06	03/24/09	07/29/10	05/20/13
Chemical Name											
Volatile Organic Compounds (µg/l)											
1,1-Dichloroethene	7	7	28	0.5 U	0.05 U	0.025 U	0.5 U	0.5 U	0.05 U	0.025 R	0.5 U
1,4-Dichlorobenzene	75	63	0.48	0.5 U	0.05 U	0.025 U	NA	0.5 U	0.05 U	0.025 R	NA
Acetone	--	--	1,400	5 U	6 U	140 U	NA	5 U	390	32 J	NA
Benzene	5	5	0.45	0.5 U	0.05 U	0.01 J	NA	0.5 U	0.05 U	0.025 R	NA
Carbon disulfide	--	--	81	0.5 U	1 U	0.5 U	NA	0.5 U	1	0.77 J	NA
Chloroform	80	57	0.22	0.5 U	1 U	0.5 U	NA	**0.5**	1 U	0.5 R	NA
Chloromethane	--	--	19	0.5 U	2 U	1 U	NA	0.5 U	2 U	1 R	NA
cis-1,2-Dichloroethene	70	--	3.6	0.5 UJ	1 U	0.5 U	0.5 U	0.5 U	1 U	0.5 R	0.5 U
Tetrachloroethene	5	5	4.1	0.5 U	0.05 U	0.025 U	0.5 U	0.5 U	0.05 U	0.025 R	0.5 U
Toluene	1,000	1,000	110	0.5 U	1 U	0.5 U	NA	0.11 J	1 U	0.5 R	NA
Trichloroethene	5	5	0.28	0.5 U	1 U	0.5 U	0.2 U	0.5 U	1 U	0.5 R	0.2 U
Vinyl chloride	2	0.25	0.019	0.5 U	0.15 U	0.05 U	0.2 U	0.5 U	0.15 U	0.05 R	0.2 U
Semivolatile Organic Compounds (µg/l)											
No Detections											
Pesticide/Polychlorinated Biphenyls (µg/l)											
No Detections											
Total Metals (µg/l)											
Aluminum	--	--	2,000	200 U	NA	NA	NA	200 U	NA	NA	NA
Barium	2,000	--	380	200 U	NA	NA	NA	200 U	NA	NA	NA
Calcium	--	--	--	80,500	NA	NA	NA	146,000	NA	NA	NA
Chromium	100	100	0.035	**1.8 J**	NA	NA	NA	**22.3**	NA	NA	NA
Cobalt	--	--	0.6	0.41 J	NA	NA	NA	50 U	NA	NA	NA
Copper	1,300	1,300	80	25 U	NA	NA	NA	25 U	NA	NA	NA
Iron	--	--	1,400	100 U	NA	NA	NA	213	NA	NA	NA
Magnesium	--	--	--	51,500	NA	NA	NA	169,000	NA	NA	NA
Manganese	--	--	43	8.1 J	NA	NA	NA	**64.6**	NA	NA	NA
Nickel	--	610	39	1.6 J	NA	NA	NA	18.1 J	NA	NA	NA
Potassium	--	--	--	5,000 U	NA	NA	NA	5,000 U	NA	NA	NA
Selenium	50	50	10	2.3 J	NA	NA	NA	2.8 J	NA	NA	NA
Sodium	--	--	--	245,000	NA	NA	NA	344,000	NA	NA	NA
Vanadium	--	--	8.6	50 U	NA	NA	NA	50 U	NA	NA	NA
Dissolved Metals (µg/l)											
Aluminum, Dissolved	--	--	2,000	200 U	NA	NA	NA	200 U	NA	NA	NA
Barium, Dissolved	2,000	--	380	91.1 J	NA	NA	NA	191 J	NA	NA	NA
Cadmium, Dissolved	5	5	0.92	5 U	NA	NA	NA	5 U	NA	NA	NA
Calcium, Dissolved	--	--	--	82,100	NA	NA	NA	151,000	NA	NA	NA
Chromium, Dissolved	100	100	0.035	**0.77 J**	NA	NA	NA	**2.4 J**	NA	NA	NA
Cobalt, Dissolved	--	--	0.6	50 U	NA	NA	NA	50 U	NA	NA	NA
Copper, Dissolved	1,300	1,300	80	25 U	NA	NA	NA	25 U	NA	NA	NA
Iron, Dissolved	--	--	1,400	100 U	NA	NA	NA	100 U	NA	NA	NA
Magnesium, Dissolved	--	--	--	53,000	NA	NA	NA	177,000	NA	NA	NA
Manganese, Dissolved	--	--	43	4.1 J	NA	NA	NA	31.4	NA	NA	NA
Mercury, Dissolved	2	0.05	0.57	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA
Nickel, Dissolved	--	610	39	1 J	NA	NA	NA	5.7 J	NA	NA	NA
Potassium, Dissolved	--	--	--	1,380 J	NA	NA	NA	1,620 J	NA	NA	NA
Selenium, Dissolved	50	50	10	1.9 J	NA	NA	NA	35 U	NA	NA	NA
Sodium, Dissolved	--	--	--	248,000	NA	NA	NA	355,000	NA	NA	NA
Vanadium, Dissolved	--	--	8.6	**25.2 J**	NA	NA	NA	**14.3 J**	NA	NA	NA

TABLE 4-4
Validated Groundwater Exceedances 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	MCL	Puerto Rico Water Quality Class SG	Adjusted Tap Water RSLs (June 2015)	EPI04-MW03				EPI04-MW04			
Sample ID				EPI04-GW03-06B	VEP4-GW03-0309	VEP04-GW03-0710	VEP4-GW03-0513	EPI04-GW04-06B	VEP4-GW04-0309	VEP04-GW04-0710	VEP4-GW04-0513
Sample Date				04/04/06	03/26/09	07/29/10	05/16/13	04/05/06	03/24/09	07/29/10	05/20/13
Chemical Name											
Wet Chemistry (mg/l)											
Alkalinity	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Chloride	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Methane	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate	10	10	3.2	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Total dissolved solids (TDS)	--	--	--	1,100	NA	NA	NA	1,980	NA	NA	NA
Total organic carbon (TOC)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Dechlorinating Bacteria (cells/ml)											
Dehalococcoides	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Functioning Genes (cells/ml)											
No Detections											

Notes:
Shading indicates exceedance of MCL
Bold box indicates exceedance of Puerto Rico Water Quality Class SG
Bold text indicates exceedance of Adjusted Tap Water RSLs
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
D - Result of a dilution (laboratory qualifier)
H1 - Analyzed outside of recommended holding time (laboratory qualifier)
J - Analyte present, value may or may not be accurate or precise
M - Sample matrix interfered with the quantitation of the analyte; the parameters DL/LOD/LOQ have been raised (laboratory qualifier)
N - MS/MSD accuracy and/or precision outside acceptance criteria (laboratory qualifier)
R - Rejected result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
cells/ml - Cells per milliliter
mg/l - Milligrams per liter
µg/l - Micrograms per liter

TABLE 4-4
Validated Groundwater Exceedances 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	MCL	Puerto Rico Water Quality Class SG	Adjusted Tap Water RSLs (June 2015)	EPI04-MW05							
Sample ID				EPI04-GW05-06B	VEP4-GW05-0309	VEP4-GW05P-0309	VEP04-GW05-0710	VEP4-GW05-1111	VEP4-GW05P-1111	VEP4-GW05-0513	VEP4-GW05P-0513
Sample Date				04/05/06	03/24/09	03/24/09	07/13/10	11/18/11	11/18/11	05/15/13	05/15/13
Chemical Name											
Volatile Organic Compounds (µg/l)											
1,1-Dichloroethene	7	7	28	0.5 U	0.017 J	0.018 J	0.084 J	0.5 U	0.5 U	1 U	1 U
1,4-Dichlorobenzene	75	63	0.48	0.5 U	0.05 UJ	0.05 U	0.013 J	NA	NA	NA	NA
Acetone	--	--	1,400	5 U	6 U	6 U	20 U	NA	NA	NA	NA
Benzene	5	5	0.45	0.5 U	0.05 U	0.05 U	0.012 J	NA	NA	NA	NA
Carbon disulfide	--	--	81	0.5 U	1 U	1 U	0.5 U	NA	NA	NA	NA
Chloroform	80	57	0.22	0.5 U	1 U	1 U	0.5 U	0.5 U	0.5 U	NA	NA
Chloromethane	--	--	19	0.5 U	2 U	2 U	1 U	NA	NA	NA	NA
cis-1,2-Dichloroethene	70	--	3.6	0.19 J	1 U	1 U	0.49 J	0.5 U	0.5 U	0.54 J	0.62 J
Tetrachloroethene	5	5	4.1	0.17 J	0.4 J	0.42	0.28 J	0.5 U	0.271 J	1 U	1 U
Toluene	1,000	1,000	110	0.5 U	1 U	1 U	0.5 U	NA	NA	NA	NA
Trichloroethene	5	5	0.28	**9.3**	**17**	**17**	**14**	**8.42**	**7.44**	**2.5**	**2.56**
Vinyl chloride	2	0.25	0.019	0.5 U	0.15 UJ	0.15 U	0.05 UJ	0.5 U	0.5 U	0.4 U	0.4 U
Semivolatile Organic Compounds (µg/l)											
No Detections											
Pesticide/Polychlorinated Biphenyls (µg/l)											
No Detections											
Total Metals (µg/l)											
Aluminum	--	--	2,000	794	NA	NA	NA	NA	NA	NA	NA
Barium	2,000	--	380	272	NA	NA	NA	NA	NA	NA	NA
Calcium	--	--	--	416,000	NA	NA	NA	NA	NA	NA	NA
Chromium	100	100	0.035	**11.7**	NA	NA	NA	NA	NA	NA	NA
Cobalt	--	--	0.6	**2.6 J**	NA	NA	NA	NA	NA	NA	NA
Copper	1,300	1,300	80	25 U	NA	NA	NA	NA	NA	NA	NA
Iron	--	--	1,400	1,280	NA	NA	NA	NA	NA	NA	NA
Magnesium	--	--	--	346,000	NA	NA	NA	NA	NA	NA	NA
Manganese	--	--	43	**62.6**	NA	NA	NA	NA	NA	NA	NA
Nickel	--	610	39	7.2 J	NA	NA	NA	NA	NA	NA	NA
Potassium	--	--	--	5,000 U	NA	NA	NA	NA	NA	NA	NA
Selenium	50	50	10	35 U	NA	NA	NA	NA	NA	NA	NA
Sodium	--	--	--	477,000	NA	NA	NA	NA	NA	NA	NA
Vanadium	--	--	8.6	50 U	NA	NA	NA	NA	NA	NA	NA
Dissolved Metals (µg/l)											
Aluminum, Dissolved	--	--	2,000	200 U	NA	NA	NA	NA	NA	NA	NA
Barium, Dissolved	2,000	--	380	273	NA	NA	NA	NA	NA	NA	NA
Cadmium, Dissolved	5	5	0.92	5 U	NA	NA	NA	NA	NA	NA	NA
Calcium, Dissolved	--	--	--	422,000	NA	NA	NA	NA	NA	NA	NA
Chromium, Dissolved	100	100	0.035	**1.2 J**	NA	NA	NA	NA	NA	NA	NA
Cobalt, Dissolved	--	--	0.6	50 U	NA	NA	NA	NA	NA	NA	NA
Copper, Dissolved	1,300	1,300	80	25 U	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	--	--	1,400	66.6 J	NA	NA	NA	NA	NA	NA	NA
Magnesium, Dissolved	--	--	--	358,000	NA	NA	NA	NA	NA	NA	NA
Manganese, Dissolved	--	--	43	13.3 J	NA	NA	NA	NA	NA	NA	NA
Mercury, Dissolved	2	0.05	0.57	0.2 U	NA	NA	NA	NA	NA	NA	NA
Nickel, Dissolved	--	610	39	3.1 J	NA	NA	NA	NA	NA	NA	NA
Potassium, Dissolved	--	--	--	3,260 J	NA	NA	NA	NA	NA	NA	NA
Selenium, Dissolved	50	50	10	35 U	NA	NA	NA	NA	NA	NA	NA
Sodium, Dissolved	--	--	--	493,000	NA	NA	NA	NA	NA	NA	NA
Vanadium, Dissolved	--	--	8.6	**13.5 J**	NA	NA	NA	NA	NA	NA	NA

TABLE 4-4
Validated Groundwater Exceedances 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	MCL	Puerto Rico Water Quality Class SG	Adjusted Tap Water RSLs (June 2015)	EPI04-MW05							
Sample ID				EPI04-GW05-06B	VEP4-GW05-0309	VEP4-GW05P-0309	VEP04-GW05-0710	VEP4-GW05-1111	VEP4-GW05P-1111	VEP4-GW05-0513	VEP4-GW05P-0513
Sample Date				04/05/06	03/24/09	03/24/09	07/13/10	11/18/11	11/18/11	05/15/13	05/15/13
Chemical Name											
Wet Chemistry (mg/l)											
Alkalinity	--	--	--	NA	NA	NA	NA	346	NA	NA	NA
Chloride	--	--	--	NA	NA	NA	NA	2,020	NA	NA	NA
Methane	--	--	--	NA	NA	NA	NA	0.00555	NA	NA	NA
Nitrate	10	10	3.2	NA	NA	NA	NA	0.35	NA	NA	NA
Sulfate	--	--	--	NA	NA	NA	NA	234	NA	NA	NA
Total dissolved solids (TDS)	--	--	--	4,560	NA	NA	NA	4,000	NA	NA	NA
Total organic carbon (TOC)	--	--	--	NA	NA	NA	NA	1.04	NA	NA	NA
Dechlorinating Bacteria (cells/ml)											
Dehalococcoides	--	--	--	NA	NA	NA	NA	0.2 J	NA	NA	NA
Functioning Genes (cells/ml)											
No Detections											

Notes:
Shading indicates exceedance of MCL
Bold box indicates exceedance of Puerto Rico Water Quality Class SG
Bold text indicates exceedance of Adjusted Tap Water RSLs
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
D - Result of a dilution (laboratory qualifier)
H1 - Analyzed outside of recommended holding time (laboratory qualifier)
J - Analyte present, value may or may not be accurate or precise
M - Sample matrix interfered with the quantitation of the analyte; the parameters DL/LOD/LOQ have been raised (laboratory qualifier)
N - MS/MSD accuracy and/or precision outside acceptance criteria (laboratory qualifier)
R - Rejected result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
cells/ml - Cells per milliliter
mg/l - Milligrams per liter
µg/l - Micrograms per liter

TABLE 4-4
Validated Groundwater Exceedances 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	MCL	Puerto Rico Water Quality Class SG	Adjusted Tap Water RSLs (June 2015)	EPI04-MW06				EPI04-MW07				
Sample ID				VEP4-GW06-0309	VEP04-GW06-0710	VEP4-GW06-1111	VEP4-GW06-0513	VEP4-GW07-0409	VEP04-GW07-0710	VEP04-GW07P-0710	VEP4-GW07-1111	VEP4-GW07-0513
Sample Date				03/26/09	07/14/10	11/17/11	05/15/13	04/03/09	07/13/10	07/13/10	11/17/11	05/17/13
Chemical Name												
Volatile Organic Compounds (µg/l)												
1,1-Dichloroethene	7	7	28	0.05 U	0.025 U	0.5 U	0.5 U	0.05 U	0.025 U	0.025 U	0.5 U	0.5 U
1,4-Dichlorobenzene	75	63	0.48	0.05 U	0.011 J	NA	NA	0.05 U	0.012 J	0.011 J	NA	NA
Acetone	--	--	1,400	10 U	10 U	NA	NA	22	2.6 U	3.7 U	NA	NA
Benzene	5	5	0.45	0.05 U	0.033 J	NA	NA	0.05 U	0.043 J	0.039 J	NA	NA
Carbon disulfide	--	--	81	1 U	0.51 U	NA	NA	1 U	0.5 U	0.5 U	NA	NA
Chloroform	80	57	0.22	1 U	0.5 U	0.5 U	NA	1 U	0.5 U	0.5 U	0.5 U	NA
Chloromethane	--	--	19	2 U	1 U	NA	NA	2 U	1 U	0.37 J	NA	NA
cis-1,2-Dichloroethene	70	--	3.6	1 U	0.5 U	0.5 U	0.5 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U
Tetrachloroethene	5	5	4.1	0.025 J	0.017 J	0.5 U	0.5 U	0.05 U	0.025 U	0.025 U	0.5 U	0.5 U
Toluene	1,000	1,000	110	1 U	0.5 U	NA	NA	1 U	0.5 U	0.5 U	NA	NA
Trichloroethene	5	5	0.28	1 U	0.5 U	0.5 U	0.2 U	1 U	0.5 U	0.5 U	0.5 U	0.2 U
Vinyl chloride	2	0.25	0.019	**0.027 J**	0.05 U	0.5 U	0.2 U	0.15 U	0.05 U	0.05 U	0.5 U	0.2 U
Semivolatile Organic Compounds (µg/l)												
No Detections												
Pesticide/Polychlorinated Biphenyls (µg/l)												
No Detections												
Total Metals (µg/l)												
Aluminum	--	--	2,000	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	2,000	--	380	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	100	100	0.035	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	--	--	0.6	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	1,300	1,300	80	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	--	--	1,400	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	--	--	43	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	--	610	39	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	50	50	10	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	--	--	8.6	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Metals (µg/l)												
Aluminum, Dissolved	--	--	2,000	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium, Dissolved	2,000	--	380	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium, Dissolved	5	5	0.92	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium, Dissolved	100	100	0.035	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt, Dissolved	--	--	0.6	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper, Dissolved	1,300	1,300	80	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	--	--	1,400	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese, Dissolved	--	--	43	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury, Dissolved	2	0.05	0.57	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel, Dissolved	--	610	39	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium, Dissolved	50	50	10	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium, Dissolved	--	--	8.6	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 4-4
Validated Groundwater Exceedances 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	MCL	Puerto Rico Water Quality Class SG	Adjusted Tap Water RSLs (June 2015)	EPI04-MW06				EPI04-MW07				
Sample ID				VEP4-GW06-0309	VEP04-GW06-0710	VEP4-GW06-1111	VEP4-GW06-0513	VEP4-GW07-0409	VEP04-GW07-0710	VEP04-GW07P-0710	VEP4-GW07-1111	VEP4-GW07-0513
Sample Date				03/26/09	07/14/10	11/17/11	05/15/13	04/03/09	07/13/10	07/13/10	11/17/11	05/17/13
Chemical Name												
Wet Chemistry (mg/l)												
Alkalinity	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloride	--	--	--	NA	NA	NA	NA	3,100	NA	NA	NA	NA
Methane	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate	10	10	3.2	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total dissolved solids (TDS)	--	--	--	NA	NA	NA	NA	2,300	NA	NA	NA	NA
Total organic carbon (TOC)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dechlorinating Bacteria (cells/ml)												
Dehalococcoides	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Functioning Genes (cells/ml)												
No Detections												

Notes:
Shading indicates exceedance of MCL
Bold box indicates exceedance of Puerto Rico Water Quality Class SG
Bold text indicates exceedance of Adjusted Tap Water RSLs
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
D - Result of a dilution (laboratory qualifier)
H1 - Analyzed outside of recommended holding time (laboratory qualifier)
J - Analyte present, value may or may not be accurate or precise
M - Sample matrix interfered with the quantitation of the analyte; the parameters DL/LOD/LOQ have been raised (laboratory qualifier)
N - MS/MSD accuracy and/or precision outside acceptance criteria (laboratory qualifier)
R - Rejected result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
cells/ml - Cells per milliliter
mg/l - Milligrams per liter
µg/l - Micrograms per liter

TABLE 4-4
Validated Groundwater Exceedances 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	MCL	Puerto Rico Water Quality Class SG	Adjusted Tap Water RSLs (June 2015)	EPI04-MW08			EPI04-MW09		EPI04-MW10		
Sample ID				VEP4-GW08-1111	VEP4-GW08-0513	VEP4-GW08P-0513	VEP4-GW09-1111	VEP4-GW09-0513	VEP4-GW10-1111	VEP4-GW10-0513	VEP4-GW10-0914
Sample Date				11/15/11	05/20/13	05/20/13	11/18/11	05/22/13	11/20/11	05/21/13	09/16/14
Chemical Name											
Volatile Organic Compounds (µg/l)											
1,1-Dichloroethene	7	7	28	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U
1,4-Dichlorobenzene	75	63	0.48	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	--	--	1,400	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	5	5	0.45	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	--	--	81	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	80	57	0.22	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	NA
Chloromethane	--	--	19	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	70	--	3.6	0.5 U	0.38 J	0.44 J	0.5 U	0.5 U	0.43 J	0.51 J	0.674 J
Tetrachloroethene	5	5	4.1	1.03	0.5 U	0.5 U	0.5 U	0.5 U	0.51 J	0.5 U	0.72 J
Toluene	1,000	1,000	110	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	5	5	0.28	**41.4**	**2.44**	**2.31**	**2.76**	**0.9**	**21.1**	**6.71**	**23.3**
Vinyl chloride	2	0.25	0.019	0.5 U	0.2 U	0.2 U	0.5 U	0.2 U	0.5 U	0.2 U	0.4 U
Semivolatile Organic Compounds (µg/l)											
No Detections											
Pesticide/Polychlorinated Biphenyls (µg/l)											
No Detections											
Total Metals (µg/l)											
Aluminum	--	--	2,000	NA	NA	NA	NA	NA	NA	NA	NA
Barium	2,000	--	380	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	100	100	0.035	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	--	--	0.6	NA	NA	NA	NA	NA	NA	NA	NA
Copper	1,300	1,300	80	NA	NA	NA	NA	NA	NA	NA	NA
Iron	--	--	1,400	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	--	--	43	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	--	610	39	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	50	50	10	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	--	--	8.6	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Metals (µg/l)											
Aluminum, Dissolved	--	--	2,000	NA	NA	NA	NA	NA	NA	NA	NA
Barium, Dissolved	2,000	--	380	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium, Dissolved	5	5	0.92	NA	NA	NA	NA	NA	NA	NA	NA
Calcium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Chromium, Dissolved	100	100	0.035	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt, Dissolved	--	--	0.6	NA	NA	NA	NA	NA	NA	NA	NA
Copper, Dissolved	1,300	1,300	80	NA	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	--	--	1,400	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Manganese, Dissolved	--	--	43	NA	NA	NA	NA	NA	NA	NA	NA
Mercury, Dissolved	2	0.05	0.57	NA	NA	NA	NA	NA	NA	NA	NA
Nickel, Dissolved	--	610	39	NA	NA	NA	NA	NA	NA	NA	NA
Potassium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Selenium, Dissolved	50	50	10	NA	NA	NA	NA	NA	NA	NA	NA
Sodium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium, Dissolved	--	--	8.6	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 4-4
Validated Groundwater Exceedances 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	MCL	Puerto Rico Water Quality Class SG	Adjusted Tap Water RSLs (June 2015)	EPI04-MW08			EPI04-MW09		EPI04-MW10		
Sample ID				VEP4-GW08-1111	VEP4-GW08-0513	VEP4-GW08P-0513	VEP4-GW09-1111	VEP4-GW09-0513	VEP4-GW10-1111	VEP4-GW10-0513	VEP4-GW10-0914
Sample Date				11/15/11	05/20/13	05/20/13	11/18/11	05/22/13	11/20/11	05/21/13	09/16/14
Chemical Name											
Wet Chemistry (mg/l)											
Alkalinity	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Chloride	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Methane	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate	10	10	3.2	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Total dissolved solids (TDS)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (TOC)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Dechlorinating Bacteria (cells/ml)											
Dehalococcoides	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Functioning Genes (cells/ml)											
No Detections											

Notes:
Shading indicates exceedance of MCL
Bold box indicates exceedance of Puerto Rico Water Quality Class SG
Bold text indicates exceedance of Adjusted Tap Water RSLs
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
D - Result of a dilution (laboratory qualifier)
H1 - Analyzed outside of recommended holding time (laboratory qualifier)
J - Analyte present, value may or may not be accurate or precise
M - Sample matrix interfered with the quantitation of the analyte; the parameters DL/LOD/LOQ have been raised (laboratory qualifier)
N - MS/MSD accuracy and/or precision outside acceptance criteria (laboratory qualifier)
R - Rejected result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
cells/ml - Cells per milliliter
mg/l - Milligrams per liter
µg/l - Micrograms per liter

TABLE 4-4
Validated Groundwater Exceedances 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	MCL	Puerto Rico Water Quality Class SG	Adjusted Tap Water RSLs (June 2015)	EPI04-MW11		EPI04-MW12		EPI04-MW13				
Sample ID				VEP4-GW11-1111	VEP4-GW11-0513	VEP4-GW12-1111	VEP4-GW12-0513	VEP4-GW13-1211	VEP4-GW13-0513	VEP4-GW13P-0513	VEP4-GW13-0914	VEP4-GW13P-0914
Sample Date				11/21/11	05/23/13	11/21/11	05/23/13	12/07/11	05/22/13	05/22/13	09/16/14	09/16/14
Chemical Name												
Volatile Organic Compounds (µg/l)												
1,1-Dichloroethene	7	7	28	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	1 U
1,4-Dichlorobenzene	75	63	0.48	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	--	--	1,400	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	5	5	0.45	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	--	--	81	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	80	57	0.22	0.5 U	NA	0.5 U	NA	0.5 U	NA	NA	NA	NA
Chloromethane	--	--	19	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	70	--	3.6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.47 J	0.47 J	0.986 J	1.05 J
Tetrachloroethene	5	5	4.1	0.5 U	0.5 U	0.61 J	0.5 U	1.96	1.25 J	1.59 J	0.576 J	0.644 J
Toluene	1,000	1,000	110	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	5	5	0.28	0.265 J	0.2 U	**16.6**	**1.8**	**87.7**	**61.9**	**64.9**	**32.3**	**32.6**
Vinyl chloride	2	0.25	0.019	0.5 U	0.2 U	0.5 U	0.2 U	0.5 U	0.2 U	0.2 U	0.4 U	0.4 U
Semivolatile Organic Compounds (µg/l)												
No Detections												
Pesticide/Polychlorinated Biphenyls (µg/l)												
No Detections												
Total Metals (µg/l)												
Aluminum	--	--	2,000	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	2,000	--	380	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	100	100	0.035	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	--	--	0.6	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	1,300	1,300	80	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	--	--	1,400	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	--	--	43	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	--	610	39	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	50	50	10	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	--	--	8.6	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Metals (µg/l)												
Aluminum, Dissolved	--	--	2,000	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium, Dissolved	2,000	--	380	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium, Dissolved	5	5	0.92	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium, Dissolved	100	100	0.035	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt, Dissolved	--	--	0.6	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper, Dissolved	1,300	1,300	80	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	--	--	1,400	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese, Dissolved	--	--	43	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury, Dissolved	2	0.05	0.57	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel, Dissolved	--	610	39	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium, Dissolved	50	50	10	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium, Dissolved	--	--	8.6	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 4-4
Validated Groundwater Exceedances 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	MCL	Puerto Rico Water Quality Class SG	Adjusted Tap Water RSLs (June 2015)	EPI04-MW11		EPI04-MW12		EPI04-MW13				
Sample ID				VEP4-GW11-1111	VEP4-GW11-0513	VEP4-GW12-1111	VEP4-GW12-0513	VEP4-GW13-1211	VEP4-GW13-0513	VEP4-GW13P-0513	VEP4-GW13-0914	VEP4-GW13P-0914
Sample Date				11/21/11	05/23/13	11/21/11	05/23/13	12/07/11	05/22/13	05/22/13	09/16/14	09/16/14
Chemical Name												
Wet Chemistry (mg/l)												
Alkalinity	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloride	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methane	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate	10	10	3.2	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total dissolved solids (TDS)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (TOC)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dechlorinating Bacteria (cells/ml)												
Dehalococcoides	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Functioning Genes (cells/ml)												
No Detections												

Notes:
Shading indicates exceedance of MCL
Bold box indicates exceedance of Puerto Rico Water Quality Class SG
Bold text indicates exceedance of Adjusted Tap Water RSLs
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
D - Result of a dilution (laboratory qualifier)
H1 - Analyzed outside of recommended holding time (laboratory qualifier)
J - Analyte present, value may or may not be accurate or precise
M - Sample matrix interfered with the quantitation of the analyte; the parameters DL/LOD/LOQ have been raised (laboratory qualifier)
N - MS/MSD accuracy and/or precision outside acceptance criteria (laboratory qualifier)
R - Rejected result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
cells/ml - Cells per milliliter
mg/l - Milligrams per liter
µg/l - Micrograms per liter

TABLE 4-4
Validated Groundwater Exceedances 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	MCL	Puerto Rico Water Quality Class SG	Adjusted Tap Water RSLs (June 2015)	EPI04-MW13D		EPI04-MW14			EPI04-MW15	EPI04-MW16	
Sample ID				VEP4-GW13D-0713	VEP4-GW13D-0914	VEP4-GW14-1211	VEP4-GW14-0513	VEP4-GW14-0914	VEP4-GW15-0613	VEP4-GW16-0613	VEP4-GW16-0914
Sample Date				07/02/13	09/16/14	12/07/11	05/24/13	09/15/14	06/05/13	06/10/13	09/11/14
Chemical Name											
Volatile Organic Compounds (µg/l)											
1,1-Dichloroethene	7	7	28	0.5 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U
1,4-Dichlorobenzene	75	63	0.48	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	--	--	1,400	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	5	5	0.45	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	--	--	81	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	80	57	0.22	NA	NA	0.5 U	NA	NA	NA	NA	NA
Chloromethane	--	--	19	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	70	--	3.6	0.5 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U
Tetrachloroethene	5	5	4.1	0.78 J	0.725 J	0.5 U	0.5 U	0.5 U	0.5 UJ	0.34 J	1 U
Toluene	1,000	1,000	110	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	5	5	0.28	**48.8**	**35.3**	**5.47**	**0.3 J**	0.2 U	**2.3**	**14.7**	**9.17**
Vinyl chloride	2	0.25	0.019	0.2 U	0.4 U	0.5 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.4 U
Semivolatile Organic Compounds (µg/l)											
No Detections											
Pesticide/Polychlorinated Biphenyls (µg/l)											
No Detections											
Total Metals (µg/l)											
Aluminum	--	--	2,000	NA	NA	NA	NA	NA	NA	NA	NA
Barium	2,000	--	380	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	100	100	0.035	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	--	--	0.6	NA	NA	NA	NA	NA	NA	NA	NA
Copper	1,300	1,300	80	NA	NA	NA	NA	NA	NA	NA	NA
Iron	--	--	1,400	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	--	--	43	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	--	610	39	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	50	50	10	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	--	--	8.6	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Metals (µg/l)											
Aluminum, Dissolved	--	--	2,000	NA	NA	NA	NA	NA	NA	NA	NA
Barium, Dissolved	2,000	--	380	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium, Dissolved	5	5	0.92	NA	NA	NA	NA	NA	NA	NA	NA
Calcium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Chromium, Dissolved	100	100	0.035	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt, Dissolved	--	--	0.6	NA	NA	NA	NA	NA	NA	NA	NA
Copper, Dissolved	1,300	1,300	80	NA	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	--	--	1,400	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Manganese, Dissolved	--	--	43	NA	NA	NA	NA	NA	NA	NA	NA
Mercury, Dissolved	2	0.05	0.57	NA	NA	NA	NA	NA	NA	NA	NA
Nickel, Dissolved	--	610	39	NA	NA	NA	NA	NA	NA	NA	NA
Potassium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Selenium, Dissolved	50	50	10	NA	NA	NA	NA	NA	NA	NA	NA
Sodium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium, Dissolved	--	--	8.6	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 4-4
Validated Groundwater Exceedances 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	MCL	Puerto Rico Water Quality Class SG	Adjusted Tap Water RSLs (June 2015)	EPI04-MW13D		EPI04-MW14			EPI04-MW15	EPI04-MW16	
Sample ID				VEP4-GW13D-0713	VEP4-GW13D-0914	VEP4-GW14-1211	VEP4-GW14-0513	VEP4-GW14-0914	VEP4-GW15-0613	VEP4-GW16-0613	VEP4-GW16-0914
Sample Date				07/02/13	09/16/14	12/07/11	05/24/13	09/15/14	06/05/13	06/10/13	09/11/14
Chemical Name											
Wet Chemistry (mg/l)											
Alkalinity	--	--	--	NA	NA	NA	NA	NA	507 N	456	NA
Chloride	--	--	--	NA	NA	NA	NA	NA	941 MD	1,320 MD	NA
Methane	--	--	--	NA	NA	NA	NA	NA	0.00115 NJ	0.002 U	NA
Nitrate	10	10	3.2	NA	NA	NA	NA	NA	2.29	**4.16**	NA
Sulfate	--	--	--	NA	NA	NA	NA	NA	167	196	NA
Total dissolved solids (TDS)	--	--	--	NA	NA	NA	NA	NA	2,320	2,690	NA
Total organic carbon (TOC)	--	--	--	NA	NA	NA	NA	NA	1.6 J	1.32 J	NA
Dechlorinating Bacteria (cells/ml)											
Dehalococcoides	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA
Functioning Genes (cells/ml)											
No Detections											

Notes:
Shading indicates exceedance of MCL
Bold box indicates exceedance of Puerto Rico Water Quality Class SG
Bold text indicates exceedance of Adjusted Tap Water RSLs
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
D - Result of a dilution (laboratory qualifier)
H1 - Analyzed outside of recommended holding time (laboratory qualifier)
J - Analyte present, value may or may not be accurate or precise
M - Sample matrix interfered with the quantitation of the analyte; the parameters DL/LOD/LOQ have been raised (laboratory qualifier)
N - MS/MSD accuracy and/or precision outside acceptance criteria (laboratory qualifier)
R - Rejected result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
cells/ml - Cells per milliliter
mg/l - Milligrams per liter
µg/l - Micrograms per liter

TABLE 4-4
Validated Groundwater Exceedances 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	MCL	Puerto Rico Water Quality Class SG	Adjusted Tap Water RSLs (June 2015)	EPI04-MW17			EPI04-MW17D		EPI04-MW18		EPI04-MW19	
Sample ID				VEP4-GW17-0613	VEP4-GW17P-0613	VEP4-GW17-0914	VEP4-GW17D-0713	VEP4-GW17D-0914	VEP4-GW18-0613	VEP4-GW18-0914	VEP4-GW19-0613	VEP4-GW19-0914
Sample Date				06/10/13	06/10/13	09/17/14	07/01/13	09/17/14	06/07/13	09/15/14	06/06/13	09/15/14
Chemical Name												
Volatile Organic Compounds (µg/l)												
1,1-Dichloroethene	7	7	28	0.3 J	1 U	1 U	0.5 U	1 U	0.5 U	1 U	0.5 U	1 U
1,4-Dichlorobenzene	75	63	0.48	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	--	--	1,400	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	5	5	0.45	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	--	--	81	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	80	57	0.22	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloromethane	--	--	19	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	70	--	3.6	0.28 J	1 U	1 U	0.6 J	0.651 J	0.5 U	1 U	0.5 U	1 U
Tetrachloroethene	5	5	4.1	2.4 J	1.92 J	2.14	1.07	1.01 J	0.5 U	1 U	0.5 U	1 U
Toluene	1,000	1,000	110	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	5	5	0.28	**114 J**	**92.7 J**	**98.1**	**58.8**	**47.6**	**2.24**	**2.3**	**2.7**	**3.27**
Vinyl chloride	2	0.25	0.019	0.2 U	0.4 U	0.4 U	0.2 U	0.4 U	0.2 U	0.4 U	0.2 U	0.4 U
Semivolatile Organic Compounds (µg/l)												
No Detections												
Pesticide/Polychlorinated Biphenyls (µg/l)												
No Detections												
Total Metals (µg/l)												
Aluminum	--	--	2,000	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	2,000	--	380	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	100	100	0.035	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	--	--	0.6	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	1,300	1,300	80	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	--	--	1,400	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	--	--	43	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	--	610	39	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	50	50	10	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	--	--	8.6	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Metals (µg/l)												
Aluminum, Dissolved	--	--	2,000	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium, Dissolved	2,000	--	380	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium, Dissolved	5	5	0.92	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium, Dissolved	100	100	0.035	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt, Dissolved	--	--	0.6	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper, Dissolved	1,300	1,300	80	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	--	--	1,400	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese, Dissolved	--	--	43	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury, Dissolved	2	0.05	0.57	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel, Dissolved	--	610	39	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium, Dissolved	50	50	10	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium, Dissolved	--	--	8.6	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 4-4
Validated Groundwater Exceedances 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	MCL	Puerto Rico Water Quality Class SG	Adjusted Tap Water RSLs (June 2015)	EPI04-MW17			EPI04-MW17D		EPI04-MW18		EPI04-MW19	
Sample ID				VEP4-GW17-0613	VEP4-GW17P-0613	VEP4-GW17-0914	VEP4-GW17D-0713	VEP4-GW17D-0914	VEP4-GW18-0613	VEP4-GW18-0914	VEP4-GW19-0613	VEP4-GW19-0914
Sample Date				06/10/13	06/10/13	09/17/14	07/01/13	09/17/14	06/07/13	09/15/14	06/06/13	09/15/14
Chemical Name												
Wet Chemistry (mg/l)												
Alkalinity	--	--	--	NA	NA	NA	NA	NA	364	NA	NA	NA
Chloride	--	--	--	NA	NA	NA	NA	NA	3,110 H1M	NA	NA	NA
Methane	--	--	--	NA	NA	NA	NA	NA	0.00248 J	NA	NA	NA
Nitrate	10	10	3.2	NA	NA	NA	NA	NA	2.47	NA	NA	NA
Sulfate	--	--	--	NA	NA	NA	NA	NA	235	NA	NA	NA
Total dissolved solids (TDS)	--	--	--	NA	NA	NA	NA	NA	6,570	NA	NA	NA
Total organic carbon (TOC)	--	--	--	NA	NA	NA	NA	NA	2.5 U	NA	NA	NA
Dechlorinating Bacteria (cells/ml)												
Dehalococcoides	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Functioning Genes (cells/ml)												
No Detections												

Notes:
Shading indicates exceedance of MCL
Bold box indicates exceedance of Puerto Rico Water Quality Class SG
Bold text indicates exceedance of Adjusted Tap Water RSLs
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
D - Result of a dilution (laboratory qualifier)
H1 - Analyzed outside of recommended holding time (laboratory qualifier)
J - Analyte present, value may or may not be accurate or precise
M - Sample matrix interfered with the quantitation of the analyte; the parameters DL/LOD/LOQ have been raised (laboratory qualifier)
N - MS/MSD accuracy and/or precision outside acceptance criteria (laboratory qualifier)
R - Rejected result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
cells/ml - Cells per milliliter
mg/l - Milligrams per liter
µg/l - Micrograms per liter

TABLE 4-4
Validated Groundwater Exceedances 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	MCL	Puerto Rico Water Quality Class SG	Adjusted Tap Water RSLs (June 2015)	EPI04-MW20		EPI04-MW21		EPI04-MW22			EPI04-MW23	
Sample ID				VEP4-GW20-0613	VEP4-GW20-0914	VEP4-GW21-0713	VEP4-GW21-0914	VEP4-GW22-0713	VEP4-GW22-0914	VEP4-GW22P-0914	VEP4-GW23-0713	VEP4-GW23-0914
Sample Date				06/17/13	09/12/14	07/16/13	09/11/14	07/17/13	09/11/14	09/11/14	07/23/13	09/17/14
Chemical Name												
Volatile Organic Compounds (µg/l)												
1,1-Dichloroethene	7	7	28	0.5 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.34 J	0.754 J
1,4-Dichlorobenzene	75	63	0.48	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	--	--	1,400	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	5	5	0.45	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	--	--	81	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	80	57	0.22	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloromethane	--	--	19	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	70	--	3.6	0.5 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.04	1.33 J
Tetrachloroethene	5	5	4.1	1.06	0.574 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.32	1.62 J
Toluene	1,000	1,000	110	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	5	5	0.28	**52.2**	**30.6**	**6.8**	**2.1**	**1.73**	**0.613**	**0.525**	**71**	**84.1**
Vinyl chloride	2	0.25	0.019	0.2 U	0.4 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.4 U
Semivolatile Organic Compounds (µg/l)												
No Detections												
Pesticide/Polychlorinated Biphenyls (µg/l)												
No Detections												
Total Metals (µg/l)												
Aluminum	--	--	2,000	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	2,000	--	380	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	100	100	0.035	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	--	--	0.6	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	1,300	1,300	80	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	--	--	1,400	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	--	--	43	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	--	610	39	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	50	50	10	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	--	--	8.6	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Metals (µg/l)												
Aluminum, Dissolved	--	--	2,000	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium, Dissolved	2,000	--	380	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium, Dissolved	5	5	0.92	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium, Dissolved	100	100	0.035	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt, Dissolved	--	--	0.6	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper, Dissolved	1,300	1,300	80	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	--	--	1,400	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese, Dissolved	--	--	43	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury, Dissolved	2	0.05	0.57	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel, Dissolved	--	610	39	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium, Dissolved	50	50	10	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium, Dissolved	--	--	8.6	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 4-4
Validated Groundwater Exceedances 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	MCL	Puerto Rico Water Quality Class SG	Adjusted Tap Water RSLs (June 2015)	EPI04-MW20		EPI04-MW21		EPI04-MW22			EPI04-MW23	
Sample ID				VEP4-GW20-0613	VEP4-GW20-0914	VEP4-GW21-0713	VEP4-GW21-0914	VEP4-GW22-0713	VEP4-GW22-0914	VEP4-GW22P-0914	VEP4-GW23-0713	VEP4-GW23-0914
Sample Date				06/17/13	09/12/14	07/16/13	09/11/14	07/17/13	09/11/14	09/11/14	07/23/13	09/17/14
Chemical Name												
Wet Chemistry (mg/l)												
Alkalinity	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloride	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methane	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate	10	10	3.2	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total dissolved solids (TDS)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (TOC)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dechlorinating Bacteria (cells/ml)												
Dehalococcoides	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Functioning Genes (cells/ml)												
No Detections												

Notes:
Shading indicates exceedance of MCL
Bold box indicates exceedance of Puerto Rico Water Quality Class SG
Bold text indicates exceedance of Adjusted Tap Water RSLs
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
D - Result of a dilution (laboratory qualifier)
H1 - Analyzed outside of recommended holding time (laboratory qualifier)
J - Analyte present, value may or may not be accurate or precise
M - Sample matrix interfered with the quantitation of the analyte; the parameters DL/LOD/LOQ have been raised (laboratory qualifier)
N - MS/MSD accuracy and/or precision outside acceptance criteria (laboratory qualifier)
R - Rejected result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
cells/ml - Cells per milliliter
mg/l - Milligrams per liter
µg/l - Micrograms per liter

TABLE 4-4
Validated Groundwater Exceedances 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	MCL	Puerto Rico Water Quality Class SG	Adjusted Tap Water RSLs (June 2015)	EPI04-MW24			EPI04-MW24D	EPI04-MW25		EPI04-MW25D	EPI04-MW26	
Sample ID				VEP4-GW24-0713	VEP4-GW24-0914	VEP4-GW24P-0914	VEP4-GW24D-0914	VEP4-GW25-0913	VEP4-GW25-0914	VEP4-GW25D-0914	VEP4-GW26-0913	VEP4-GW26-0914
Sample Date				07/24/13	09/23/14	09/23/14	09/26/14	09/26/13	09/18/14	09/23/14	09/24/13	09/12/14
Chemical Name												
Volatile Organic Compounds (µg/l)												
1,1-Dichloroethene	7	7	28	1.06 J	1.15 J	1.29 J	1 U	1 U	0.527 J	1 U	0.5 U	1 U
1,4-Dichlorobenzene	75	63	0.48	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	--	--	1,400	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	5	5	0.45	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	--	--	81	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	80	57	0.22	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloromethane	--	--	19	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	70	--	3.6	1 U	0.719 J	0.648 J	1 U	1 U	1 U	1 U	0.73 J	0.507 J
Tetrachloroethene	5	5	4.1	**5.14**	**5.87**	**5.33**	1.52 J	2.84	2.35	1.5 J	0.5 U	1 U
Toluene	1,000	1,000	110	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	5	5	0.28	**246**	**334**	**317**	**98.2**	**143**	**157**	**101**	**12.6**	**6.52**
Vinyl chloride	2	0.25	0.019	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.2 U	0.4 U
Semivolatile Organic Compounds (µg/l)												
No Detections												
Pesticide/Polychlorinated Biphenyls (µg/l)												
No Detections												
Total Metals (µg/l)												
Aluminum	--	--	2,000	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	2,000	--	380	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	100	100	0.035	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	--	--	0.6	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	1,300	1,300	80	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	--	--	1,400	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	--	--	43	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	--	610	39	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	50	50	10	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	--	--	8.6	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Metals (µg/l)												
Aluminum, Dissolved	--	--	2,000	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium, Dissolved	2,000	--	380	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium, Dissolved	5	5	0.92	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium, Dissolved	100	100	0.035	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt, Dissolved	--	--	0.6	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper, Dissolved	1,300	1,300	80	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	--	--	1,400	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese, Dissolved	--	--	43	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury, Dissolved	2	0.05	0.57	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel, Dissolved	--	610	39	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium, Dissolved	50	50	10	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium, Dissolved	--	--	8.6	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 4-4
Validated Groundwater Exceedances 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	MCL	Puerto Rico Water Quality Class SG	Adjusted Tap Water RSLs (June 2015)	EPI04-MW24			EPI04-MW24D	EPI04-MW25		EPI04-MW25D	EPI04-MW26	
Sample ID				VEP4-GW24-0713	VEP4-GW24-0914	VEP4-GW24P-0914	VEP4-GW24D-0914	VEP4-GW25-0913	VEP4-GW25-0914	VEP4-GW25D-0914	VEP4-GW26-0913	VEP4-GW26-0914
Sample Date				07/24/13	09/23/14	09/23/14	09/26/14	09/26/13	09/18/14	09/23/14	09/24/13	09/12/14
Chemical Name												
Wet Chemistry (mg/l)												
Alkalinity	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloride	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methane	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate	10	10	3.2	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total dissolved solids (TDS)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (TOC)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dechlorinating Bacteria (cells/ml)												
Dehalococcoides	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Functioning Genes (cells/ml)												
No Detections												

Notes:
Shading indicates exceedance of MCL
Bold box indicates exceedance of Puerto Rico Water Quality Class SG
Bold text indicates exceedance of Adjusted Tap Water RSLs
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
D - Result of a dilution (laboratory qualifier)
H1 - Analyzed outside of recommended holding time (laboratory qualifier)
J - Analyte present, value may or may not be accurate or precise
M - Sample matrix interfered with the quantitation of the analyte; the parameters DL/LOD/LOQ have been raised (laboratory qualifier)
N - MS/MSD accuracy and/or precision outside acceptance criteria (laboratory qualifier)
R - Rejected result
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cells/ml - Cells per milliliter
mg/l - Milligrams per liter
µg/l - Micrograms per liter

TABLE 4-4
Validated Groundwater Exceedances 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	MCL	Puerto Rico Water Quality Class SG	Adjusted Tap Water RSLs (June 2015)	EPI04-MW27		EPI04-MW28		EPI04-MW28D	EPI04-MW29		EPI04-MW30	
Sample ID				VEP4-GW27-0913	VEP4-GW27-0914	VEP4-GW28-1013	VEP4-GW28-0914	VEP4-GW28D-0914	VEP4-GW29-1013	VEP4-GW29-0914	VEP4-GW30-0913	VEP4-GW30-0914
Sample Date				09/26/13	09/10/14	10/02/13	09/09/14	09/26/14	10/02/13	09/10/14	09/24/13	09/10/14
Chemical Name												
Volatile Organic Compounds (µg/l)												
1,1-Dichloroethene	7	7	28	0.5 U	1 U	0.5 U	1 U	1 U	0.5 U	1 U	0.5 U	1 U
1,4-Dichlorobenzene	75	63	0.48	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	--	--	1,400	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	5	5	0.45	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	--	--	81	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	80	57	0.22	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloromethane	--	--	19	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	70	--	3.6	1.43	0.666 J	0.78 J	1 U	1 U	0.36 J	1 U	0.5 U	1 U
Tetrachloroethene	5	5	4.1	0.5 U	1 U	0.5 U	1 U	1 U	0.5 U	1 U	0.5 U	1 U
Toluene	1,000	1,000	110	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	5	5	0.28	**7.45**	**2.81**	**20.5**	**11.9**	**1.01**	**4.15**	**2.56**	**1.88**	**1.32**
Vinyl chloride	2	0.25	0.019	**0.23 J**	0.4 U	0.2 U	0.4 U	0.4 U	0.2 U	0.4 U	0.2 U	0.4 U
Semivolatile Organic Compounds (µg/l)												
No Detections												
Pesticide/Polychlorinated Biphenyls (µg/l)												
No Detections												
Total Metals (µg/l)												
Aluminum	--	--	2,000	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	2,000	--	380	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	100	100	0.035	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	--	--	0.6	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	1,300	1,300	80	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	--	--	1,400	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	--	--	43	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	--	610	39	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	50	50	10	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	--	--	8.6	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Metals (µg/l)												
Aluminum, Dissolved	--	--	2,000	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium, Dissolved	2,000	--	380	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium, Dissolved	5	5	0.92	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium, Dissolved	100	100	0.035	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt, Dissolved	--	--	0.6	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper, Dissolved	1,300	1,300	80	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	--	--	1,400	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese, Dissolved	--	--	43	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury, Dissolved	2	0.05	0.57	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel, Dissolved	--	610	39	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium, Dissolved	50	50	10	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium, Dissolved	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium, Dissolved	--	--	8.6	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 4-4
Validated Groundwater Exceedances 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	MCL	Puerto Rico Water Quality Class SG	Adjusted Tap Water RSLs (June 2015)	EPI04-MW27		EPI04-MW28		EPI04-MW28D	EPI04-MW29		EPI04-MW30	
Sample ID				VEP4-GW27-0913	VEP4-GW27-0914	VEP4-GW28-1013	VEP4-GW28-0914	VEP4-GW28D-0914	VEP4-GW29-1013	VEP4-GW29-0914	VEP4-GW30-0913	VEP4-GW30-0914
Sample Date				09/26/13	09/10/14	10/02/13	09/09/14	09/26/14	10/02/13	09/10/14	09/24/13	09/10/14
Chemical Name												
Wet Chemistry (mg/l)												
Alkalinity	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloride	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methane	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate	10	10	3.2	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total dissolved solids (TDS)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (TOC)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dechlorinating Bacteria (cells/ml)												
Dehalococcoides	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA
Functioning Genes (cells/ml)												
No Detections												

Notes:
Shading indicates exceedance of MCL
Bold box indicates exceedance of Puerto Rico Water Quality Class SG
Bold text indicates exceedance of Adjusted Tap Water RSLs
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
NA - Not analyzed
D - Result of a dilution (laboratory qualifier)
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cells/ml - Cells per milliliter
mg/l - Milligrams per liter
µg/l - Micrograms per liter

TABLE 4-4
Validated Groundwater Exceedances 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID Sample ID Sample Date	MCL	Puerto Rico Water Quality Class SG	Adjusted Tap Water RSLs (June 2015)	EPI04-MW31 VEP4-GW31-0914 09/26/14	EPI04-MW32 VEP4-GW32-0914 09/23/14	EPI04-MW33 VEP4-GW33-0914 09/26/14
Chemical Name						
Volatile Organic Compounds (µg/l)						
1,1-Dichloroethene	7	7	28	1 U	1 U	1 U
1,4-Dichlorobenzene	75	63	0.48	NA	NA	NA
Acetone	--	--	1,400	NA	NA	NA
Benzene	5	5	0.45	NA	NA	NA
Carbon disulfide	--	--	81	NA	NA	NA
Chloroform	80	57	0.22	NA	NA	NA
Chloromethane	--	--	19	NA	NA	NA
cis-1,2-Dichloroethene	70	--	3.6	1 U	1 U	1 U
Tetrachloroethene	5	5	4.1	1 U	1 U	1 U
Toluene	1,000	1,000	110	NA	NA	NA
Trichloroethene	5	5	0.28	0.4 U	0.4 U	0.4 U
Vinyl chloride	2	0.25	0.019	0.4 U	0.4 U	0.4 U
Semivolatile Organic Compounds (µg/l)						
No Detections						
Pesticide/Polychlorinated Biphenyls (µg/l)						
No Detections						
Total Metals (µg/l)						
Aluminum	--	--	2,000	NA	NA	NA
Barium	2,000	--	380	NA	NA	NA
Calcium	--	--	--	NA	NA	NA
Chromium	100	100	0.035	NA	NA	NA
Cobalt	--	--	0.6	NA	NA	NA
Copper	1,300	1,300	80	NA	NA	NA
Iron	--	--	1,400	NA	NA	NA
Magnesium	--	--	--	NA	NA	NA
Manganese	--	--	43	NA	NA	NA
Nickel	--	610	39	NA	NA	NA
Potassium	--	--	--	NA	NA	NA
Selenium	50	50	10	NA	NA	NA
Sodium	--	--	--	NA	NA	NA
Vanadium	--	--	8.6	NA	NA	NA
Dissolved Metals (µg/l)						
Aluminum, Dissolved	--	--	2,000	NA	NA	NA
Barium, Dissolved	2,000	--	380	NA	NA	NA
Cadmium, Dissolved	5	5	0.92	NA	NA	NA
Calcium, Dissolved	--	--	--	NA	NA	NA
Chromium, Dissolved	100	100	0.035	NA	NA	NA
Cobalt, Dissolved	--	--	0.6	NA	NA	NA
Copper, Dissolved	1,300	1,300	80	NA	NA	NA
Iron, Dissolved	--	--	1,400	NA	NA	NA
Magnesium, Dissolved	--	--	--	NA	NA	NA
Manganese, Dissolved	--	--	43	NA	NA	NA
Mercury, Dissolved	2	0.05	0.57	NA	NA	NA
Nickel, Dissolved	--	610	39	NA	NA	NA
Potassium, Dissolved	--	--	--	NA	NA	NA
Selenium, Dissolved	50	50	10	NA	NA	NA
Sodium, Dissolved	--	--	--	NA	NA	NA
Vanadium, Dissolved	--	--	8.6	NA	NA	NA

TABLE 4-4
Validated Groundwater Exceedances 2006-2014
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID Sample ID Sample Date	MCL	Puerto Rico Water Quality Class SG	Adjusted Tap Water RSLs (June 2015)	EPI04-MW31 VEP4-GW31-0914 09/26/14	EPI04-MW32 VEP4-GW32-0914 09/23/14	EPI04-MW33 VEP4-GW33-0914 09/26/14
Chemical Name						
Wet Chemistry (mg/l)						
Alkalinity	--	--	--	NA	NA	NA
Chloride	--	--	--	NA	NA	NA
Methane	--	--	--	NA	NA	NA
Nitrate	10	10	3.2	NA	NA	NA
Sulfate	--	--	--	NA	NA	NA
Total dissolved solids (TDS)	--	--	--	NA	NA	NA
Total organic carbon (TOC)	--	--	--	NA	NA	NA
Dechlorinating Bacteria (cells/ml)						
Dehalococcoides	--	--	--	NA	NA	NA
Functioning Genes (cells/ml)						
No Detections						

Notes:
Shading indicates exceedance of MCL
Bold box indicates exceedance of Puerto Rico Water Quality Class SG
Bold text indicates exceedance of Adjusted Tap Water RSLs
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cells/ml - Cells per milliliter
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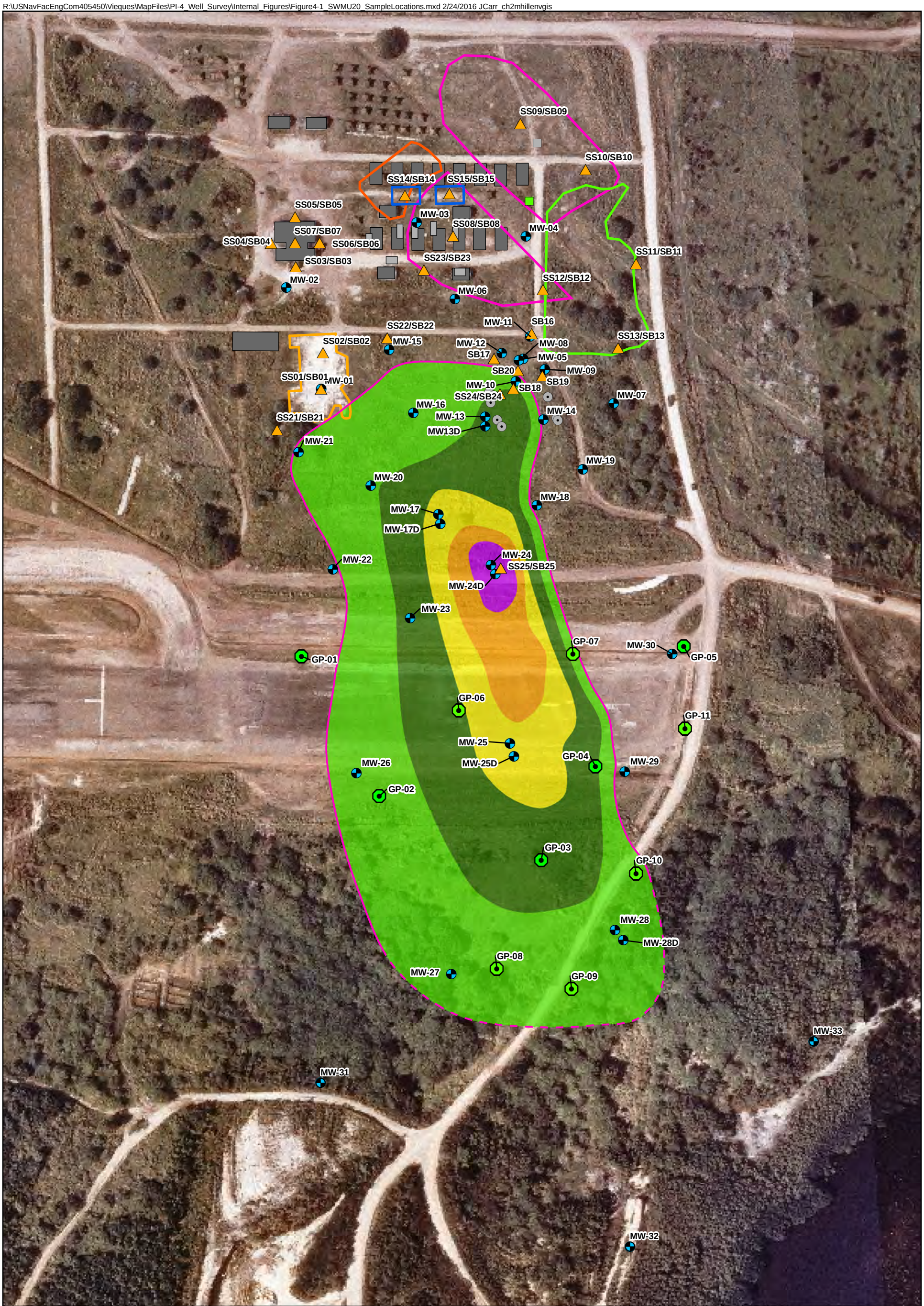
µg/l - Micrograms per liter

R:\USNavFacEngCom405450\Vieques\MapFiles\PI-4_Well_Survey\Internal_Figures\Figure4-1_SWMU20_SampleLocations.mxd 2/24/2016 JCarr_ch2mhillenvgis



Legend

- Ground Surface Depressions
- Concrete Pad
- Concrete Vault Box
- Monitoring Well installed during the RI
- SS/SB Locations
- Grab Groundwater Location
- 5 ppb TCE Isoconcentration Line 2013 Sampling (dashed where inferred)
- Estimated Location of Bermed Area used for Fuel Bladder Storage
- Former Location of Structures
- Disturbed Areas (1962)

ERI Aerial Photographic Analysis (February 2003)

- Disturbed Ground/Possible Fill Area 1964
- Trench Scars 1959
- Trench/Possible Debris 1959

Isoconcentration

- 5-50 ppb
- 50-100 ppb
- 100-150 ppb
- 150-200 ppb
- 200-250 ppb

N W E S

0 100 200 Feet

Figure 4-1
Sample Locations
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

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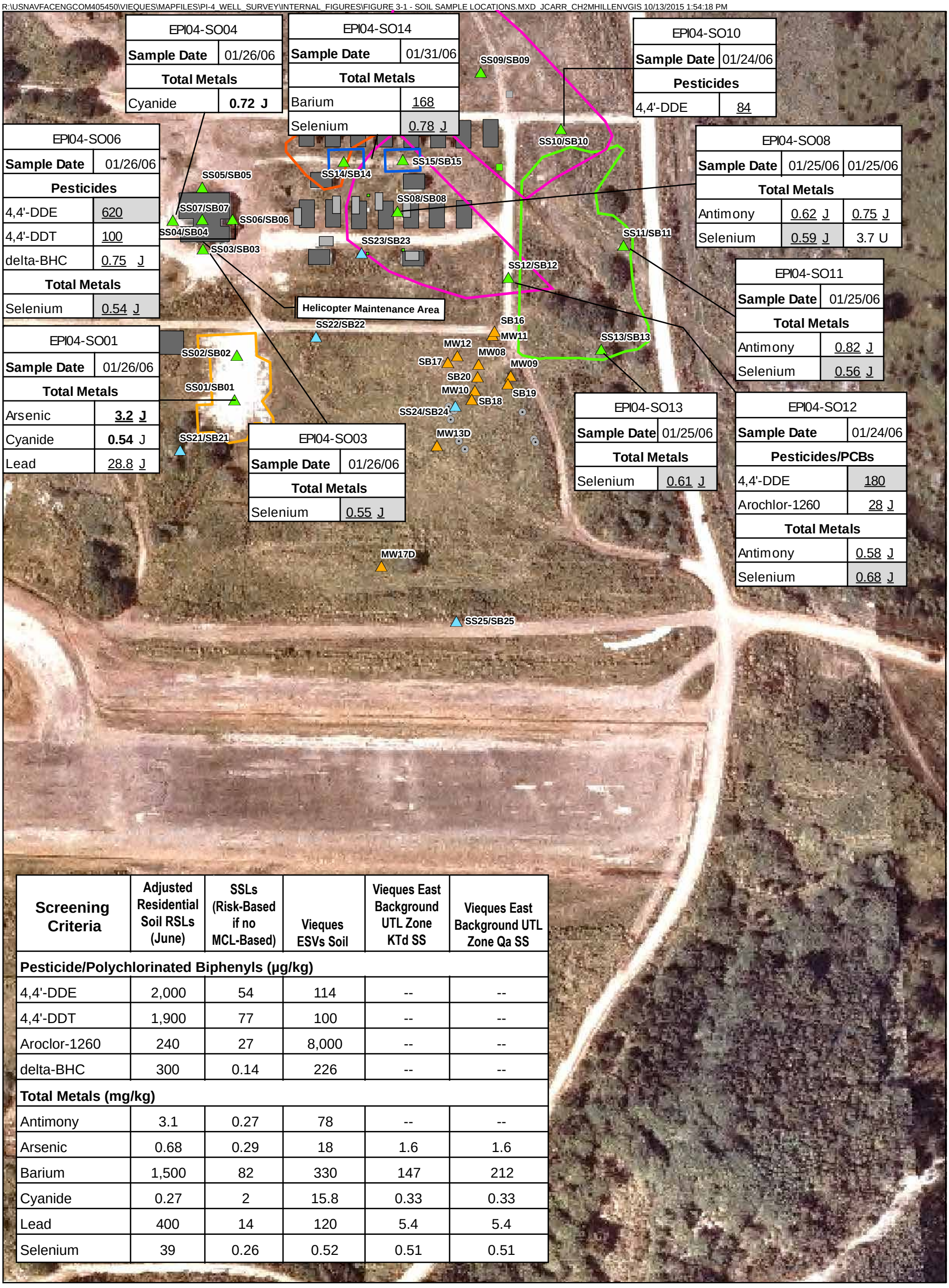


EPI04-SO04	
Sample Date	01/26/06
Total Metals	
Cyanide	**0.72 J**

EPI04-SO14	
Sample Date	01/31/06
Total Metals	
Barium	168
Selenium	0.78 J

EPI04-SO10	
Sample Date	01/24/06
Pesticides	
4,4'-DDE	84

EPI04-SO06	
Sample Date	01/26/06
Pesticides	
4,4'-DDE	620
4,4'-DDT	100
delta-BHC	0.75 J
Total Metals	
Selenium	0.54 J

EPI04-SO08		
Sample Date	01/25/06	01/25/06
Total Metals		
Antimony	0.62 J	0.75 J
Selenium	0.59 J	3.7 U

EPI04-SO11	
Sample Date	01/25/06
Total Metals	
Antimony	0.82 J
Selenium	0.56 J

EPI04-SO01	
Sample Date	01/26/06
Total Metals	
Arsenic	**3.2 J**
Cyanide	**0.54** J
Lead	28.8 J

EPI04-SO03	
Sample Date	01/26/06
Total Metals	
Selenium	0.55 J

EPI04-SO13	
Sample Date	01/25/06
Total Metals	
Selenium	0.61 J

EPI04-SO12	
Sample Date	01/24/06
Pesticides/PCBs	
4,4'-DDE	180
Arochlor-1260	28 J
Total Metals	
Antimony	0.58 J
Selenium	0.68 J

Screening Criteria	Adjusted Residential Soil RSLs (June)	SSLs (Risk-Based if no MCL-Based)	Vieques ESVs Soil	Vieques East Background UTL Zone KTd SS	Vieques East Background UTL Zone Qa SS
Pesticide/Polychlorinated Biphenyls (µg/kg)					
4,4'-DDE	2,000	54	114	--	--
4,4'-DDT	1,900	77	100	--	--
Aroclor-1260	240	27	8,000	--	--
delta-BHC	300	0.14	226	--	--
Total Metals (mg/kg)					
Antimony	3.1	0.27	78	--	--
Arsenic	0.68	0.29	18	1.6	1.6
Barium	1,500	82	330	147	212
Cyanide	0.27	2	15.8	0.33	0.33
Lead	400	14	120	5.4	5.4
Selenium	39	0.26	0.52	0.51	0.51

Legend

- Ground Surface Depressions
- Concrete Pad
- Concrete Vault Box
- Estimated Location of Bermed Area used for Fuel Bladder Storage
- Former Location of Structures
- Disturbed Areas (1962)
- PA/SI Surface and Subsurface Soil Sample Location
- Supplemental ESI Subsurface Soil Sample Location
- RI Surface and Subsurface Soil Sample Location

ERI Aerial Photographic Analysis (February 2003)

- Disturbed Ground/Possible Fill Area 1964
- Trench Scars 1959
- Trench/Possible Debris 1959

Notes:

Bold text indicates exceedance of Adjusted Residential Soil RSLs
Underline indicates exceedance of SSLs
Shading indicates exceedance of ESVs
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

J - Analyte present, value may or may not be accurate or precise

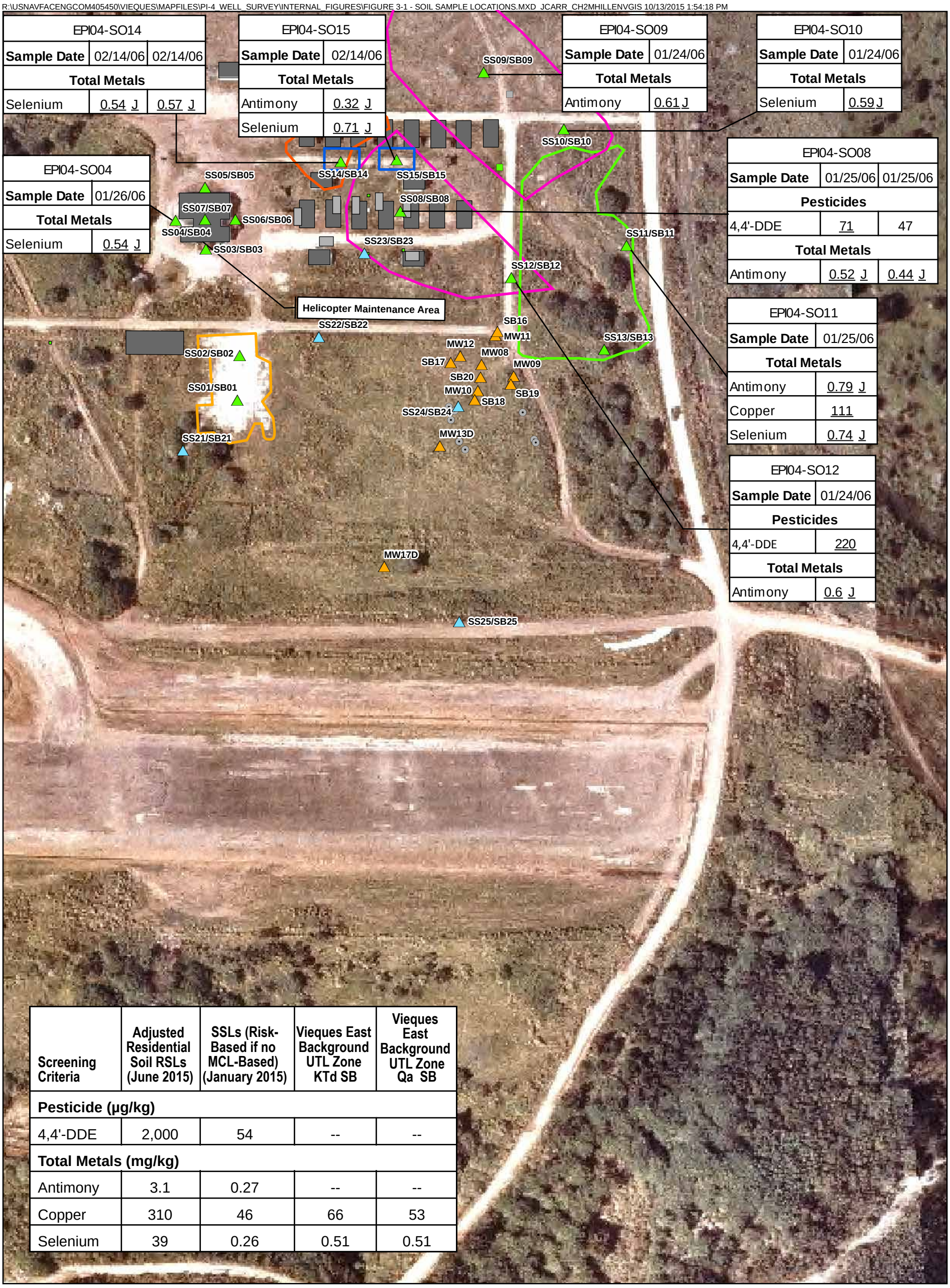
mg/kg - Milligrams per kilogram

µg/kg - Micrograms per kilogram

N W E S

0 85 170 Feet

Figure 4-2
Surface Soil Exceedances
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico



EPI04-SO14		
Sample Date	02/14/06	02/14/06
Total Metals		
Selenium	0.54 J	0.57 J

EPI04-SO15	
Sample Date	02/14/06
Total Metals	
Antimony	0.32 J
Selenium	0.71 J

EPI04-SO09	
Sample Date	01/24/06
Total Metals	
Antimony	0.61 J

EPI04-SO10	
Sample Date	01/24/06
Total Metals	
Selenium	0.59 J

EPI04-SO04	
Sample Date	01/26/06
Total Metals	
Selenium	0.54 J

EPI04-SO08		
Sample Date	01/25/06	01/25/06
Pesticides		
4,4'-DDE	71	47
Total Metals		
Antimony	0.52 J	0.44 J

EPI04-SO11	
Sample Date	01/25/06
Total Metals	
Antimony	0.79 J
Copper	111
Selenium	0.74 J

EPI04-SO12	
Sample Date	01/24/06
Pesticides	
4,4'-DDE	220
Total Metals	
Antimony	0.6 J

Screening Criteria	Adjusted Residential Soil RSLs (June 2015)	SSLs (Risk-Based if no MCL-Based) (January 2015)	Vieques East Background UTL Zone KTd SB	Vieques East Background UTL Zone Qa SB
Pesticide (µg/kg)				
4,4'-DDE	2,000	54	--	--
Total Metals (mg/kg)				
Antimony	3.1	0.27	--	--
Copper	310	46	66	53
Selenium	39	0.26	0.51	0.51

Legend

- Ground Surface Depressions
- Concrete Pad
- Concrete Vault Box
- Estimated Location of Bermed Area used for Fuel Bladder Storage
- Former Location of Structures
- Disturbed Areas (1962)
- PA/SI Surface and Subsurface Soil Sample Location
- Supplemental ESI Subsurface Soil Sample Location
- RI Surface and Subsurface Soil Sample Location

ERI Aerial Photographic Analysis (February 2003)

- Disturbed Ground/Possible Fill Area 1964
- Trench Scars 1959
- Trench/Possible Debris 1959

Notes:

Bold text indicates exceedance of Adjusted Residential Soil RSLs

Underline indicates exceedance of SSLs

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

NA - Not analyzed

J - Analyte present, value may or may not be accurate or precise

U - Nondetect

mg/kg - Milligrams per kilogram

µg/kg - Micrograms per kilogram

N W E S

0 85 170 Feet

Figure 4-3
Subsurface Soil Exceedances
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

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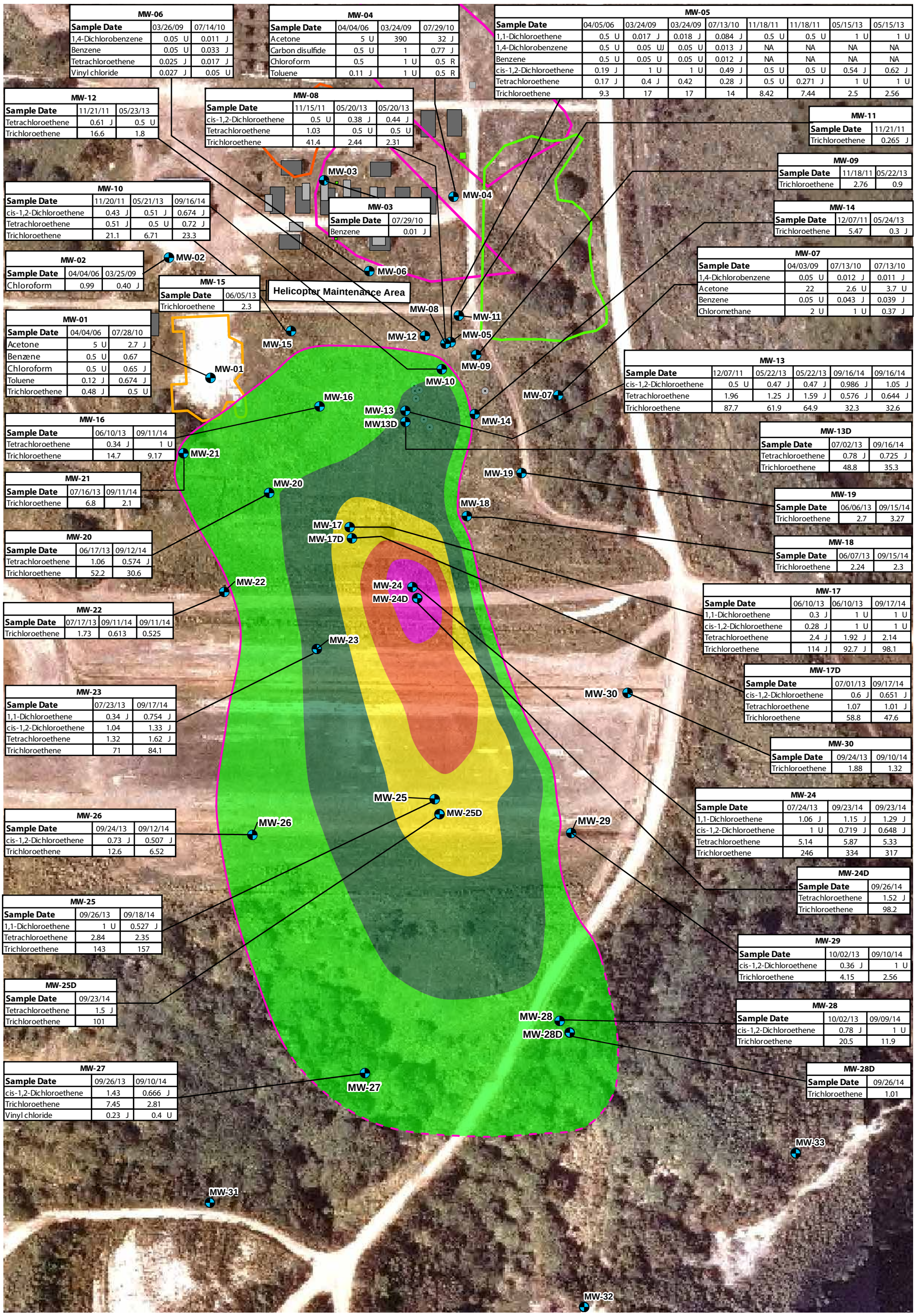

MW-06		
Sample Date	03/26/09	07/14/10
1,4-Dichlorobenzene	0.05 U	0.011 J
Benzene	0.05 U	0.033 J
Tetrachloroethene	0.025 J	0.017 J
Vinyl chloride	0.027 J	0.05 U

MW-04			
Sample Date	04/04/06	03/24/09	07/29/10
Acetone	5 U	390	32 J
Carbon disulfide	0.5 U	1	0.77 J
Chloroform	0.5	1 U	0.5 R
Toluene	0.11 J	1 U	0.5 R

MW-05								
Sample Date	04/05/06	03/24/09	03/24/09	07/13/10	11/18/11	11/18/11	05/15/13	05/15/13
1,1-Dichloroethene	0.5 U	0.017 J	0.018 J	0.084 J	0.5 U	0.5 U	1 U	1 U
1,4-Dichlorobenzene	0.5 U	0.05 UJ	0.05 U	0.013 J	NA	NA	NA	NA
Benzene	0.5 U	0.05 U	0.05 U	0.012 J	NA	NA	NA	NA
cis-1,2-Dichloroethene	0.19 J	1 U	1 U	0.49 J	0.5 U	0.5 U	0.54 J	0.62 J
Tetrachloroethene	0.17 J	0.4 J	0.42	0.28 J	0.5 U	0.271 J	1 U	1 U
Trichloroethene	9.3	17	17	14	8.42	7.44	2.5	2.56

MW-12		
Sample Date	11/21/11	05/23/13
Tetrachloroethene	0.61 J	0.5 U
Trichloroethene	16.6	1.8

MW-08			
Sample Date	11/15/11	05/20/13	05/20/13
cis-1,2-Dichloroethene	0.5 U	0.38 J	0.44 J
Tetrachloroethene	1.03	0.5 U	0.5 U
Trichloroethene	41.4	2.44	2.31

MW-11	
Sample Date	11/21/11
Trichloroethene	0.265 J

MW-09		
Sample Date	11/18/11	05/22/13
Trichloroethene	2.76	0.9

MW-10			
Sample Date	11/20/11	05/21/13	09/16/14
cis-1,2-Dichloroethene	0.43 J	0.51 J	0.674 J
Tetrachloroethene	0.51 J	0.5 U	0.72 J
Trichloroethene	21.1	6.71	23.3

MW-03	
Sample Date	07/29/10
Benzene	0.01 J

MW-14		
Sample Date	12/07/11	05/24/13
Trichloroethene	5.47	0.3 J

MW-02		
Sample Date	04/04/06	03/25/09
Chloroform	0.99	0.40 J

MW-15	
Sample Date	06/05/13
Trichloroethene	2.3

MW-07			
Sample Date	04/03/09	07/13/10	07/13/10
1,4-Dichlorobenzene	0.05 U	0.012 J	0.011 J
Acetone	22	2.6 U	3.7 U
Benzene	0.05 U	0.043 J	0.039 J
Chloromethane	2 U	1 U	0.37 J

MW-01		
Sample Date	04/04/06	07/28/10
Acetone	5 U	2.7 J
Benzene	0.5 U	0.67
Chloroform	0.5 U	0.65 J
Toluene	0.12 J	0.674 J
Trichloroethene	0.48 J	0.5 U

MW-13					
Sample Date	12/07/11	05/22/13	05/22/13	09/16/14	09/16/14
cis-1,2-Dichloroethene	0.5 U	0.47 J	0.47 J	0.986 J	1.05 J
Tetrachloroethene	1.96	1.25 J	1.59 J	0.576 J	0.644 J
Trichloroethene	87.7	61.9	64.9	32.3	32.6

MW-16		
Sample Date	06/10/13	09/11/14
Tetrachloroethene	0.34 J	1 U
Trichloroethene	14.7	9.17

MW-13D		
Sample Date	07/02/13	09/16/14
Tetrachloroethene	0.78 J	0.725 J
Trichloroethene	48.8	35.3

MW-21		
Sample Date	07/16/13	09/11/14
Trichloroethene	6.8	2.1

MW-19		
Sample Date	06/06/13	09/15/14
Trichloroethene	2.7	3.27

MW-20		
Sample Date	06/17/13	09/12/14
Tetrachloroethene	1.06	0.574 J
Trichloroethene	52.2	30.6

MW-18		
Sample Date	06/07/13	09/15/14
Trichloroethene	2.24	2.3

MW-17			
Sample Date	06/10/13	06/10/13	09/17/14
1,1-Dichloroethene	0.3 J	1 U	1 U
cis-1,2-Dichloroethene	0.28 J	1 U	1 U
Tetrachloroethene	2.4 J	1.92 J	2.14
Trichloroethene	114 J	92.7 J	98.1

MW-22			
Sample Date	07/17/13	09/11/14	09/11/14
Trichloroethene	1.73	0.613	0.525

MW-17D		
Sample Date	07/01/13	09/17/14
cis-1,2-Dichloroethene	0.6 J	0.651 J
Tetrachloroethene	1.07	1.01 J
Trichloroethene	58.8	47.6

MW-23		
Sample Date	07/23/13	09/17/14
1,1-Dichloroethene	0.34 J	0.754 J
cis-1,2-Dichloroethene	1.04	1.33 J
Tetrachloroethene	1.32	1.62 J
Trichloroethene	71	84.1

MW-30		
Sample Date	09/24/13	09/10/14
Trichloroethene	1.88	1.32

MW-24			
Sample Date	07/24/13	09/23/14	09/23/14
1,1-Dichloroethene	1.06 J	1.15 J	1.29 J
cis-1,2-Dichloroethene	1 U	0.719 J	0.648 J
Tetrachloroethene	5.14	5.87	5.33
Trichloroethene	246	334	317

MW-26		
Sample Date	09/24/13	09/12/14
cis-1,2-Dichloroethene	0.73 J	0.507 J
Trichloroethene	12.6	6.52

MW-24D	
Sample Date	09/26/14
Tetrachloroethene	1.52 J
Trichloroethene	98.2

MW-25		
Sample Date	09/26/13	09/18/14
1,1-Dichloroethene	1 U	0.527 J
Tetrachloroethene	2.84	2.35
Trichloroethene	143	157

MW-29		
Sample Date	10/02/13	09/10/14
cis-1,2-Dichloroethene	0.36 J	1 U
Trichloroethene	4.15	2.56

MW-25D	
Sample Date	09/23/14
Tetrachloroethene	1.5 J
Trichloroethene	101

MW-28		
Sample Date	10/02/13	09/09/14
cis-1,2-Dichloroethene	0.78 J	1 U
Trichloroethene	20.5	11.9

MW-27		
Sample Date	09/26/13	09/10/14
cis-1,2-Dichloroethene	1.43	0.666 J
Trichloroethene	7.45	2.81
Vinyl chloride	0.23 J	0.4 U

MW-28D	
Sample Date	09/26/14
Trichloroethene	1.01

Legend

- Ground Surface Depressions
- Concrete Pad
- Concrete Vault Box
- Estimated Location of Bermed Area used for Fuel Bladder Storage
- Former Location of Structures
- Disturbed Areas (1962)
- Monitoring Well
- 5 ppb TCE Isoconcentration Line (dashed where inferred)

ERI Aerial Photographic Analysis (February 2003)

- Disturbed Ground/Possible Fill Area 1964
- Trench Scars 1959
- Trench/Possible Debris 1959

Isoconcentrations

- 5-50 ppb
- 50-100 ppb
- 100-150 ppb
- 150-200 ppb
- 200-250 ppb

Notes:

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

U - Nondetect

µg/l - Micrograms per liter

N W E S

0 85 170 Feet

FIGURE 4-4
VOC Detections in Groundwater
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

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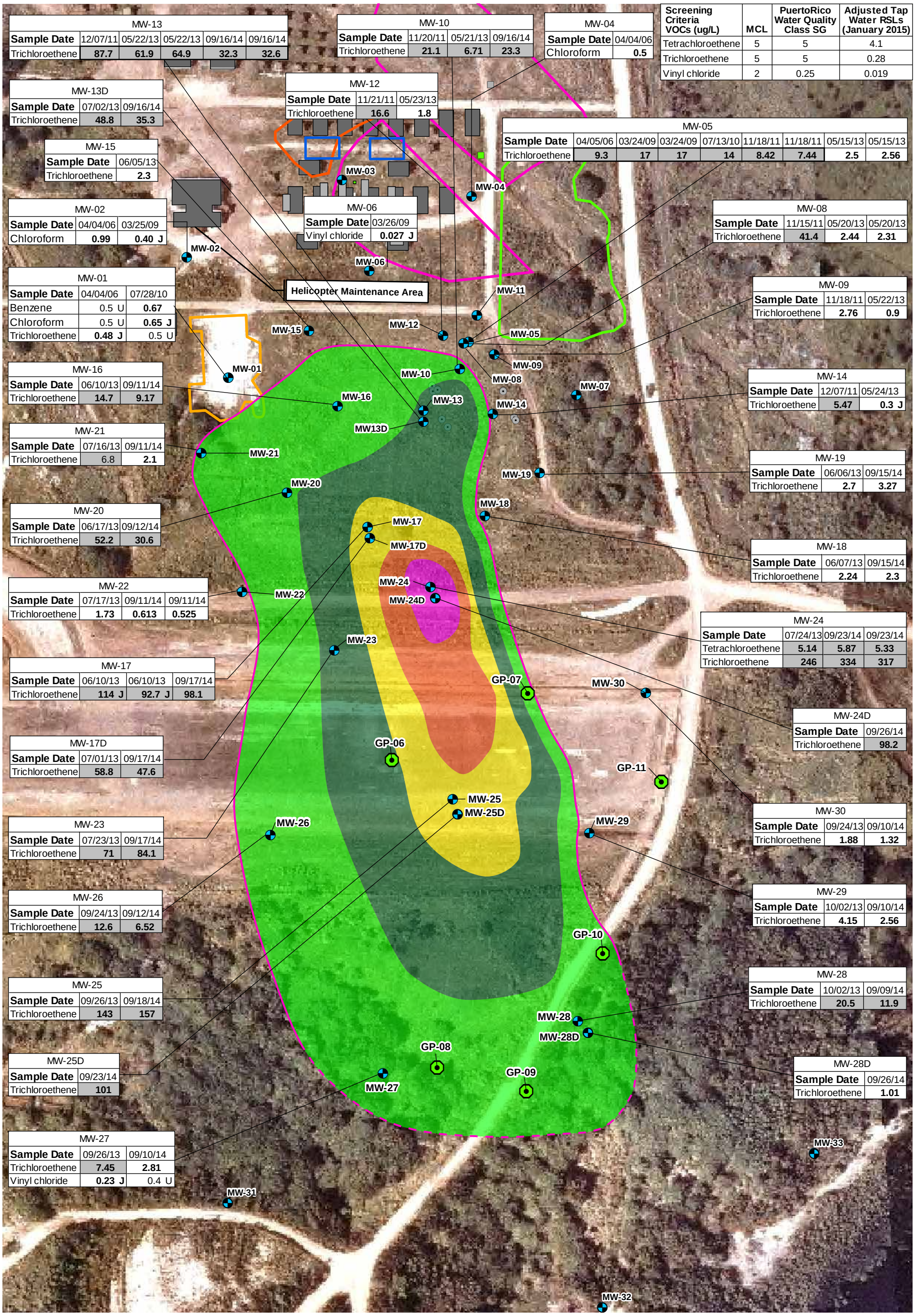

MW-13					
Sample Date	12/07/11	05/22/13	05/22/13	09/16/14	09/16/14
Trichloroethene	**87.7**	**61.9**	**64.9**	**32.3**	**32.6**

MW-10			
Sample Date	11/20/11	05/21/13	09/16/14
Trichloroethene	**21.1**	**6.71**	**23.3**

MW-04	
Sample Date	04/04/06
Chloroform	**0.5**

Screening Criteria VOCs (ug/L)	MCL	PuertoRico Water Quality Class SG	Adjusted Tap Water RSLs (January 2015)
Tetrachloroethene	5	5	4.1
Trichloroethene	5	5	0.28
Vinyl chloride	2	0.25	0.019

MW-13D		
Sample Date	07/02/13	09/16/14
Trichloroethene	**48.8**	**35.3**

MW-12		
Sample Date	11/21/11	05/23/13
Trichloroethene	**16.6**	**1.8**

MW-05								
Sample Date	04/05/06	03/24/09	03/24/09	07/13/10	11/18/11	11/18/11	05/15/13	05/15/13
Trichloroethene	**9.3**	**17**	**17**	**14**	**8.42**	**7.44**	**2.5**	**2.56**

MW-15	
Sample Date	06/05/13
Trichloroethene	**2.3**

MW-02		
Sample Date	04/04/06	03/25/09
Chloroform	**0.99**	**0.40 J**

MW-06	
Sample Date	03/26/09
Vinyl chloride	**0.027 J**

MW-08			
Sample Date	11/15/11	05/20/13	05/20/13
Trichloroethene	**41.4**	**2.44**	**2.31**

MW-01		
Sample Date	04/04/06	07/28/10
Benzene	0.5 U	**0.67**
Chloroform	0.5 U	**0.65 J**
Trichloroethene	**0.48 J**	0.5 U

MW-09		
Sample Date	11/18/11	05/22/13
Trichloroethene	**2.76**	**0.9**

MW-16		
Sample Date	06/10/13	09/11/14
Trichloroethene	**14.7**	**9.17**

MW-14		
Sample Date	12/07/11	05/24/13
Trichloroethene	**5.47**	**0.3 J**

MW-21		
Sample Date	07/16/13	09/11/14
Trichloroethene	6.8	**2.1**

MW-19		
Sample Date	06/06/13	09/15/14
Trichloroethene	**2.7**	**3.27**

MW-20		
Sample Date	06/17/13	09/12/14
Trichloroethene	**52.2**	**30.6**

MW-18		
Sample Date	06/07/13	09/15/14
Trichloroethene	**2.24**	**2.3**

MW-22			
Sample Date	07/17/13	09/11/14	09/11/14
Trichloroethene	**1.73**	**0.613**	**0.525**

MW-24			
Sample Date	07/24/13	09/23/14	09/23/14
Tetrachloroethene	**5.14**	**5.87**	**5.33**
Trichloroethene	**246**	**334**	**317**

MW-17			
Sample Date	06/10/13	06/10/13	09/17/14
Trichloroethene	**114 J**	**92.7 J**	**98.1**

MW-24D	
Sample Date	09/26/14
Trichloroethene	**98.2**

MW-17D		
Sample Date	07/01/13	09/17/14
Trichloroethene	**58.8**	**47.6**

MW-30		
Sample Date	09/24/13	09/10/14
Trichloroethene	**1.88**	**1.32**

MW-23		
Sample Date	07/23/13	09/17/14
Trichloroethene	**71**	**84.1**

MW-29		
Sample Date	10/02/13	09/10/14
Trichloroethene	**4.15**	**2.56**

MW-26		
Sample Date	09/24/13	09/12/14
Trichloroethene	**12.6**	**6.52**

MW-28		
Sample Date	10/02/13	09/09/14
Trichloroethene	**20.5**	**11.9**

MW-25		
Sample Date	09/26/13	09/18/14
Trichloroethene	**143**	**157**

MW-28D	
Sample Date	09/26/14
Trichloroethene	**1.01**

MW-25D	
Sample Date	09/23/14
Trichloroethene	**101**

MW-27		
Sample Date	09/26/13	09/10/14
Trichloroethene	**7.45**	**2.81**
Vinyl chloride	**0.23 J**	0.4 U

Legend

- Ground Surface Depressions
- Concrete Pad
- Concrete Vault Box
- Estimated Location of Bermed Area used for Fuel Bladder Storage
- Former Location of Structures
- Disturbed Areas (1962)
- Monitoring Well Location
- 5 ppb TCE Isoconcentration Line (dashed where inferred)

ERI Aerial Photographic Analysis (February 2003)

- Disturbed Ground/Possible Fill Area 1964
- Trench Scars 1959
- Trench/Possible Debris 1959

Isoconcentrations

- 5-50 ppb
- 50-100 ppb
- 100-150 ppb
- 150-200 ppb
- 200-250 ppb

Notes:

Shading indicates exceedance of MCL
Bold box indicates exceedance of Puerto Rico Water Quality Class SG
Bold text indicates exceedance of Adjusted Tap Water RSLs
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents
J - Analyte present, value may or may not be accurate or precise
U - Nondetect
µg/l - Micrograms per liter

N W E S

0 85 170 Feet

FIGURE 4-5
VOC Exceedances in Groundwater
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

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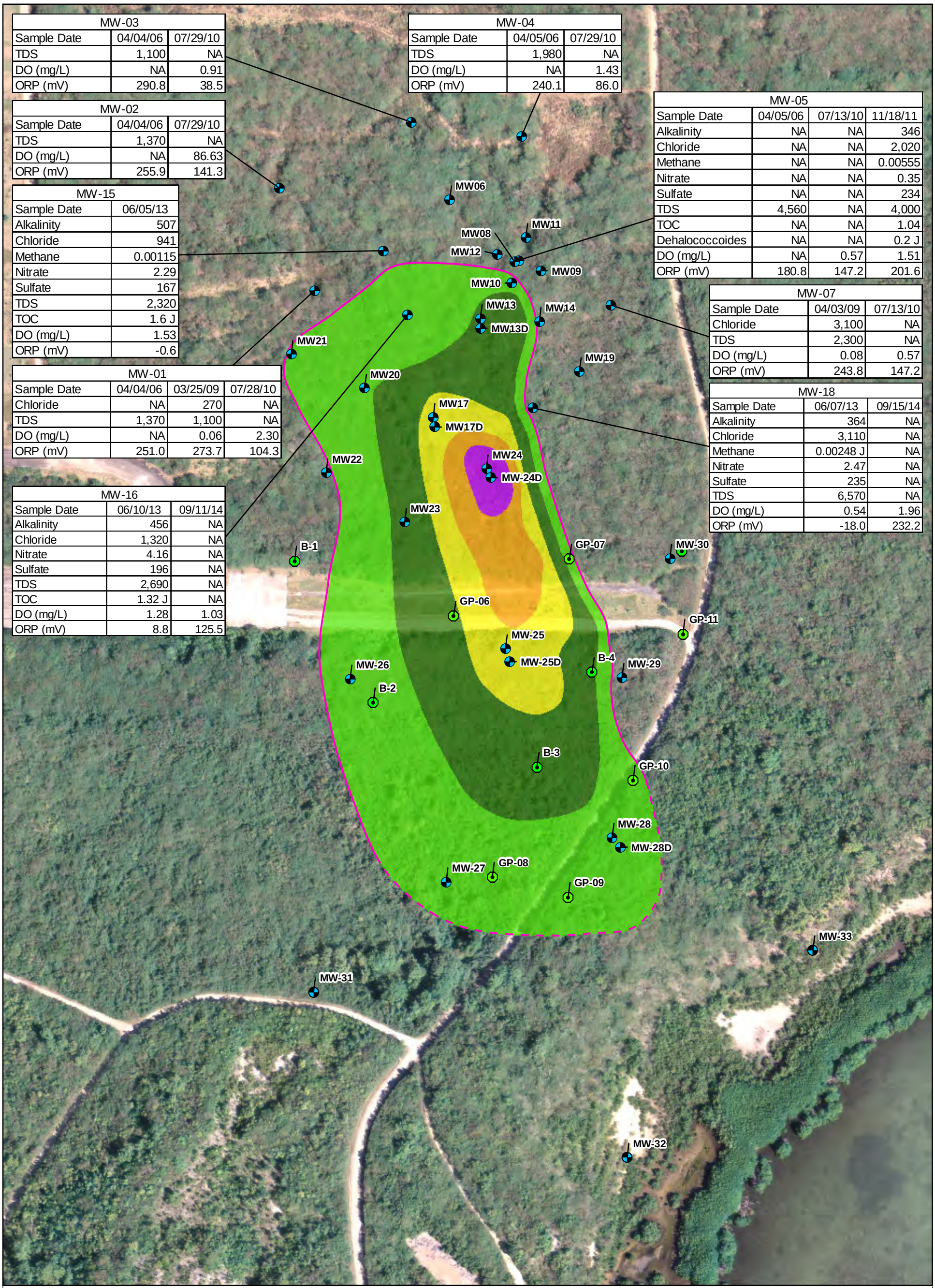

MW-03		
Sample Date	04/04/06	07/29/10
TDS	1,100	NA
DO (mg/L)	NA	0.91
ORP (mV)	290.8	38.5

MW-04		
Sample Date	04/05/06	07/29/10
TDS	1,980	NA
DO (mg/L)	NA	1.43
ORP (mV)	240.1	86.0

MW-02		
Sample Date	04/04/06	07/29/10
TDS	1,370	NA
DO (mg/L)	NA	86.63
ORP (mV)	255.9	141.3

MW-05			
Sample Date	04/05/06	07/13/10	11/18/11
Alkalinity	NA	NA	346
Chloride	NA	NA	2,020
Methane	NA	NA	0.00555
Nitrate	NA	NA	0.35
Sulfate	NA	NA	234
TDS	4,560	NA	4,000
TOC	NA	NA	1.04
Dehalococcoides	NA	NA	0.2 J
DO (mg/L)	NA	0.57	1.51
ORP (mV)	180.8	147.2	201.6

MW-15	
Sample Date	06/05/13
Alkalinity	507
Chloride	941
Methane	0.00115
Nitrate	2.29
Sulfate	167
TDS	2,320
TOC	1.6 J
DO (mg/L)	1.53
ORP (mV)	-0.6

MW-07		
Sample Date	04/03/09	07/13/10
Chloride	3,100	NA
TDS	2,300	NA
DO (mg/L)	0.08	0.57
ORP (mV)	243.8	147.2

MW-01			
Sample Date	04/04/06	03/25/09	07/28/10
Chloride	NA	270	NA
TDS	1,370	1,100	NA
DO (mg/L)	NA	0.06	2.30
ORP (mV)	251.0	273.7	104.3

MW-18		
Sample Date	06/07/13	09/15/14
Alkalinity	364	NA
Chloride	3,110	NA
Methane	0.00248 J	NA
Nitrate	2.47	NA
Sulfate	235	NA
TDS	6,570	NA
DO (mg/L)	0.54	1.96
ORP (mV)	-18.0	232.2

MW-16		
Sample Date	06/10/13	09/11/14
Alkalinity	456	NA
Chloride	1,320	NA
Nitrate	4.16	NA
Sulfate	196	NA
TDS	2,690	NA
TOC	1.32 J	NA
DO (mg/L)	1.28	1.03
ORP (mV)	8.8	125.5

Legend

- Monitoring Well Location
- Grab Groundwater Location
- 5 ppb TCE Isoconcentration Line 2013 Sampling (dashed where inferred)

Isoconcentration

- 5-50 ppb
- 50-100 ppb
- 100-150 ppb
- 150-200 ppb
- 200-250 ppb

N W E S

0 100 200 Feet

Figure 4-6
Groundwater Natural Attenuation Parameter Results
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

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SECTION 5

Contaminant Fate and Transport

This section discusses the fate and transport of chemicals observed in groundwater at SWMU 20. Fate and transport consists of identification of theoretical chemical phases and migration and degradation pathways. An understanding of the mobility and persistence of a chemical in media is part of the overall assessment of the potential for that chemical to cause an adverse human health or environmental effect.

This section includes the CSM of the various media (soil and groundwater) at SWMU 20 (**Figure 5-1**). The CSM qualitatively combines and interprets the information presented in this section and earlier sections of the report, including the hydrogeologic conceptual model, contaminant sources, potential migration of the contaminants, and the potential exposure and receptor pathways. The CSM is used to support potential risk management decisions and aids in defining the effectiveness of remedial alternatives, if necessary.

Because Section 4 demonstrated that other contaminants are either absent or present at insignificant levels, the CSM and fate and transport discussion focuses on TCE and its related VOCs. Although several other non-inorganics and inorganics were found at SWMU 20, their concentrations posed no unacceptable risk (see Sections 6 and 7) or were attributed to background or non-CERCLA-related sources. Therefore, these chemicals are not discussed in this section because their presence at the site will not require action.

The chemical and physical properties of TCE and its parent and degradation products found at SWMU 20 are summarized in **Table 5-1**.

5.1 Chemical Mobility and Persistence

The mobility and persistence of the potential contaminants at the site are determined by their physical, chemical, and biological interaction with the environment. Mobility is the potential for a chemical to migrate from a site, and persistence is a measure of how long a chemical will remain in the environment. Because physical and chemical properties of contaminants and the environment affect the movement of a contaminant in soil and groundwater, predicting contaminant behavior and migration is complex. Some of the mechanisms controlling mobility and persistence are described in the following sections.

5.1.1 Solubility

Solubility is a measure of the degree to which a constituent will dissolve in water. Highly soluble chemicals are more likely to be leached from soil by precipitation or runoff that infiltrates into the subsurface. The chlorinated VOCs of interest at SWMU 20 have high water solubilities (greater than 1,000 mg/L), except for PCE with a water solubility of 150 mg/L.

In general, dissolved concentrations of chlorinated VOCs in groundwater at approximately one to 10 percent of their solubility indicate dense, non-aqueous phase liquid (DNAPL) may be present in the subsurface (Bedient et al., 1994). The concentrations of PCE and its daughter products in SWMU 20 groundwater are significantly lower than these levels. Therefore, it is highly unlikely that DNAPL is present at SWMU 20.

5.1.2 Sorption

Sorption occurs when a constituent adheres to and becomes associated with solid particles in the formation. The subsurface materials likely to sorb chemicals are clays and organic matter.

The conventional measure of sorption is the distribution coefficient (K_d). The K_d for organic chemicals is the product of the soil organic carbon partition coefficient (K_{oc}) of the chemical and the fraction of organic carbon (f_{oc}) in the soil. The TOC of SWMU 20 soil ranges from 362 to 41,600 mg/kg, with an average of 11,389 mg/kg. Thus the average f_{oc} content in SWMU 20 soil is 1.14 percent.

Chemicals with high K_{oc}, generally have low water solubilities, and vice versa. In general chemicals with a K_{oc} greater than 10,000 milliliters per gram (mL/g) have high degrees of adsorption and consequentially low mobility, whereas chemicals with a K_{oc} lower than 1,000 mL/g have lower degrees of adsorption and consequentially higher mobility. K_{oc} values for chlorinated VOCs (PCE, TCE, cis-1,2-DCE, 1,1-DCE, and VC) vary in published literature due to the temperature of the solution tested; however, the coefficients range from 665 for PCE to 8.2 for VC (ITRC, 2005). The K_{oc} of PCE degradation products decreases with each step in the transformation process; thus, daughter products are less sorptive. If cis-1,2-DCE or VC were to form under ambient conditions at SWMU 20, these would be expected to be detected further downgradient than PCE or TCE because they are more mobile in the subsurface environment and are not preferentially bound to the soil phase. Because all chlorinated VOCs detected in SWMU 20 groundwater do not sorb well to soil, the plume is expected to continue to migrate with the groundwater flow.

5.1.3 Volatilization

Volatilization occurs when a compound transfers from the aqueous phase to the gas phase. Measures of a chemical's tendency to volatilize from water and soil include its vapor pressure and Henry's Law Constant (K_h). Compounds with K_h values higher than 10^{-3} atmosphere-cubic meter per mole (atm-m^3/M) are expected to volatilize readily from water to air, whereas those with K_h values lower than 10^{-5} atm-m^3/M are relatively non-volatile. Compounds with K_h values in between these values are expected to be moderately volatile. At a given temperature, the higher the vapor pressure of a compound, the higher the volatility of that compound.

Volatilization tends to occur more readily from shallow soil than from deeper soil or groundwater. In groundwater, volatilization can occur only at the air/water interface between the saturated and unsaturated zones, and movement of aqueous-phase contaminants from bulk groundwater to the interface is largely diffusion-limited. In unsaturated shallow soil, the soil gas pressure generally approximates the ambient air pressure. With depth, the soil gas pressure tends to increase and it becomes more difficult for the gas to escape and equalize with the ambient air pressure.

Values of vapor pressure and K_h for the VOCs of interest are provided in **Table 5-1**. The K_h values indicate that the VOCs have properties indicative of high volatility. In addition to the absence of chlorinated VOCs in soil being indicative of the absence of a soil source, their absence indicates volatilization is not an important transport mechanism at the site.

5.1.4 Degradation

Degradation is the deterioration or destruction of a chemical either biologically (biodegradation) or abiotically through such processes as hydrolysis and photolysis. Biodegradation of chemicals by microbial organisms occurs through metabolic or enzymatic processes. Hydrolysis is the reaction of a chemical with water and photolysis is the result of exposing the chemical to light. The rate of degradation can be expressed as a half-life and is dependent on the existing chemical, biological, and physical conditions of the media in which the contaminant is located.

Chlorinated VOCs detected in groundwater can undergo biodegradation by functioning as an electron acceptor (reductive dechlorination) or as an electron donor (oxidation), or by co-metabolism. PCE and TCE typically can be biodegraded via reductive dechlorination. Reductive dechlorination occurs in a series of reactions in which the parent compound is reduced to daughter compounds; each reaction forms a daughter compound with sequentially fewer chlorine atoms. The reductive degradation pathway for PCE and TCE is as follows:

$$\text{PCE} \rightarrow \text{TCE} \rightarrow \text{cis-1,2-DCE} \rightarrow \text{vinyl chloride} \rightarrow \text{ethene}$$

While cis-1,2-DCE is the primary dechlorination product of TCE, a minor reductive degradation pathway can lead to 1,1-DCE forming. All of these reductive dechlorination reactions are often limited by the amount of an available carbon source (electron donor) in the groundwater system. Additionally, the rate of reductive dechlorination appears to decrease as the degree of chlorination decreases. The reduced daughter products of TCE (especially vinyl chloride) can also be biodegraded via aerobic degradation pathways.

The limited cis-1,2-DCE, 1,1-DCE, and VC detections in groundwater at SWMU 20 suggest reductive dechlorination is not occurring to any significant degree, which is supported by evidence for an aerobic environment dominating in the subsurface. Very localized reduced zones may develop in more clay-rich lenses of the saprolite resulting in limited anaerobic reductions; however, biodegradation under prevailing ambient groundwater conditions is unlikely to contribute to decreasing TCE concentrations.

Abiotic dechlorination and therefore destruction of TCE without producing daughter products such as cis-1,2-DCE, 1,1-DCE, and VC is also unlikely to contribute to TCE degradation at SWMU 20, as this process occurs under reducing conditions.

5.1.5 Bioaccumulation

Bioaccumulation is the extent to which a chemical will partition from water into the lipophilic parts (e.g., fat) of an organism. Bioaccumulation commonly is estimated by the octanol-water partition coefficient (K_{ow}). Chemicals with high values of K_{ow} tend to avoid the aqueous phase and remain in soil longer or bioaccumulate in the lipid tissue of exposed organisms. Accumulation of a chemical in the tissue of the organism can be quantified by a bioconcentration factor (BCF), which is the ratio of the concentration of the chemical in the tissue to the concentration in the water. BCFs are both contaminant-specific and species-specific.

Table 5-1 lists some bioaccumulation values for the constituents of interest. VOCs generally have low values of K_{ow} (range is 10^{-3} to 10^{7}) and BCF, which indicates a lower potential to bioaccumulate. Furthermore, constituents of interest at SWMU 20 were detected only in groundwater, which is not accessible to bioaccumulative fauna. Based on the incomplete pathway, this process is unlikely to occur.

5.2 Natural Attenuation Evaluation

Natural attenuation of chlorinated VOCs can take place biologically or physically. Biodegradation of chlorinated solvents occurs when naturally occurring microorganisms break down the chlorinated solvents through an electron transfer process. Under anaerobic conditions, anaerobic bacteria use additional electron acceptors in the following order of preference: nitrate (“nitrate reduction”), ferric iron (“iron reduction”), sulfate (“sulfate reduction”), and carbon dioxide (“methanogenesis”). Reductive dechlorination has been demonstrated under nitrate-reducing and sulfate-reducing conditions, but is most efficient under methanogenic conditions. The relative concentrations of parent to daughter products is indicative of the potential for reductive dechlorination.

Natural attenuation indicator parameters at SWMU 20 were measured from field test kits, groundwater monitoring probes, and laboratory analytical results. Samples collected and analyzed in the laboratory for wet chemistry parameters from four monitoring wells (MW-05, MW-15, MW-16, and MW-18) are summarized in **Table 5-2** and **Figure 4-6**. Of the four wells, three (MW-05, MW-15, and MW-18) are to the north and east, just outside of the 5 µg/L TCE plume boundary; MW-16 is within the northern portion of the TCE plume. Natural attenuation parameters, including the microbe parameter *Dehalococcoides* species, were analyzed in groundwater collected from monitoring well MW-05 when it was within the 5 µg/L plume boundary (2011), but its TCE concentration decreased to below 5 µg/L by 2013. Field measurements collected from the monitoring wells that were included during the 2014 sampling event are summarized in Table 5-3.

Additional sample collection during the pre-Feasibility Study (FS) pilot study will provide more data for additional evaluation. This, along with other proposed further actions, is discussed in Section 8.3, Recommendations. Specific groundwater geochemical parameters and their indications for natural attenuation are discussed in detail in the following subsections.

5.2.1 Dissolved Oxygen

DO is the most thermodynamically favored electron acceptor used by microbes for the biodegradation of organic carbon. Generally, reductive dechlorination can occur with DO concentrations less than 2 mg/L. However, concentrations below 1 mg/L are considered to be indicative of anaerobic conditions, which is favorable for reductive dechlorination. DO concentrations less than 0.5 mg/L are considered ideal for reductive dechlorination.

DO concentrations ranged from 0.35 (MW-13) to 3.59 mg/L (MW-13D) during the most recent sampling event in 2014, with only seven wells exhibiting a DO below 1 mg/L. The DO concentrations observed indicate that reductive dechlorination is possible in localized areas of aquifer at the site, but not throughout SWMU 20 groundwater.

5.2.2 Nitrate/Nitrite

After DO has been depleted, nitrate may be used as an electron acceptor during anaerobic biodegradation of organic carbon via denitrification. In this process, nitrate is reduced and nitrite is produced. Nitrate was detected at four monitoring wells with concentrations ranging from 0.35 mg/L (MW-05) to 4.16 mg/L (MW-16), while nitrite was not detected in the four samples. Based on results from MW-16, located within the northern portion of the plume, nitrate reduction does not appear to be a significant electron acceptor process, at least within the portion of the plume with characteristics represented by the data from MW-16. It is uncertain if nitrate reduction may be occurring in higher-concentration areas of the TCE plume...

5.2.3 Ferric Iron/Ferrous Iron

In some cases, ferric iron (iron III) is used as an electron acceptor during anaerobic degradation. During this process ("iron reduction"), ferric iron is reduced to iron (II) or ferrous iron. As a result, measurable concentrations of ferrous iron are an indicator of iron reduction. In general, ferrous iron concentrations greater than 1 mg/L are considered to be an indicator of iron reduction.

As shown in **Table 4-4**, dissolved iron concentrations were detected in just two monitoring wells, with a maximum dissolved iron concentration of 0.118 mg/L (MW-02), an order of magnitude lower than 1 mg/L. Field test kits were used to test total and ferrous iron at 14 wells during the 2013 sampling event. Ferrous iron was detected in just two of those samples at concentrations ranging from 0.1 mg/L to 0.2 mg/L. The absence of high ferrous iron within the aquifer suggests that iron reduction is not a significant electron acceptor process at SWMU 20.

5.2.4 Sulfate/Sulfide

After DO, nitrate, and iron have been depleted, sulfate may be used as the electron acceptor in anaerobic degradation. This process is termed "sulfate reduction" and results in the production of sulfide. Sulfide concentrations increase within the aquifer when sulfate reduction is occurring.

Sulfate concentrations ranged from 167 (MW-15) to 235 mg/L (MW-18) in four monitoring wells, while sulfide concentrations were non-detect in those same four wells. Based on the sulfate results from MW-16 (196 mg/L), located within the northern portion of the plume, sulfate reduction is not a significant electron acceptor process, at least within the portions of the plume represented by MW-16 data, which is expected since nitrate and iron reductions are also absent. It is uncertain if sulfate reduction may be occurring in the higher-concentration areas of the TCE plume.

5.2.5 Ethene/Ethane

Ethene is a daughter product of vinyl chloride, and ethane is a daughter product of ethene. Concentrations of ethene above 0.01 μg/L and ethane above 0.1 μg/L indicate reductive dechlorination is proceeding to completion. Ethene and ethane were not detected in groundwater from the four monitoring wells for which these parameters were analyzed, including the one well (MW-16) located within the northern portion of the TCE plume. The lack of ethene and ethane detections is not unexpected with the infrequent and very low detections of cis-1,2-DCE and vinyl chloride in SWMU 20 groundwater. The non-detects of ethene and ethane indicate that reductive dechlorination of TCE is not complete, at least in the northern portion of the TCE plume; however, it is also likely not a significant process in the remainder of the plume due to the low concentrations and/or general absence of cis-1,2-DCE and vinyl chloride across the site.

5.2.6 Total Organic Carbon

Organic carbon is used as an electron donor (or may produce hydrogen, which can serve as the electron donor) in the reductive dechlorination process and, therefore, is needed to drive the process. The presence of TOC at

concentrations greater than 20 mg/L indicates ideal conditions for reductive dechlorination. The maximum TOC concentration observed in SWMU 20 groundwater was 1.6J mg/L (MW-15), which does not indicate favorable conditions for reductive dechlorination.

5.2.7 Oxidation-Reduction Potential

The ORP of groundwater is a measure of electron activity and is an indicator of the relative tendency of a solution to accept or transfer electrons. Reductive dechlorination is most efficient and likely occurring in the ORP range corresponding to sulfate reduction and methanogenesis (<-100 millivolts [mV]); however, dechlorination of TCE is possible in the ORP range associated with nitrate, manganese, and ferric iron reduction (<+50).

ORP values ranged from -65 mV to 264 mV in the most recent groundwater sampling event in 2014, with eight of the 26 monitoring wells (seven shallow wells and one deep well) showing ORP values between 50 and -100 mV. No ORP values were recorded below -100 mV. This indicates that localized reductive dechlorination is possible, but it is not widespread in SWMU 20 groundwater.

5.2.8 Temperature and pH

Groundwater temperature directly affects the solubility of oxygen and other geochemical species. Reductive dechlorination can occur at groundwater temperatures between 5 degrees Celsius (°C) and 20°C, while temperatures greater than 20°C are considered ideal for reductive dechlorination. Groundwater temperatures ranged from 28.5 to 30.9°C in the most recent groundwater sampling event in 2014; however, other geochemical parameters described above show that groundwater conditions do not readily support reductive dechlorination across the site.

The pH of groundwater has an effect on the presence and activity of microbial populations in groundwater. The optimal pH range for reductive dechlorination is 6 to 8. The pH in groundwater ranged from 6.11 to 7.03 in the most recent 2014 groundwater sampling event.

5.2.9 Reductive Dechlorination Daughter Products

Reductive dechlorination daughter products of TCE include 1,1-DCE, cis-1,2-DCE, vinyl chloride, ethane, and ethene. The presence of these compounds indicates biodegradation is occurring. In general, the widespread presence of reductive dechlorination daughter products would indicate that reductive dechlorination is a significant mechanism. While reductive dechlorination daughter products 1,1-DCE, cis-1,2-DCE, and vinyl chloride were detected, the detections were at low concentrations in the SWMU 20 aquifer: 1,1-DCE was detected in five monitoring wells at concentrations ranging from 0.084J to 1.29J (MW-24), cis-1,2-DCE was detected in 12 monitoring wells at concentrations ranging from 0.19J to 1.59 ug/L (MW-23), and vinyl chloride was detected in only two monitoring wells with a high concentration of 0.23J (MW-27). This information indicates that reductive dechlorination is occurring, but is not a significant mechanism (under natural conditions) for natural attenuation.

5.2.10 Microbial Results

Dehalorespiring organisms such as *Dehalococcoides* can facilitate dechlorination of chlorinated solvents to ethene/ethane. In general, a density of less than 1 cell per milliliter (cell/mL) is not optimal to sustain dechlorination rates. The concentration of *Dehalococcoides* detected at MW-05 was 0.2J cells/mL, which is not indicative of a culture that may sustain appreciable dechlorination rates.

5.2.11 Summary

The comprehensive geochemical data collected from SWMU 20 groundwater indicate conditions are not supportive for significant reductive dechlorination site-wide. However, more favorable conditions are observed in localized areas. Furthermore, the geochemical framework critical for enhancing dechlorination conditions at SWMU 20 can be field engineered with various substrates and additives.

5.3 Contaminant Migration at SWMU 20

This subsection discusses the site-specific sources and potential mechanisms for contaminant release and migration from these sources. **Figure 5-1**, the SWMU 20 CSM, supports the discussion in this section.

5.3.1 Potential Sources of Contamination

The sources of potential contamination at SWMU are likely historical discharges of waste material and solvents from helicopter maintenance or other areas identified from historical information and subsequently investigated. While a source existed in the past, sampling conducted during the RI and previous investigations suggests there are no residual sources of contamination in SWMU 20 soil.

5.3.2 Migration from Potential Source Areas

The migration pathways at SWMU 20 were assessed by identifying potential sources of contamination, evaluating horizontal and vertical distributions of contaminants, and incorporating the hydrogeologic conceptual model. A generalized description of the potential contaminant migration pathways is provided below.

5.3.2.1. Migration from Surface Release to Groundwater

Any surface release would cause contaminants to migrate downward, as either a free-phase liquid or dissolved in water, through the vadose zone to groundwater. Since several investigations of soil were previously conducted in the potential source areas and no ongoing source of contamination was found, the vadose zone is not expected to be a continuous source of contamination.

5.3.2.2. Migration in Groundwater

Contaminant transport in groundwater is primarily by advection and dispersion. Advection includes the transport of dissolved contaminants by the bulk motion of flowing groundwater. Dispersion is the spreading of dissolved contaminants from the path they would be expected to follow during advection, due to the spatial variation in aquifer permeability, fluid mixing, and molecular diffusion.

Contaminants typically will not move as rapidly as groundwater because of retardation, or the adsorption of the contaminant to the solid media. The advective migration rates of different dissolved contaminants vary depending on the K_d and the rate of groundwater flow. For each contaminant of interest, it is possible to calculate a retardation coefficient, which is an estimate of the degree to which the contaminant is slowed by adsorption in relation to the groundwater flow velocity. The retardation coefficient is calculated according to the following equation:

$$R = 1 + p_b \times K_d/n_e$$

Where:

R = Retardation coefficient (dimensionless)
p_b = soil bulk density (grams per cubic centimeter [g/cm^3])
K_d = Distribution coefficient (mL/g)
n_e = effective porosity (dimensionless)

The retardation factor can be interpreted as the velocity of a contaminant relative to the velocity of the groundwater. A retardation factor close to 1.0 indicates that the contaminant has little tendency to bind to soils, and thus moves freely in groundwater. By contrast, the larger the value of R, the greater the tendency for a contaminant to bind to the soil matrix and, consequently, the slower it will move in groundwater. Using a bulk density of 1.3 grams/cm3 (from saprolite formation at SWMU 4 on Vieques) and an effective porosity of 0.18, R values for the contaminants PCE, TCE, cis-1,2-DCE, and vinyl chloride were calculated. These are presented in **Table 5-1**. The R values range from 1.2 for vinyl chloride to 23.2 for PCE. The chlorinated VOCs except vinyl chloride are likely retarded by the saprolite aquifer beneath the site, including TCE with an R value of 7.8.

Based on their retardation coefficients, the average calculated groundwater flow velocity of 38 feet/year shown above yields estimated advective transport rates of about 2 feet/year to 31 feet/year for individual constituents of interest. Assuming a release year of 1960 (active facility), the travel duration of 54 years and observed plume length of approximately 1,550 feet yield an estimated maximum advective transport rate of 29 feet/year. This is consistent with the upper end of the range of transport rates for individual constituents of interest estimated from the average calculated groundwater flow rate. The estimated groundwater velocity for SWMU 20 uses a hydraulic conductivity from a neighboring site; therefore, once slug tests are performed at the site during the pilot study, the velocities will be updated.

5.3.2.3. Migration in Vapor Phase

The potential for the migration of VOC vapors into the vadose zone exists at SWMU 20. VOCs located in subsurface soils or in groundwater can volatilize, migrate through soil gas, and transport into indoor spaces, potentially producing inhalation exposure. VOCs in soil gas will primarily migrate and spread out by vapor diffusion. Advective transport of VOC vapors (i.e., by the convective flow of soil gas) is expected to occur near the ground surface as a result of atmospheric pressure variations. A secondary spreading mechanism for VOCs in the vadose zone is the migration of soil moisture due to infiltration or evapotranspiration.

The nature, extent, and migration of contamination within the vapor phase was not investigated as part of the RI. However, SWMU 20 is no longer operational, no buildings are present at the site, and no buildings are planned in the future at the site. The potential for vapor intrusion risk is evaluated in Section 6.

TABLE 5-1
Physical and Chemical Data of Constituents of Interest
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Constituents of Interest	CAS #	Molecular Weight (g/mole)	Density (g/cm^3)	Water Solubility (mg/L)	Vapor Pressure (mm Hg)	K_h (atm-m3/mole)	Log K_{oc} (---)	K_d (mL/g)	R (---)	V_c (ft/day)	Log K_{ow} (---)	Log BCF (---)
Volatile Organic Compounds												
1,1-Dichloroethene	75-35-4	96.94	1.21	2,250	500	2.61E-02	1.81	0.74	6.3	0.016	2.13	4.5
Tetrachloroethene	127-18-4	165.8	1.62	150	20	1.53E-02	2.43	3.07	23.2	0.004	2.53	2
Trichloroethene	79-01-6	131.4	1.46	1,100	74	9.10E-03	1.92	0.95	7.8	0.013	2.53	2
cis-1,2-Dichloroethene	156-59-2	96.94	1.28	6,410	200	4.08E-03	1.69	0.56	5.0	0.020	1.86	1.36
Vinyl Chloride	75-01-4	62.50	0.91	1,100	2,531	2.78E-02	0.39	0.03	1.2	0.086	0.60	3.04

BCF = Bioconcentration Factor
foc = fraction organic carbon = 0.0114
K_d = Soil-Water partition coefficient = K_{oc} x foc for organics
K_h= Henry's Law Constant
K_{oc} = Organic carbon partition coefficient
K_{ow} = Octanol-water partition coefficient
n_e = Effective porosity = 0.18
R = Retardation coefficient = 1 + K_d x p_b / n_e
p_b = Soil bulk density = 1.3 grams per cubic centimeter (based on value obtained for saprolite from SWMU 4 on Vieques)
Vc = Contaminant velocity = seepage velocity (estimated average is 0.103 ft/day) / R

Data sources:
(1) Agency of Toxic Substances and Disease Registry. 2009. Toxicological Profiles. *http://www.atsdr.cdc.gov/toxpro2.html*
(2) Dragun, James. 1998. *The Soil Chemistry of Hazardous Materials 2nd Edition*.
(3) Interstate Technology and Regulatory Council. 2002. *A Systematic Approach to In Situ Bioremediation in Groundwater Including Decision Trees on In Situ Bioremediation for Nitrates, Carbon Tetrachloride, and Perchlorate.* In Situ Bioremediation Team.
(4) Montgomery. 2000. *Groundwater Chemicals Desk Reference. Third Edition.*
(5) SRC. 2009. Interactive PhysProp Database Demo. *http://www.srcinc.com/what-we-do/databaseforms.aspx?id=386*
(6) United States National Library of Medicine. 2009. Hazardous Substances Data Bank (HSDB). *http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB*
(7) IPCS. 2010. *http://www.inchem.org/*

TABLE 5-2
MNA Parameters
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Station ID	EPI04-MW05	EPI04-MW15	EPI04-MW16	EPI04-MW18
Sample ID	VEP4-GW05-1111	VEP4-GW15-0613	VEP4-GW16-0613	VEP4-GW18-0613
Sample Date	11/18/11	06/05/13	06/10/13	06/07/13
Wet Chemistry (mg/l)				
Acetate	NA	1 U	1 U	1 U
Alkalinity	346	507 N	456	364
Butyrate	NA	1 U	1 U	1 U
Chloride	2,020	941 MD	1,320 MD	3,110 H1MD
Ethane	NA	0.002 U	0.002 U	0.002 U
Ethene	NA	0.002 U	0.002 U	0.002 U
Formic acid	NA	NA	NA	NA
Lactic Acid	NA	1 U	5 U	1 U
Methane	0.00555	0.00115 NJ	0.002 U	0.00248 J
Nitrate	0.35	2.29	4.16	2.47
Nitrite	NA	0.1 NU	0.1 U	0.1 U
Propionic Acid	NA	1 U	1 U	1 U
Pyruvate	NA	1 U	1 U	1 U
Sulfate	234	167	196	235
Sulfide	NA	1.69 U	1.85 U	1.85 U
Total dissolved solids (TDS)	4,000	2,320	2,690	6,570
Total organic carbon (TOC)	1.04	1.6 J	1.32 J	2.5 U
Dehalococcoides (cells/ml)	0.2 J	NA	NA	NA

Notes:
NA - Not analyzed
D - Result of a dilution (laboratory qualifier)
H1 - Analyzed outside of recommended holding time (laboratory qualifier)
J - Analyte present, value may or may not be accurate or precise
M - Sample matrix interfered with the quantitation of the analyte; the parameters DL/LOD/LOQ have been raised (laboratory qualifier)
N - MS/MSD accuracy and/or precision outside acceptance criteria (laboratory qualifier)
U - The material was analyzed for, but not detected
mg/l - Milligrams per liter

TABLE 5-3
2014 Field Indicator Parameters
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Well	DO (mg/L)	ORP (mV)	pH	Temp (C)
MW-10	0.59	183.9	6.56	30.35
MW-13	0.35	152.7	6.5	30.86
MW-13D	3.59	155.2	6.73	30.96
MW-14	1.27	223.4	6.77	30.7
MW-16	1.03	125.5	6.73	29.84
MW-17	1.67	240.5	6.7	30.5
MW-17D	2.31	41.6	6.45	29.04
MW-18	1.96	232.2	6.64	29.8
MW-19	1.63	233	6.65	29.98
MW-20	1.07	-65	6.83	29.63
MW-21	2.23	154.6	7.03	29.4
MW-22	2.37	156.1	6.98	29.77
MW-23	0.81	213.4	6.5	30.24
MW-24	0.83	37.6	6.78	29.09
MW-24D	1.98	108.5	6.76	28.78
MW-25	0.59	264.4	6.73	29.55
MW-25D	1.93	61.5	6.86	29.15
MW-26	1.05	6.6	6.55	29.67
MW-27	0.92	39.6	6.48	28.42
MW-28	1.26	156.5	6.83	NR
MW-28D	1.29	86.9	6.77	28.13
MW-29	1.25	25.8	6.51	29.22
MW-30	0.98	6.39	6.4	29.4
MW-31	1.17	143.7	6.95	28.5
MW-32	1.53	84.6	6.48	30.55
MW-33	2.3	21.8	6.11	30.13

NR = Not Recorded in field log book

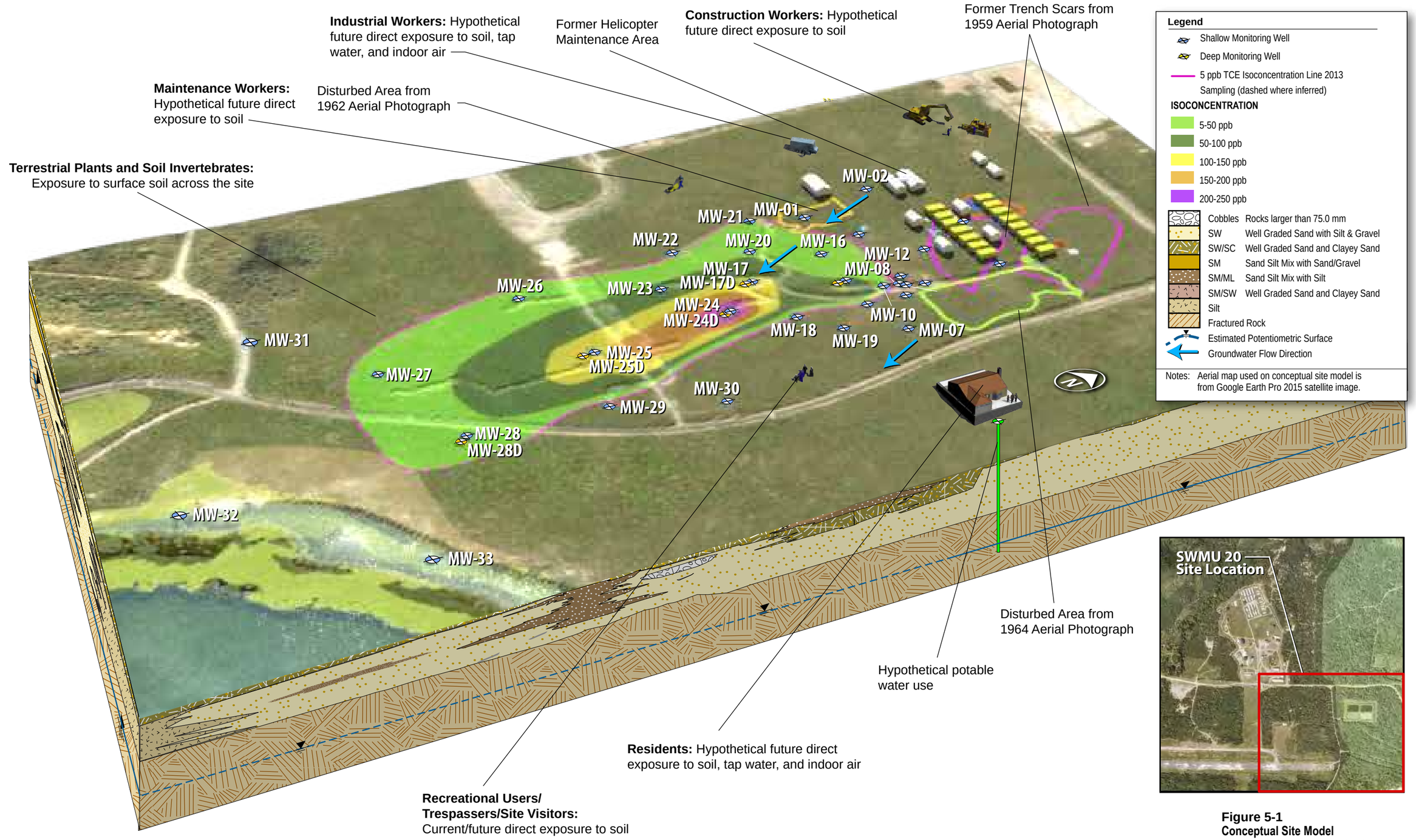

Figure 5-1
Conceptual Site Model
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

SECTION 6

Human Health Risk Assessment Summary

An HHRA was conducted for SWMU 20 that evaluated potential current and future health risks from exposure to site soil and groundwater based on the analytical data collected during the RI and previous investigations. The HHRA was conducted in accordance with the Vieques Master HHRA protocol (CH2M, 2010b), which is consistent with EPA Region 2 policy and EPA guidance documents. The primary guidance documents used in preparation of the HHRA are the *EPA Risk Assessment Guidance for Superfund (RAGS) Parts A, D, E, and F* (EPA, 1989, 2001, 2004, 2009), and Update of Standard Default Exposure Factors (EPA, 2014). The complete HHRA is presented in **Appendix K**. This section summarizes the key components and findings of the HHRA.

6.1 Chemicals of Potential Concern

The analytical data used in the HHRA consist of soil samples collected during the PA/SI in 2006 and soil and groundwater samples collected during the RI in 2013 and 2014. The soil dataset comprising the surface soil interval consists of 25 samples collected from the 0-1 foot interval (because no land crab habitat is present at the site), and the soil dataset for the 0-6 foot interval ("total soil") includes 50 samples collected from three depth intervals (0-1 foot, 2-4 foot, and 4-6 foot intervals). The groundwater dataset consists of 77 samples collected from 38 monitoring wells.

COPCs were identified for surface soil, total soil, and groundwater using the screening process presented in the Vieques Master HHRA protocol (CH2M, 2010b). The following COPCs were identified for each receptor group:

Recreational Users/Trespassers/Site Visitors:

- Surface soil - Seven inorganics (aluminum, arsenic, chromium, cobalt, iron, manganese, and vanadium) and cyanide

Maintenance Workers:

- Surface soil - Two inorganics (arsenic and chromium)

Residents:

- Surface soil - Seven inorganics (aluminum, arsenic, chromium, cobalt, iron, manganese, and vanadium) and cyanide
- Total soil - Seven inorganics (aluminum, arsenic, chromium, cobalt, iron, manganese, and vanadium) and cyanide
- Groundwater (direct contact) – Three VOCs (PCE, TCE, and vinyl chloride)
- Groundwater (indoor air) – Two VOCs (TCE and vinyl chloride)

Industrial Workers:

- Total soil - Two inorganics (arsenic and chromium)
- Groundwater (direct contact) – Three VOCs (PCE, TCE, and vinyl chloride)
- Groundwater (indoor air) – One VOC (TCE)

Construction Workers:

- Total Soil - Two inorganics (arsenic and chromium)

6.2 Exposure Evaluation

As noted in Section 3.1 of **Appendix K** and in the conceptual model for potential human receptors (**Appendix K**, Table 1 of Attachment K-1, and Figure 1 of Attachment K-5), current and future receptors evaluated in the HHRA consist of recreational users/trespassers/site visitors (adult, youth, and child), maintenance workers, residents (adult and child), industrial workers, and construction workers.

The following potential exposure pathways were quantified for potential receptors identified at the site:

- Current/Future Recreational Users/Trespassers/Site Visitors - Ingestion, dermal contact, and inhalation exposures to surface soil
- Future Maintenance Workers – Ingestion, dermal contact, and inhalation exposures to surface soil
- Future Residents:
    - Soil - Ingestion, dermal contact, and inhalation exposures to soil (0-1 foot or 0-6 feet, whichever depth interval has the higher exposure point concentration [EPC] for each COPC)
    - Groundwater (drinking water) – Ingestion, dermal contact, and inhalation exposure (during showering) to groundwater
    - Indoor Air (vapor intrusion from groundwater) – Inhalation exposure
- Future Industrial Workers:
    - Total Soil - Ingestion, dermal contact, and inhalation exposures to total soil
    - Groundwater (drinking water) – Ingestion and dermal contact exposure to groundwater
    - Indoor Air (vapor intrusion from groundwater) – Inhalation exposure
- Future Construction Workers – Ingestion, dermal contact, and inhalation exposures to total soil

6.3 Risk Estimates

EPA's acceptable range for excess lifetime cancer risk (ELCR) associated with CERCLA sites is 1-in-10,000 ($1x10^{-4}$) to 1-in-1,000,000 ($1x10^{-6}$). Similarly, the target (acceptable) non-cancer hazard index (HI) is 1 or less per target organ. Risk estimates were calculated for potential receptors and exposure pathways using conservative assumptions for exposure factors and exposure point concentrations. The risk estimates are summarized below:

Recreational User/Trespasser/Site Visitor – Current/Future Scenarios

Surface Soil (ingestion, dermal contact, and inhalation)

- Adult: $2x10^{-7}$ cumulative ELCR, all target organ specific HI<1
- Youth: $2x10^{-7}$ cumulative ELCR, all target organ specific HI<1
- Child: $6x10^{-7}$ cumulative ELCR, all target organ specific HI<1

Maintenance Workers – Future Scenarios

Surface Soil (ingestion, dermal contact, and inhalation)

- 1x10-7 cumulative ELCR, all target organ specific HI<1

Residents – Future Scenarios

Total soil (ingestion, dermal contact, and inhalation)

- Adult: all target organ-specific HI <1
- Child: all target organ-specific HI<1
- Adult/child aggregate: 3x10-6 ELCR

Groundwater (ingestion, dermal contact, inhalation of bathroom air, and inhalation of indoor air)

- Adult: One target organ-specific HI >1 – immunological [HI = 140], due to TCE
- Child: all target organ-specific HI >1 – immunological [HI = 130], due to TCE
- Adult/child aggregate: 5x10-3 ELCR, due to TCE

Industrial Workers – Future Scenarios

Total Soil (ingestion, dermal contact, and inhalation)

- 5x10-7 cumulative ELCR, all target organ specific HI<1

Groundwater (ingestion, dermal contact, and inhalation of indoor air)

- 8x10-5 cumulative ELCR, one target organ-specific HI >1 – immunological [HI = 22], due to TCE

Construction Workers – Future Scenarios

Total Soil (ingestion, dermal contact, and inhalation)

- 6x10-8 cumulative ELCR, all target organ specific HI<1

6.4 Contaminants of Concern

In general, COCs are identified when the potential ELCR or HI for a receptor group exceeds EPA threshold values (a total ELCR of $1x10^{-4}$ or a target organ-specific HI of 1) and concentrations are site-related and above background levels. When a potential ELCR of $1x10^{-4}$ is exceeded for an exposure medium for a receptor group, the COPCs above background levels and posing an individual ELCR greater than $1x10^{-6}$ in the environmental medium responsible for the unacceptable risks are identified as COCs. When a potential target organ-specific HI exceeds 1 for an exposure medium for a receptor group, the COPCs above background levels and posing an HQ greater than 0.1 for that target organ in the environmental medium responsible for the unacceptable HI are identified as COCs. Factors such as nature of contamination source, laboratory contamination, and common pesticide use (unrelated to spills, improper storage disposal, or use) are typically considered when identifying COCs.

Risk estimates for soil were less than or within EPA acceptable levels for all current and future receptor groups evaluated in this HHRA. That is, the potential ELCRs for these exposure scenarios evaluated at the site were within the target ELCR range of $1x10^{-6}$ to $1x10^{-4}$ and the estimated target organ-specific HIs were less than the threshold of 1. Therefore, there are no soil COCs.

Risk estimates for groundwater exceeded EPA acceptable levels for residents (adult and child) and industrial workers. Potential TCE exposures exceeded EPA acceptable levels via ingestion, dermal contact, inhalation of vapors in bathroom air, and inhalation of indoor air for residents. Potential TCE exposures also exceeded EPA acceptable levels via ingestion and inhalation of indoor air by industrial workers. PCE contributes to excess risk levels via inhalation of vapors in bathroom air, while vinyl chloride contributes to excess risk levels via ingestion and inhalation of indoor air. Therefore, TCE, PCE, and vinyl chloride are identified as COCs in site groundwater.

SECTION 7

Ecological Risk Assessment Summary

This section summarizes the results of the ERA that was conducted for SWMU 20. The complete ERA is contained in **Appendix L**.

7.1 Introduction

This ERA was conducted in accordance with the *Navy Policy for Conducting Ecological Risk Assessments* (CNO, 1999) and the Navy guidance for implementing this ERA policy (NAVFAC, 2003; 2012). It considers previously collected data as well as data collected specifically for this RI. This ERA is completed through Step 3A of the 8-step ERA process (EPA, 1997).

The general approach, methods, and assumptions used to conduct this ERA were based on the final ERA protocol presented in the Revision 1 to the ERA Protocol (CH2M, 2015b), the ERA interim deliverable for SWMU 20 (CH2M, 2015a), and regulator comments on the interim deliverable.

7.2 Environmental Setting

SWMU 20 (formerly PI-4) is located on the south side of the main access road leading from the main gate of Camp Garcia (**Figure 2-2**).

7.2.1 Site Description

The site was identified in an aerial photography study completed in 2000, which showed a series of trenches and disturbed ground, active between 1959 and 1964. The trenches, visible in a 1959 aerial photograph, had been covered by 1962. An area of disturbed ground (other than that associated with the trenches) was visible in the 1962 aerial photograph just south of the former helicopter maintenance area. Two rectangular bermed areas, identified as having been historically used for fuel bladder storage, were also visible in the 1962 aerial photograph, as is the helicopter maintenance area (active at the time). An area of disturbed ground appears in the southeastern corner of the trenched area in the 1964 photograph. Interviews and records also indicate that barracks and a mess hall were present at the site, although no buildings are currently present. Based on the configuration of the trenches, and the presence of concrete slabs and a concrete vault in the area of the trenches, it is possible that the trenches were associated with a sanitary leach field for the barracks and mess.

Based on the above information, five potential sources of a CERCLA-related release were originally identified based on historical activities at the site: 1) former trenches; 2) area of disturbed ground south of the helicopter maintenance area; 3) former fuel bladder storage area; 4) former helicopter maintenance area; and 5) disturbed area in the southeastern part of the trenched area (**Figure 2-3**).

The site slopes gently to the southeast with elevations dropping from about 45 feet amsl to approximately 5 feet amsl. The land around SWMU 20 was at one time maintained as cleared, but became re-vegetated once operations at the site ceased. Soils are primarily dry sands and dry silty sands (KTd and Qa soil types).

There are no surface water bodies on, or immediately adjacent to, the site. The closest surface water body topographically downgradient of the site is Bahia Tapón along the coast, approximately 0.5 miles southeast of the former structures at the site (**Figure 2-5**). Based on water level readings from site monitoring wells, groundwater flows through the fractured bedrock aquifer toward the south-southeast.

7.2.2 Habitats and Biota

The description of the habitats and biota at SWMU 20 is based primarily on the habitat characterization that was conducted by Geo-Marine, Inc. (GMI) in September 2005 (GMI, 2005) which included a biological survey of plants, animals, and critical habitats. While no more recent biological evaluations of this area are known to have been

conducted (e.g., by USFWS), qualitative surveys of vegetation/habitats and wildlife on SWMU 20 were conducted by a CH2M biologist in September 2008 and in July 2014. Based on the results of these surveys, no significant changes have occurred to the habitats present on the site, or the biota potentially using the site, relative to the 2005 GMI survey.

Numerous concrete foundations, concrete culverts associated with ditches, and piles of rubble and soil were observed on or near the site during the biological survey. Vegetative communities in this area consisted primarily of *Prosopis/Acacia* successional savanna with a dense, nearly continuous herbaceous layer (dominated by *Commelina diffusa*) covering most of the ground surface, including the concrete pads. Invasive shrubs and vines were also common. Non-leguminous trees were scarce, both in number of species and individuals, but included *Ziziphus mauritiana*, *Bucida buceras*, *Citharexylum fruticosum*, *Zanthoxylum monophyllum*, *Bursera simaruba*, and *Bourreria succulenta*. Low herbaceous plants dominated the area surrounding the runway.

A total of 98 plant species were identified on the site and adjacent (runway) areas (GMI, 2005; **Appendix L**, Table L-1). A list of mammals, birds, and reptiles observed in and around SWMU 20 is provided in **Appendix L**, Table L-1. The only mammal observed was the Indian mongoose (*Herpestes auropunctatus*), a common invasive species on Vieques. No amphibians were observed but three species of reptiles (lizards) were. A total of 18 species of birds were observed on or near the site. No federally protected species or preferred habitats were observed at SWMU 20.

7.3 Analytical Data Used in the ERA

Surface soil samples (0 to 1 foot depth) evaluated in this ERA include those collected in 2006 from 15 borings (SO01 through SO15) as part of the PA/SI, two samples collected in 2013 as part of the Supplemental ESI, and five samples collected in 2014 during the RI.

7.4 Conceptual Site Model

The CSM relates potentially exposed receptor populations with potential source areas based on physical site characteristics and complete exposure pathways. Important components of the CSM are the identification of potential source areas, transport pathways, exposure media, exposure pathways and routes, and receptors. **Appendix L**, Figure L-2 illustrates a diagrammatic CSM for SWMU 20. Key components of this CSM are discussed in **Appendix L**. **Table 7-1** shows the assessment endpoints, risk hypotheses, and measurement endpoints used in the ERA and the receptors associated with each of these endpoints.

7.5 Results

This section summarizes the results of the ERA. A more detailed description of the ERA results is provided in **Appendix L**.

7.5.1 Terrestrial Habitats

Eight assessment endpoints were developed for terrestrial habitats on SWMU 20 (**Table 7-1**). Lines of evidence for terrestrial habitats included: 1) comparison of surface soil concentrations with ESVs; 2) comparison of modeled dietary doses with ingestion toxicity reference values (TRVs); and 3) comparison of site surface soil concentrations with background concentrations.

In SWMU 20 surface soil, selenium was identified as a Step 3A COPC for further risk evaluation. Vanadium was identified as a Step 3A COPC for further risk evaluation for terrestrial food web exposures.

As discussed in both the PA/SI and SI/ESI reports, selenium does not pose an unacceptable risk to plants and soil invertebrates based on the following:

- The site is overgrown with vegetation, with no signs of stressed vegetation. The qualitative plant survey that has been conducted at the site observed no impacts to the terrestrial plant community based on the species composition found and the lack of stressed vegetation.
- Selenium exceeded the soil ESV in 7 of 15 samples at a maximum HQ of 1.50. In the East Vieques background study, three (KTd, Kv, and Qa) of the four soil types were combined when developing background soil UTLs (SWMU 20 is in the KTd type). The maximum detected surface soil concentration at SWMU 20 (0.78 mg/kg) is not that elevated relative to the UTL for this group (0.51 mg/kg; ratio is about 1.50). However, detection limits for selenium in the background study soil samples were generally in the 3 to 5 mg/kg range for these soil types. The East Vieques background UTL for the fourth (Tl) soil type, which also occurs in the vicinity of SWMU 20, is 1.30 mg/kg (which is also the UTL for the combined set [all soil types]) and is higher than the maximum surface soil concentration at SWMU 20. Further, maximum background concentrations of selenium in the KTd (0.73 mg/kg) and Qa (2.00 mg/kg) soil types from West Vieques are similar to (KTd; ratio of 1.07) or greater than (Qa; ratio of 0.39) the maximum site concentration. These data support the conclusion that selenium concentrations detected in surface soils at SWMU 20 (maximum of 0.78 mg/kg) are within the range of background. Further, the soil ESV (0.52 mg/kg) is based on potential impacts to plants. The site is heavily vegetated, with no observed impacts to the terrestrial plant community based on the results of a qualitative plant survey. Maximum surface soil concentrations are less than soil ESVs based on other receptors (e.g., 4.10 mg/kg for soil invertebrates).
- Surface soil concentrations of vanadium did not exceed the background UTL. Thus, potential risks to avian receptors from food web exposures are not elevated above background levels and are thus acceptable.

7.6 ERA Summary and Conclusions

In summary, no chemical was identified as a final Step 3A COPC in surface soils or for terrestrial food web exposures at SWMU 20. Thus, potential ecological risks for the site are acceptable.

TABLE 7-1
Assessment Endpoints, Risk Hypotheses, and Measurement Endpoints
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Assessment Endpoint	Risk Hypothesis	Measurement Endpoint	Receptor
Terrestrial Habitats			
Survival, growth, and reproduction of terrestrial soil invertebrate communities	Are site-related chemical concentrations in surface soil sufficient to adversely effect soil invertebrate communities?	Comparison of chemical concentrations in surface soil with soil ecological screening values (ESVs)	Soil invertebrates
Survival, growth, and reproduction of terrestrial plant communities	Are site-related chemical concentrations in surface soil sufficient to adversely effect terrestrial plant communities?	Comparison of chemical concentrations in surface soil with soil ecological screening values (ESVs)	Terrestrial plants
Survival, growth, and reproduction of terrestrial reptile populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to terrestrial reptile populations?	Comparison of chemical concentrations in surface soil with soil ecological screening values (ESVs)	Reptiles
		Evidence of potential risk to other upper trophic level terrestrial receptors evaluated in the ERA (birds and mammals used as surrogates)	
Survival, growth, and reproduction of avian terrestrial invertivore (SERA)/ omnivore (BERA) populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to avian receptor populations that may consume terrestrial plants and soil invertebrates from the site?	Comparison of modeled dietary intakes using surface soil concentrations with literature-based ingestion TRVs; ratios ≥1 based on the NOAEL-LOAEL range indicate an effect	Pearly-eyed thrasher
Survival, growth, and reproduction of avian terrestrial herbivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to avian receptor populations that may consume terrestrial plants from the site?	Comparison of modeled dietary intakes using surface soil concentrations with literature-based ingestion TRVs; ratios ≥1 based on the NOAEL-LOAEL range indicate an effect	Common ground dove
Survival, growth, and reproduction of avian terrestrial carnivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to avian receptor populations that may consume small mammals from the site?	Comparison of modeled dietary intakes using surface soil concentrations with literature-based ingestion TRVs; ratios ≥1 based on the NOAEL-LOAEL range indicate an effect	Red-tailed hawk
Survival, growth, and reproduction of mammalian terrestrial herbivore (SERA)/ omnivore (BERA) populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to mammalian receptor populations that may consume terrestrial plants and soil invertebrates from the site?	Comparison of modeled dietary intakes using surface soil concentrations with literature-based ingestion TRVs; ratios ≥1 based on the NOAEL-LOAEL range indicate an effect	Norway rat
Survival, growth, and reproduction of mammalian terrestrial invertivore (SERA)/ omnivore (BERA) populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to mammalian receptor populations that may consume small mammals, soil invertebrates, and plants from the site?	Comparison of modeled dietary intakes using surface soil concentrations with literature-based ingestion TRVs; ratios ≥1 based on the NOAEL-LOAEL range indicate an effect	Indian mongoose

SECTION 8

Summary, Conclusion, and Recommendations

This section presents the summary and conclusions of the RI conducted at SWMU 20 and the recommendations for the path forward for the site.

8.1 Summary and Conclusions

The RI and previous investigations at SWMU 20 (PI-4) provide for a comprehensive understanding of the nature and extent of contamination and associated risks.

- Soil data collected across the site indicate no residual or continuing source of contamination is present.
- Groundwater is the only medium of concern at the site based on concentrations of TCE (and its parent and daughter products).
- Other than TCE (and its parent and daughter products), constituent concentrations are insignificant or attributable to background or non-CERCLA-related sources.
- The shallow bedrock groundwater contamination covers an area of about 18 acres, with a configuration indicating it does not have a continuing source in the unsaturated zone and is migrating south-southeast toward Bahia Tapón with little retardation. The boundaries of the plume (i.e., 5 μg/L contour) have been identified, indicating the horizontal extent of groundwater contamination has been sufficiently delineated to make remedial action determinations.
- The area of deep bedrock groundwater contamination is contained within the area of shallow bedrock groundwater contamination (i.e., plume footprint is smaller). Because groundwater flow is through fractures, tangential flow on the small scale is possible such that the plume size and shape may be slightly different in the deeper bedrock. However, the ocean is the ultimate discharge point (i.e., lowest hydraulic head). Therefore, because of the close proximity of SWMU 20 to the ocean, the overall groundwater flow direction at the site will be toward the ocean. While the vertical extent of contamination could not be completely determined from the five deep bedrock wells, available data indicate that contaminant concentrations decrease with depth, and suggest that the horizontal area of contamination, or plume footprint, is smaller in deep bedrock than in shallow bedrock.
- Biological and geochemical evaluation of the groundwater indicates reductive dechlorination may occur in localized areas of the site, but that without enhancement, it would not be a significant process on a site-wide basis.
- The HHRA demonstrated no unacceptable risks associated with soil. Risk estimates for groundwater exceeded EPA acceptable levels for residents (adult and child) and industrial workers. Potential TCE exposures exceeded EPA acceptable levels via ingestion, dermal contact, inhalation of vapors in bathroom air, and inhalation of indoor air for residents. Potential TCE exposures also exceeded EPA acceptable levels via ingestion and inhalation of indoor air by industrial workers. PCE contributes to excess risk levels via inhalation of vapors in bathroom air, while vinyl chloride contributes to excess risk levels via ingestion and inhalation of indoor air.
- TCE and PCE concentrations in groundwater exceed the Federal MCLs and PRWQS.
- The ERA demonstrated no unacceptable ecological risks exist at the site.
- All planned samples were collected. All planned laboratory analyses were performed. Field completeness is 100%.

8.2 Conclusion

Based on the findings previously summarized, remedial action alternatives evaluation is warranted for TCE (and its parent and daughter products) because they pose unacceptable human health risks and TCE and PCE concentrations exceed MCLs.

8.3 Recommendations

The findings of the RI were discussed during the March 2015 ERP Technical Subcommittee meeting. Based on the discussion, it was concurred that a pre-FS pilot study to evaluate the efficacy of in situ treatment to reduce the concentrations of TCE and related VOCs in groundwater is warranted.

Based on this, the following are the recommended next steps:

1. Prepare the Pilot Study SAP for groundwater to:
    - Evaluate in situ technologies that inject one or combination of reagents: ISCO, enhanced in situ bioremediation (EISB), and/or in situ chemical reduction (ISCR). The technology selected for the pilot study will be designed to minimize the potential for accumulation of COC daughter products above MCLs or PRWQS.
2. Conduct the groundwater pilot study at SWMU 20.
    - Pilot Study will focus on ISCO in a treatment zone centered on the hotspot area around MW-24; other reagents (EISB, ISCR) may also be tested
3. During the pilot study (or prior to the FS), perform slug testing to evaluate hydraulic characteristics of the saprolite and bedrock.
4. Prepare the SWMU 20 FS using data collected during the RI, pilot study, and slug testing.

SECTION 9

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Appendix A
Soil Boring Logs

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER EPI04-SO01 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : 8 PI/PAOC Sites | LOCATION : PI-4 | DATE: 2/27/2006

WEATHER: Sunny hot humid | DRILLING CONTRACTOR :

DRILLING METHOD AND EQUIPMENT USED: Trailer mounted Earth probe 200

WATER LEVELS N/A | START : 2/8/1904 | END : 1625 | LOGGER : J. Myers

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
2, 4	0-4'	46/46	#1		0-36" CLAYEY SAND (SC), dark reddish brown (5YR 3/4), dry, medium, dense, fine sand with clay 36-48" SANDY CLAY (CL), reddish brown (5 YR 5/4), dry, medium to stiff, medium plastic, some fine to medium sand	FID = 1.70 ppm 1/26/2006 UXO clearance at surface 0-2' sample taken Sample taken @ 1115
6, 8	4-8'	46/46	#2		48-96" CLAYEY SAND(SC), yellowish red (5 YR 4/6), moist, medium dense, medium sand w/clay becoming coarse w/depth	FID = 3.0 ppm 1/26/2006 Sample taken @1130 from 4-6'
10, 12	8-12'	32/46	#3		SANDY CLAY (CL), strong brown (7.5 YR 5/6), slightly moist, stiff, medium dense, some fine to very coarse sand becoming fine w/depth	FID = 3.2 ppm

Sampler Signature: J. Myers Date: 2/27/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER EPI04-SO01 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : 8 PI/PAOC Sites | LOCATION : PI-4 | DATE: 2/27/2006

WEATHER: Sunny hot humid | DRILLING CONTRACTOR :

DRILLING METHOD AND EQUIPMENT USEI Trailer mounted Earth probe 200

WATER LEVELS N/A | START : 2/8/1904 | END : 1625 | LOGGER : J. Myers

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
14	12-16'	32/46	#4		12-18' FAT CLAY (CH), brown (7.5 YR 5/4), slightly moist, high plasticity, cohesive	FID - 3.31 ppm
16						
18	16-19'	36/36	#5		18-19' becomes SANDY FAT CLAY (CH) with medium brown to coarse sand	FID 3.5 ppm
20	19-20'	12-Dec	#6		19-20' SANDY FAT CLAY (CH) brown (7.5 YR 5/4), slightly moist, high plasticity, with fine to coarse sand, some fine gravel ~10%	FID 3.5 ppm Refusal @ 20' bgs
22						
24						

Sampler Signature: J. Myers Date: 2/27/2006

CH2MHILL	PROJECT NUMBER	BORING NUMBER
	183719.FI.01	SB-02 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : LOCATION **PI-4** DATE: 28-Feb-06

WEATHER: Sunny hot humid DRILLING CONTRACTOR : Geoworks (Hector)

DRILLING METHOD AND EQUIPMENT USED : Trailer mounted Earth probe 200

WATER LEVELS : START : 1420 END : 1455 LOGGER : J. Myers

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
2, 4	0-4'	36/46	#1		0-4' WELL GRADED SAND (SW) yellowish red (5 YR 4/6), dry, medium dense, fine to coarse sand, some fine gravel and few cobbles of granodiorite weathered	FID = 1.08 ppm
6, 8	4-8'	46/46	#2		4-8' WELL GRADED SAND WITH CLAY (SW-SC), yellowish red (5 YR 5/6), slightly moist, dense, fine to coarse sand, some clay, few fine gravel cohesive	FID = 0.4 ppm
10, 12	8-12'	46/46	#3		LEAN CLAY (CL), brownish yellow (10 YR 6/6), slightly moist, medium density, low plasticity, little fine sand	FID = 1.01 ppm
14	12-14'	24/24	#4		SAA with fine to coarse gravel ~10%	PID = 0.3 ppm refusal @ 14' bgs
					TD @ 14' bgs	

Sampler Signature: _____ Date: _____

CH2MHILL	PROJECT NUMBER	BORING NUMBER	
	183719.FI.01	SB-03	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : LOCATION : PI-4 DATE: 27-Feb-06

WEATHER: Sunny hot humid DRILLING CONTRACTOR : Geoworks (Hector)

DRILLING METHOD AND EQUIPMENT USED : Trailer mounted Earth probe 200

WATER LEVELS : START : 1340 END : 1430 LOGGER : J. Myers

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
	0-4'	32/46	#1		0-6" SILT (ML) dark brown, (7.5 YR 3/2), dry, loose silt	Background - FID 1.3 ppm
					6-24" LEAN CLAY WITH SAND (CL), dark reddish brown (5 YR 2.5/2), dry, stiff, medium plasticity, cohesive, some fine sand	1/26/2006 sample of 0-1ft taken twice for volume sample taken @ 0805
2					24-46" WELL GRADED SAND (SW), red (2.5 YR 4/6), Dry, loose, fine to medium sand	
4	4-8'	33/46	#2		46-52" Same as above	FID 2.3 ppm
					52-67" LEAN CLAY WITH SAND(CL), reddish brown(5YR 5/4), slightly moist, stiff, medium plasticity, some fine sand	1/26/2006 sample taken @0850 at 4 to 6 ft
6					67-96" CLAYEY SAND(SC), reddish brown (5YR 5/4), moist, medium, dense, medium sand w/fine sand and clay	
8	8-12'	36/46	#3		96-108" Same as above	FID 2.4 ppm
					108-120" SANDY LEAN CLAY(CL), yellowish brown(10YR 5/6), moist stiff, medium plasticity, some medium and fine sand.	
10					120-144" CLAYEY SAND(SC), reddish brown(5YR 5/4), moist, medium, dense, medium sand w/clay	
12	12-15'	34/36	#4		144-180" CLAYEY SAND(SC), yellowish red(5YR 5/6), moist, medium dense, medium to coarse sand, some fine gravely weathered gabrodiorite, some clay.	FID 2.85 ppm
14						
15					Refusal @ 15' bgs	

Sampler Signature: J. Myers Date: 2/27/2006

CH2MHILL	PROJECT NUMBER	BORING NUMBER
	183719.FI.01	SB-04 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : LOCATION PI-4 DATE: 24-Feb-06

WEATHER: Sunny and humid DRILLING CONTRACTOR : Geoworks (Hector)

DRILLING METHOD AND EQUIPMENT USED : Trailer mounted Earth probe 200

WATER LEVELS : START : 1435 END : LOGGER : J. Myers

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (ft)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
	0.4"	2.4/4	#1		SANDY LEAN CLAY(CL), very dusky red(2.5 YR 2.5/2), dry stiff, medium plastic, some fine sand	1/26/2006 Sample taken @0920 MS/MSD @ surface sample 0-1, interval sampled twice for volume
2						
4	4-8'	4'/4'	#2		SANDY LEAN CLAY(CL), reddish brown (5 YR 4/4), moist, stiff, medium plasticity some fine to coarse sand and gravel. Many cobbles ~4 cm diameter of gabrodiorictic rock - weathered heavily	Sample taken @0930 at 4-6 ft
6						
8	8-12'		#3		WELL GRADED SAND WITH CLAY & GRAVEL(SW-CL), light brown(7.5YR 6/4), dry, loose, angular, fine to coarse sand and fine gravel	
10						
12						

CH2MHILL

PROJECT NUMBER	BORING NUMBER
183719.FI.01	SB-05 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : LOCATION **PI-4** DATE: 24-Feb-06

WEATHER: Sunny and humid DRILLING CONTRACTOR : Geoworks (Hector)

DRILLING METHOD AND EQUIPMENT USED : Trailer mounted Earth probe 200

WATER LEVELS : START : 1330 END : LOGGER : J. Myers

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (ft)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
	0.4"	3.3/4	#1		0-.5': SILT WITH SAND(ML), very dark brown (7.5 YR 2.5/3), dry, non plastic noncohesive, little fine sand. .5-2.6': LEAN CLAY WITH SAND(CL), very dark brown(7.5 YR 2.5/2), dry, medium plasticity, cohesive, some fine sand 2.6-4': POORLY GRADED SAND(SP),reddish brown(5YR 4/4), dry loose fine sand, some silt	
2						
4						
	4-8'	4/4	#2		4-7' FAT CLAY WITH SAND(CH), yellowish red(5YR 4/6), dry, highly plastic cohesive w/fine to medium sand. Stiff 7-8' FAT CLAY WITH SAND (CH), reddish brown(5YR 4/4), moist, stiff, high plasticity, few fine to medium sand	
6						
8						
	8-12'	4/4	#3		Same as above	
10						
12						
	12-14'	2/2'	#4		Same as above	
14						

Sampler Signature: J. Myers Date: 2/24/2006

CH2MHILL	PROJECT NUMBER 183719.FI.01	BORING NUMBER SB-05 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : LOCATION **PI-4** DATE: 24-Feb-06

WEATHER: Sunny and humid DRILLING CONTRACTOR : Geoworks (Hector)

DRILLING METHOD AND EQUIPMENT USED : Trailer mounted Earth probe 200

WATER LEVELS : START : 1330 END : LOGGER : J. Myers

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (ft)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
	14-16'	1.7/2	#4		14-15": Same as above 15-16': SILTY SAND (SM), brown(7.5YR 5/4), dry, medium dense, fine sand and silt	
16	16-19'	3/3	#5		SANDY FAT CLAY (CH), `reddish brown (5YR 4/4), moist, stiff, high plasticity, some fine to coarse sand.	Refusal @ 19' bgs.
18						
20					TD @ 19' bgs	
22						
24						
26						
28						

Sampler Signature: J. Myers Date: 2/24/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER SS/SB 6	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : NAVFAC - Atlantic (East Vieques) LOCATION : PI-4 DATE: 2/17/2006

WEATHER: Sunny DRILLING CONTRACTOR Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED Simco Earth Probe 200

WATER LEVELS : NA START : 1300 END : LOGGER : Andy Sprinkle

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
	0 - 4'	4'	1		0 - 3.7': SILT (ML), dark grayish brown (10 YR 4/2), dry, medium stiffness.	FID (ppm) 4.15 Background 3.35
2						
4					3.7' - 6.5' SANDY SILT (ML), brown 10YR 5/3), dry, loose.	3.73
	4' - 8'	4'	2			
6					6.5 ' - 7.2' SILT (ML), brown (10 YR 4/3), dry, medium stiffness.	4.28
8					7.2' - 8' SILTY SAND (SM), brownish yellow (10 YR 6/8), dry, loose.	4.38
	8' - 12'	4'	3		8' - 11' SILT (ML) yellowish brown (10 YR 5/6), dry, stiff, occasional sand	4.21
10						
12					11' - 11.8' SILTY SAND (SM), dark yellowish brown (10YR 4/4), dry, loose. 11.8' - 12' SILT(ML), light brownish gray (10YR 6/2), dry, hard.	4.25
	12' - 14'	2'	4		12' - 14' SANDY SILT (ML), dark yellowish brown (10YR 4/6), dry stiff.	4.82 Background 4.79
14						

Sampler Signature: Andy Sprinkle Date: 2/17/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER SS/SB 6 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : NAVFAC - Atlantic (East Vieques) LOCATION : PI-4 DATE: 2/17/2006

WEATHER: DRILLING CONTRACTOR Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED Simco Earth Probe 200

WATER LEVELS : NA START : 1300 hrs END : 1358 hrs LOGGER : Andy Sprinkle

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
16	14' - 16'	2'	4		14' - 15.7' SILTY SAND (SM), dark yellowish brown (10YR 4/6),dry, loose	4.85
18	16' - 18'		5		15.7' - 17' CLAYRY SILT(ML), yellowish brown (10YR 5/8), dry, hard. 17' - 18' SILTY SAND (SM), pale brown (10YR 6/3), dry, loose.	4.55 5.02 18' bgs: Refusal.
20 22 24 28					End of boring at 18' bgs. 2/17/2006	

Sampler Signature: Andy Sprinkle Date: 2/17/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER SS/SB 7 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : NAVFAC - Atlantic (East Vieques) LOCATION : PI-4 DATE: 2/17/2006

WEATHER: Sunny DRILLING CONTRACTOR Geoworks

DRILLING METHOD AND EQUIPMENT USED Simco Earth Probe 200

WATER LEVELS : START : 1420 hrs END : LOGGER : Andy Sprinkle

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
	0 - 4'	4'	1		0 - 4' SILT (ML), very dark grayish brown(10YR 3/2), dry, loose, medium stiffness.	FID (ppm) 4.71 Background: 4.73
2						
4						
	4' - 8'	4'	2		4' - 7' CLAYEY SILT (ML), brown (10YR 4/3) ,dry, stiff	4.83
6						
					7' - 8' SILT (ML), yellowish brown (10YR 5/6), dry, hard.	4.61
8						
	8' - 12'	4'	3		8' - 12' SILT (ML), dark yellowish brown (10YR 4/4), dry, hard.	4.51
10						
12						

Sampler Signature: Andy Sprinkle Date: 2/17/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER SS/SB 7 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : NAVFAC - Atlantic (East Vieques) LOCATION : PI-4 DATE: 2/17/2006

WEATHER: DRILLING CONTRACTOR Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED Simco Earth Probe 200

WATER LEVELS : START : 1420 hrs END : LOGGER : Andy Sprinkle

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
14, 16	12' - 16'	4'	4		12' - 16' SILT (ML), yellowish brown (10YR 5/6), dry, medium stiffness, medium density.	FID (ppm) 4.78; Background: 4.75
18					16' - 18' Same as above. 18' - 19' SILTY SAND (SM), dark yellowish brown (10 YR 4/6), dry, loose.	5.01
20, 22, 24					19' bgs: refusal. End of boring at 19' bgs. 2/17/2006	

Sampler Signature: Andy Sprinkle Date: 2/17/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER SS/SB 8	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : NAVFAC - Atlantic (East Vieques) LOCATION : PI-4 DATE: 2/17/2006

WEATHER: Sunny DRILLING CONTRACTOR Earthworks

DRILLING METHOD AND EQUIPMENT USED Simco Earth Probe 200

WATER LEVELS : START : 1040 hrs END : 1123 hrs LOGGER : Andy Sprinkle

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
2, 4	0 - 4'	3.7'	1		0 - 0.8' WELL GRADED GRAVEL (SW-SM), dark yellowish brown (10YR 4/4), loose, dry. 0.8' - 4' SILT (ML), dark yellowish brown (10YR 3/6), dry stiff, with occasional sand	FID (ppm) 2.53 Background 2.30 2.49
6, 8	4' - 8'	3'	2		4' - 7.8' SILTY SAND (SM), brownish yellow (10YR 6/6) dry, loose.	3.59 3.81
10, 12	8' - 12'	4'	3		7.8' - 12' SILT (ML), dark yellowish brown (10YR 4/6), dry, hard.	4.21 4.59

Sampler Signature: Andy Sprinkle Date: 2/17/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER SS/SB 8 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : NAVFAC - Atlantic (East Vieques) LOCATION : PI-4 DATE: 2/17/2006

WEATHER: Sunny DRILLING CONTRACTOR Earthworks

DRILLING METHOD AND EQUIPMENT USED Simco Earth Probe 200

WATER LEVELS : START : 1040 hrs END : 1123 hrs LOGGER : Andy Sprinkle

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
	12' - 16'	4'	4		12' - 16' Same as above	FID (ppm)
14						
16					16' bgs: Refusal.	
					End of boring at 16' bgs, 2/17/2006	
18						
20						
22						
24						

Sampler Signature: Andy Sprinkle Date: 2/17/2006

CH2MHILL

PROJECT NUMBER	BORING NUMBER
183719.FI.01	SB-09 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : LOCATION PI-4 DATE: 28-Feb-06

WEATHER: Sunny and humid DRILLING CONTRACTOR : Geoworks (Hector)

DRILLING METHOD AND EQUIPMENT USED : Trailer mounted Earth probe 200

WATER LEVELS : START : 1515 END : 1550 LOGGER : J. Myers

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (ft)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
2, 4	0-4'	38/46	#1		0-4' LEAN CLAY (CL), brown(7.5YR 4/3), slightly moist, medium plasticity top 12" with 10% >50mm cobbles. All with fine to coarse sand.	FID = 1.7 ppm
6, 8	4-8'	40/46	#2		4-6': WELL GRADED SAND WITH CLAY(SW-SC), brown (7.5YR 4/4), slightly moist, medium dense. 6-8': SILT (ML) dark yellowish brown(10 YR 4/6), slightly moist, none plastic 7-8': POORLY GRADED SAND (SP), yellowish brown(10YR 5/6), slightly moist, medium dense, fine sand	FID = .4 ppm
10, 12	8-12'	40/46	#3		8-12': WELL GRADED SAND WITH GRAVEL (SW), yellowish brown(10YR 5/8), slightly moist, medium dense, fine to coarse sand ~30%, gravel fine to 30mm cobbles. Weathered granodiorite, quartz and Spar fragments.	FID = .1 ppm
14	12-14'	24/24	#4		12-14': Same as above	0.5 ppm Refusal @ 14' bgs
					TD @ 14' bgs	

Sampler Signature: J. Myers Date: 2/28/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER SS/SB 10	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : NAVFAC - Atlantic (East Vieques) LOCATION : PI-4 DATE: 2/17/2006

WEATHER: Sunny DRILLING CONTRACTOR Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED Simco Earth Probe 200

WATER LEVELS NA START : 0840 hrs END : 0917 hrs LOGGER : Andy Sprinkle

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
	0 - 4'	3.7'	1		0 - 4' SILT (ML), dark brown (10YR 3/3), dry, loose.	FID (ppm) 3.82; Background 4.09; 3.13
	4' - 8'	4'	2		4'-7.8' SILT (ML), dark yellowish brown (10YR 4/6), dry, very hard.	* FID out of gas.
					7.8-8' SANDY SILT (ML), dark yellowish brown (10YR 4/6), dry, medium stiffness.	No odor.
	8' - 12'	4'	3		8'-12' SILTY SAND (SM), pale brown (10YR 6/3), dry, loose.	No odor.
	12' - 13'	1'	4		12'-13' SANDY SILT (ML), light brownish gray (10YR 6/2), dry, loose.	No odor (FID not working, out of gas).
					End of boring at 13' bgs due to refusal. 02/17/06	

Sampler Signature: Andy Sprinkle Date: 2/17/2006

CH2MHILL

PROJECT NUMBER	BORING NUMBER
183719.FI.01	SB-11 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : LOCATION PI-4 DATE: 28-Feb-06

WEATHER: Sunny and humid DRILLING CONTRACTOR : Geoworks (Hector)

DRILLING METHOD AND EQUIPMENT USED : Trailer mounted Earth probe 200

WATER LEVELS : START : 1515 END : 1550 LOGGER : J. Myers

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (ft)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
	0-4'	40/46	#1	0-2'	SILTY SAND (SM), brown(7.5YR 4/3), dry, medium dense fine sand, and silt	FID - .9 ppm 1/25/2006 0-2' Sampled twice for volume 0 ppm sample taken @0845
2				2-4'	WELL GRADED SAND WITH CLAY (SW-SC), yellowish red (5YR 4/6), moist, dense, fine to coarse sand (quartz, kspar) clay ~15%.	2-4' Sampled twice for volume 0 ppm sample taken @0855
4	4-8'	40/46	#2		WELL GRADED SAND WITH CLAY (SW-SC) Continuous w/finer grains @6' becoming coarse as in 2-4'	FID = .1 ppm
6						
8	8-12'	46/46	#3		WELL GRADED SAND WITH GRAVEL (SW), yellowish red(5 YR 4/6), moist, dense, fine to coarse sand ~25% coarse and fine gravel. Appears to be heavily weathered.	FID = .2 ppm
10						
12						

Sampler Signature: J. Myers Date: 2/28/2006

CH2MHILL

PROJECT NUMBER	BORING NUMBER
183719.FI.01	SB-11 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : LOCATION PI-4 DATE: 28-Feb-06

WEATHER: Sunny and humid DRILLING CONTRACTOR : Geoworks (Hector)

DRILLING METHOD AND EQUIPMENT USED : Trailer mounted Earth probe 200

WATER LEVELS : START : 1515 END : 1550 LOGGER : J. Myers

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (ft)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
14	12-16'	46/46	#4		SANDY LEAN CLAY (CL), brown (7.5YR 5/4), moist, stiff, medium plastic, some fine to medium sand	FID = 0.5 ppm
16	16-19'	36/36	#5		WELL GRADED SAND (SW), strong brown (7.5YR 5/8), slightly moist, dense, fine to coarse w/fine gravel	FID = 0.6 ppm Refusal @ 19' bgs
18						
20					Refusal @ 19' bgs	
22						
24						

Sampler Signature: J. Myers Date: 2/28/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER SS/SB 12	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : NAVFAC - Atlantic (East Vieques) LOCATION : PI-4 DATE: 2/17/2006

WEATHER: Sunny DRILLING CONTRACTOR Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED Simco Earth Probe 200

WATER LEVELS : START : 0925 hrs END : 0917 hrs LOGGER : Andy Sprinkle

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
2	0 - 4'	4'	1		0 - 1' SILT (ML), very dark brown (10 YR 2/2 (ML), dry, medium density 1' - 1.8' SILTY SAND WITH GRAVEL (SM), brown (10 YR 5/3), dry, loose. 1.8' - 4' SILT (ML), dark yellowish brown (10 YR 4/6), dry, stiff.	No odor (FID not working) On 1/24/2006 0-1 sampled twice for volume sample taken @1030 No odor.
4						
6	4' - 8'	3.1'	2		4' - 7' SILT (ML), yellowish brown (10 YR 5/4), dry soft. 7' - 7.9' SILTY SAND (SM) yellowish brown (10 YR 5/6), dry, loose.	No odor. On 1/24/2006 2-6 ft sample taken @ 1045 No odor.
8						
10	8' - 12'	4'	3		7.9' - 12' SILT WITH SAND (ML), dark yellowish brown (10 YR 4/6), dry, stiff.	No odor.
12						

Sampler Signature: Andy Sprinkle Date: 2/17/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER SS/SB 12 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : NAVFAC - Atlantic (East Vieques) LOCATION : PI-4 DATE: 2/17/2006

WEATHER: Sunny & hot DRILLING CONTRACTOR Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED Simco Earth Probe 200

WATER LEVELS : START : 0925 hrs END : 1050 hrs LOGGER : Andy Sprinkle

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
14	12' - 16'	3'	4		12' - 16' SILT WITH SAND(ML), dark yellowish brown (10 YR 4/6), dry, medium stiffness.	FID (ppm) No odor (FID not working, out of gas). No odor.
16						
18	16' - 20'		5		16' - 20' SANDY SILT (ML), yellowish brown (10 YR 5/6),dry, medium stiffness (16' - 17.5'), hard (17.5' - 20' bgs). Refusal at 20'	No odor. No odor.
20						
22					End of boring at 20' bgs. 02/17/06	
24						

Sampler Signature: Andy Sprinkle Date: 2/17/2006

CH2MHILL	PROJECT NUMBER	BORING NUMBER
	183719.FI.01	SB-13 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : LOCATION PI-4 DATE: 1-Mar-06

WEATHER: Sunny, hot and humid DRILLING CONTRACTOR : Geoworks (Hector)

DRILLING METHOD AND EQUIPMENT USED : Trailer mounted Earth probe 200

WATER LEVELS : START : 1445 END : 1530 LOGGER : J. Myers

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (ft)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
2, 4	0-4'	46/46	#1		0-4' SANDY CLAY (CL) dark reddish brown (2.5 YR 3/3), moist, stiff, medium plasticity, w/some fine sand	FID = 1.5 ppm On 1/25/2006 0-1' sample taken @ 0915 Sampled twice for volume
6, 8	4-8'	46/46	#2		4-5.5' SANDY CLAY (CL), reddish brown (2.5 YR 4/4), moist, stiff, low plasticity, some fine to medium sand 5.5-8' WELL GRADED SAND WITH GRAVEL (SW), brown (7.5 YR 4/3), dry, medium dense, fine sand to coarse gravel, ~30% gravel.	FID = 1.7 ppm On 1/25/2006 2-4' sample taken @ 0930
10, 12	8-12'	46/46	#3		8-11.2' POORLY GRADED SAND (SP), dark yellowish brown (10 YR 4/6), slightly moist, medium dense, very fine sand. Becoming coarser with depth. 11.2-12' WELL GRADED SAND (SW) brown (7.5 YR 4/4) dry, dense, fine to coarse sand, little gravel.	FID = 3.75 ppm

Sampler Signature: J. Myers Date: 3/1/2006

CH2MHILL	PROJECT NUMBER	BORING NUMBER	
	183719.FI.01	SB-13	SHEET 2 OF 2

SOIL BORING LOG

PROJECT : LOCATION PI-4 DATE: 1-Mar-06

WEATHER: Sunny, hot and humid DRILLING CONTRACTOR : Geoworks (Hector)

DRILLING METHOD AND EQUIPMENT USED : Trailer mounted Earth probe 200

WATER LEVELS : START : 1445 END : 1530 LOGGER : J. Myers

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (ft)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
	12-16'	46/46	#3		12-16' WELL SORTED SAND (SW) strong brown (7.5 YR 5/6), slightly moist, medium dense, very fine to medium sand. Trace angular gravel.	FID = 3.75 ppm
14						
16						
18						
20						
22						
24						

Sampler Signature: J. Myers Date: 3/1/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER SB-14	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : NAVFAC - Atlantic (East Vieques) LOCATION : PI-4 DATE: 2/14/2006

WEATHER: Sunny & humid DRILLING CONTRACTOR CH2M HILL

DRILLING METHOD AND EQUIPMENT USED Slide hammer / direct push

WATER LEVELS : START : 0845 hrs END : 0931 hrs LOGGER : Andy Sprinkle

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
2					0 - 2' SILT (ML), pale brown(10 YR 6/3), light brown, dry, medium dense. Concrete slab at 0.5 feet, jack hammered through.	FID (ppm) 0 - 4' bgs: 1.73 Background: 1.82 First sample collected above concrete slab.
4					2' - 4.5' SILT (ML), dark brown (10YR 3/3), dry, medium dense.	4' - 8' bgs: 1.65
6 8					4.5' - 8' SAND WITH SILT (SM), yellow (10 YR 8/6), dry, medium dense.	
10 12					End of boring at 8' bgs. 2/14/2006	

Sampler Signature: Andy Sprinkle Date: 2/14/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER SB-15	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : NAVFAC - Atlantic (East Vieques) LOCATION : PI-4 DATE: 2/14/2006

WEATHER: Sunny & humid DRILLING CONTRACTOR CH2M HILL

DRILLING METHOD AND EQUIPMENT USED Slide hammer / direct push

WATER LEVELS : START : 0815 hrs END : 0845 hrs LOGGER : Andy Sprinkle

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
					0 - 5' SILT (ML), brown (10 YR 4/3) light brown, dry, loose. Concrete slab at 0.5 feet, jack hammered through.	FID (ppm) 0 - 4' bgs: 2.32 Background: 2.03 First sample collected above concrete slab.
2						
4						4' - 8' bgs: 2.15
					5' - 7' FINE GRAINED WITH CLAY (SC), yellowish brown (10 YR 5/4), light brown, dry, medium density.	
6						
					7' - 8' LEAN CLAY WITH SAND (CL), yellowish brown (10 YR 5/6), light brown, dry, medium stiffness.	
8						
					End of boring at 8' bgs. 2/14/2006	
10						
12						

Sampler Signature: Andy Sprinkle Date: 2/14/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER MW-01	SHEET 1 OF 4

SOIL BORING LOG

PROJECT : East Vieques | LOCATION : PI-4 | DATE: 1/26/2006

WEATHER: Sunny, 80'sF, mod wind | DRILLING CONTRACTOR : Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED : HSA (2-1/4") B-61 Mobile drill, 6-inch air rotary bit.

WATER LEVELS : | START : 1/26/2006 13:30 | END : 1/30/06 15:25 | LOGGER : J. Sathaye

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone PIO/FIO FID	Above Hole FID
	0-2	15/24	SS1 (spt)	8-7-14-13	3"-POORLY GRADED SAND (SP), 10 yr 4/3 brown dry, loose. 9" - POORLY GRADED SAND (SP), 10 yr 7/6, yellow, dry, loose, grading into 3"- POORLY GRADED SAND (SP) brown (same as above) and brick - fill.	-1.72	
2							
	2-4	12/24	SS2 (spt)	12-9-19-15	3" - Same as above, with coarse gravel 9" - POORLY GRADED SAND (SP), 2.5 yr 4/6 (red) med. dense, dry, fine white mottling, decaying organic matter /petroleum? odor- no sign on FID: 2.35, 20, - 3.05 FID readings	-4.7/-7.27	18.11/-0.40
4							
	4-6	12/24	SS3 (spt)	19-13-15-19	POORLY GRADED SAND (SP), 7.5 yr 6/3 light brown. Trace fine gravel. med. dense, dry.	-12.0/2.65	N/A/ 2.69
6							
	6-8	18/24	SS4 (spt)	15-21-22-28	6" - POORLY GRADED SAND WITH SILT (SP-SM), 2.5 YR 3/6 (red), white - pink cobble and fine gravel, dry, med. dense 12" - POORLY GRADED SAND (SP), 7.5 yr 5/4 brown, dry, dense, green mottling , 1/2 " smaller dark gray and white mottling weathered granite.	N/A/3.82 PID- N/A FID - 1.89	N/A/4.02
8							
	8-10	13/24	SS5 (spt)	15-24-35-47	POORLY GRADED SAND (SP), some coarse sand. 10 yr 5/4 (light yellowish brown) dry, med dense to dense. tr. Fine gravel	N/A - PID not functioning FID 0 out of gas	
10							
	10-12		SS6 (spt)	12-26-34-34	POORLY GRADED SAND WITH SILT (SP-SM), 10 yr 7/6, yellow, dry, medium dense to dense, w/ coarse gravel and trace green mottles (1/4")		
12							

Sampler Signature: J. Sathaye Date: 1/27/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER MW-01	SHEET 2 OF 4

SOIL BORING LOG

PROJECT : East Vieques LOCATION : PI-4 DATE: 1/26 & 1/30/06

WEATHER: Sunny, 80'sF, low wind DRILLING CONTRACTOR : Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED: HSA (21/4") Mobile drill and air rotary (6" bit)

WATER LEVELS : START : 1/26/2006 13:30 END : 1/30/06 15:25 LOGGER : J. Sathaye

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): PIO/FIO	Breathing Zone FID	Above Hole FID
12								
	12-14	18/24	SS7 (spt)	18-19-25	POORLY GRADED SAND WITH SILT (SP-SM), 10 yr 5/6 yellowish brown, dry med. dense, tr. fine gravel.	n/a		
14								
	14-16	18/24	SS8 (spt)	15-16-13-10	Same as above; trace black mottles (2 mm)			
15								
16	16-18	18/24	SS9 (spt)	6-7-8-9	12" - POORLY GRADED SAND (SP), 10 yr 5/6 yellowish brown, dry, loose 6" - POORLY GRADED SAND (SP), 10 yr 6/6 brownish yellow, dry, medium dense, with fine gravel	3.08/-1.44		3.13/2.15
18								
	18-20	18/24	SS10 (spt)	15-15-24-23	POORLY GRADED SAND (SP), 10 yr 5/6 yellowish brown, dry, medium dense bottom 6" w/ gravel and cobble	0.56/-1.27		12.82/1.45
20								
21		12/18	SS11 (spt)	24-27-50-3"	WELL GRADED SAND (SW) and highly weathered, granite, dry dense to very dense, very crumbly	6.01/-1.31		11.80/-3.44
22		4/5	SS12 (spt)	50 (5")	Same as above	-10.0/-0.65		-6.11/0.97
			Air rotary from 22'			-11	-0.86	
24								

Sampler Signature: J. Sathaye Date: 1/30/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER MW-01	SHEET 3 OF 4

SOIL BORING LOG

PROJECT : East Vieques LOCATION : PI-4 DATE: 1/30/06

WEATHER: P. Sunny, 80's F, mod wind DRILLING CONTRACTOR : Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED Air rotary mobile drill B-61

WATER LEVELS : START : 1/26/2006 13:30 END : 1/30/06 15:25 LOGGER : J. Sathaye

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone PIO/FIO	Breathing Zone FID	Above Hole FID
24					sand and granite fragments		-12	-0.36
					Weathered /granite less weathered			
27					gray			
					{granite} visible quartz and orthoclase grains.		-12	-0.2
30								
32								
33								
					Granite {visible quartz feldspar and muscovite grains black mineral (hornblende?)		-13	-0.11
36								

Sampler Signature: J. Sathaye Date: 1/30/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER MW-01	SHEET 4 OF 4

SOIL BORING LOG

PROJECT : East Vieques LOCATION : PI-4 DATE: 1/30/2006

WEATHER: P. sunny, 80's F, mod. Wind DRILLING CONTRACTOR : Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED Air rotary mobile drill B-61

WATER LEVELS : START : 1/26/2006 13:30 END : 1/30/06 15:25 LOGGER : J. Sathaye

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): PIO/FIO	Breathing Zone FID	Above Hole FID
36								
37						-14	0.27	
					granite			
39								
40								
42								
					slightly moist cuttings water @ 42' bgs.	-14		
					granite			
45								
					granite			
48					fracture zone between 49 and 50' - gushing water.	-14	-0.42	

Sampler Signature: J. Sathaye Date: 1/30/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER MW-02	SHEET 1 OF 4

SOIL BORING LOG

PROJECT : East Vieques LOCATION : PI 4 DATE: 1/26/2006

WEATHER: P. cloudy, humid, drizzle in the a.m. 80's F DRILLING CONTRACTOR : Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED : HSA (2-1/4") B-61 Mobile drill, 2-inch water rotary coring.

WATER LEVELS : START : 0820 1/26/2006 END : 1000 1/27/2006 LOGGER : J. Sathaye

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone ID/FIO	Above Hole PID/FID
	0-2	12/24	SS-1 (spt)	5-18-13-20	5" - POORLY GRADED SAND WITH CLAY (SP-SC), 10 yr 3/3(dark brown) medium dense, moist w/roots 5" - concrete rubble 2" - brown soil as above	0 0	15.11
2	2-4	18/24	SS-2 (spt)	12-16-14-11	POORLY GRADED SAND (SP), 2.5 yr 6/6 (light red), medium dense, dry, with gravel and cobble	1.01/2.00	0.08/0.001
4	4-6	14/24	SS-3 (spt)	12-13-11-10	2"- cobble 4"-POORLY GRADED SAND (SP), 7.5 yr 4/4 brown, med. dense, dry, w/coarse gravel 8"- fine sand, SP, 10 yr 6/6 brownish yellow, dry, medium dense w/coarse gravel and cobble bottom 5"	2.45/4.51	1.30/3.46
6	6-8	20/24	SS-4 (spt)	52-20-25	POORLY GRADED SAND (SP), 10 yr 4/6, reddish brown, trace coarse gravel Clay (CL) 7.5 yr 4/6, brown moist, high plasticity, stiff to very stiff., w. cobble and gravel. Grading into 8"-POORLY GRADED SAND (SP) 75 yr 6/6, dry, dense with gravel, cobble, black 1/2" mottling.	7.84/1.82 1.55/0.06	2.80/1.83 3.12/4.27
8	8-10	24/24	SS-5 (spt)	13-15-30-47	SILT WITH SAND (ML), 5 yr 4/4 reddish brown, dry, v. stiff to hard, w/ coarse gravel; black and green mottling in lower 12", bottom 3" - brown sand, SP (medium, dry, 3 yr 4/4, medium dense) bottom 1", rock (dark gray, with green, mottling)	0.65/3.72	1.49/.248
10	10-12	24/24	SS-6 (spt)	12-22-15-43	5" - Sand as above 6"-POORLY GRADED SAND (SP), w/ Silt 5 yr 4/4, reddish brown, dense, with coarse gravel, dry, some green mottling (1/4-inch) Bottom 3", rock (cobble)	5.75/1.84	2.00/3.71

Sampler Signature: J. Sathaye Date: 1/26/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER MW-02	SHEET 2 OF 4

SOIL BORING LOG

PROJECT : East Vieques | LOCATION : PI-4 | DATE: 1/26/2006

WEATHER: P. cloudy, 80's F, low wind. | DRILLING CONTRACTOR : Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED : HSA (2-1/4") B-61 Moblile drill, 2-inch water rotary coring.

WATER LEVELS : | START : 0820 1/26/2006 | END : 1000 1/27/2006 | LOGGER : J. Sathaye

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
12					10" - POORLY GRADED SAND (SP), 7.5 yr, 6/4 light brown, dry, medium dense, w/ gray coarse, gravel. 8"- as above. Fine to coarse sand w/light gray mottles. Bottom 1" - weathered granite. White to light gray mottling structure.	ID/FIO -793/-1.80 / PID/FID -344/-2.37
	12-14	18/24	55-7 (spt)	11-132-22-34		
14		12/18	55-8 (spt)	25-44-50- 3"	Weathered granite with sand. dry, crumbly, reddish brown, green mottled feldspar/ quartz and feldspar granites	-8.20/-1.82 / -2.00/-3.99
16		12/12	55-9 (spt)	34-50-4"	Same as above	
18						
20	17-22	18/60	Core 1-NQ		6" Weathered granite gray, green, white mottled core; some white clayey material (1") 12" - same as above with white 2-1/2" light green weathered portion, top 6" of this one. Jointing/ fractures not apparent, too weathered.	17" - coring begins Used - 120 gals of water
22						
	22-27		Core 2-NQ		No recovery 22'-27'	Used 60 gals water
24						

Sampler Signature: J. Sathaye Date: 1/26/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER MW-02	SHEET 3 OF 4

SOIL BORING LOG

PROJECT : East Vieques | LOCATION : PI-4 | DATE: 1/26/2006

WEATHER: Cloudy, low wind, 80's F. | DRILLING CONTRACTOR : Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED : HSA (2-1/4") B-61 Mobile drill, 2-inch water rotary coring.

WATER LEVELS : START : 0820 1/26/2006 END : 1000 1/27/2006 LOGGER : J. Sathaye

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone PID / Above Hole FID
24					No recovery	PID -8.42 FID -2.22
27	27-29	12/26	Core 3-	Fine grained	3" - whitish -gr claying material (weathered granite 9" -dark gray/black rock some quartz visible, with vertical and horizontal joints (very fine crack) visible	Used 80 gallons water
30	29-31	18/26	Core 4-NQ	Fine grained	Dark gray-green rock , some brown weathered. w/brown layer on weathered surfaces. Some metallic gray visible on some surfaces. One joint plane visible in larger fragments at 60 to horizontal.	Used 50 gallons water -8.84 -1.76
32	31-32	12/12	Core 5-NQ	Fine grained	same as above; 2 sets of vertical joints apparent in larger fragments at 60 degrees. to horizontal. and at 45 deg. to 60 deg with each other.	Used 60 gallons
33	32-33.5	18/18	Core 6-NQ	Fine grained	Same as above- joints not as apparent due to smaller fragments. Fracture planes have 1/14" layer of pale white lt. green clay.	Used 60 gallons of water. -8.8 -1.7
36	33.5-33.7	42/42	Core 7-NQ	Fine grained	Same as above; light green and white clay on fracture planes. Light gray rock with dark brown on weathered surfaces.	

Sampler Signature: J. Sathaye Date: 1/26/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER MW-02	SHEET 4 OF 4

SOIL BORING LOG

PROJECT : East Vieques LOCATION : PI-4 DATE: 1/26 & 1/27/06

WEATHER: Sunny, 80'sF, low wind DRILLING CONTRACTOR : Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED : HSA (2-1/4") B-61 Mobile drill, 2-inch water rotary coring.

WATER LEVELS : START : 0820 1/26/2006 END : 1000 1/27/2006 LOGGER : J. Sathaye

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone PID / Above Hole FID
36						
37						
	37-42	51/60	Core 8-NQ		Same as above; but rock is less weathered with several 4" to 6" core pieces intact. White clay on fracture planes visible at 60 degree to horizontal and approx. 45'/135' to each other. Where	end- 1/26/06 begin 1/27/06 1.52 / 2.15
39					clay is not present on fractures . Dark brown weathered surface visible. Lt. gray to dark gray rock, volcanic, fine grained. Lower 12" more weathered, fragmented than top 39".	Used 120 gal of water. Mid section of core has white pitting on surfaces. (water and fractured) Stop 1/27
42					Original borehole, including, core barrel and rods grouted from 0-42' bags. 2/2/2006 Well MW-02 installed in adjacent bore hole 5' north.	12'
45						
48						

Sampler Signature: J. Sathaye Date: 1/27/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER MW-03	SHEET 1 OF 4

SOIL BORING LOG

PROJECT : East Vieques PI-4 LOCATION : PI-4 DATE: 1/23/2006

WEATHER: Sunny, very wind, 80's F DRILLING CONTRACTOR : Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED : HSA (2-1/4") B-61 Mobile drill, 6-inch air rotary bit.

WATER LEVELS : START : 0945 END : 1600 LOGGER : J. Sathaye

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone PIO	FID	Above Hole PID/FID
						0	0.002	1.01/0
	0-2	18"/24	SS-1 (spt)	5-16-16-11	POORLY GRADED SAND (SP) 10YR 2/2 (very dark brown), moist to 10" medium dense top 4" with roots, organic - rich set (topsoil). Becoming progressively sandier (color from 10-18" = 7.5 yr 3/3 dark brown dry			
2								
	2-4	16"/24	SS-2 (spt)	8-9-8-7	POORLY GRADED SAND (SP), 7-5, 10YR 3/3 (dark brown), dry, loose, trace roots, with coarse sand last 4" and silt	0.67	0.4	2.0/0
4	4-6	13"/24	SS-3 (spt)	13-19-22-30	9" SILTY SAND (SM), 10YR 2/2 very dark brown, moist, stiff to very stiff trace cobble. 4" POORLY GRADED SAND (SP) 7.5TR 3/3 (dark brown), dry dense with coarse gravel	0.28	0.7	2.12/0.82
6	6-8	12"/26	SS-4 (spt)	12-20-26-25	POORLY GRADED SAND (SP), 10 YR 6/6. (yellowish brown), dry medium dense with gray and green coarse gravel (green mottling (gravel "rock")	0.63	0.54	0.92/0.22
8	8-10	10"/26	SS-5 (spt)	145-19-27	POORLY GRADED SAND (SP) 2.5 Y 1/6 , olive yellow, dry, medium dense , trace grey, coarse cobble in upper 2"	0.4	0.63	2.0/0.79
10	10-12	12"/26	SS-6 (spt)	8-13-19-31	SILTY SAND (SM), very fine sand 5YR 4/6 (dark yellowish brown) Stiff to very stiff ,with gray mottling.			
12						0.27	0.89	0.66/1.30

Sampler Signature: J. Sathaye Date: 1/23/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER MW-03	SHEET 2 OF 4

SOIL BORING LOG

PROJECT : East Vieques PI-4 LOCATION : PI-4 DATE: 1/23/2006

WEATHER: Sunny, mod wind, 80's F DRILLING CONTRACTOR : Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED : HSA (2-1/4") B-61 Mobile drill, 6-inch air rotary bit.

WATER LEVELS : START : 0945 END : 1600 LOGGER : J. Sathaye

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): PIO	Breathing Zone FID	Above Hole PID/FID
12					9" POORLY GRADED SAND (SP) 10 yr 4/3 brown, some silt, slightly moist, medium dense	0.19	0.88	0.40/2.00
	12-16	18/24	SS7 (spt)	12-17-23-26	9" - POORLY GRADED SAND (SP), 10 yr 5/6 brownish yellow, dry, medium dense trace coarse sand and fine gravel trace gray mottling			
14								
	14-16	18/24	SS8 (spt)	11-11-12-14	POORLY GRADED SAND (SP), 10 yr 5/6 yellowish brown, dry, medium dense some gray mottling , trace medium sand.	0.19	0.85	0.34/0.89
16								
	16-18	13/24	SS9 (spt)	8-10-14-13	POORLY GRADED SAND (SP), 10 yr 6/6 brownish yellow, dry, loose, trace gray mottling top 3"	0.16	0.78	0.19/0.85
18								
	18-20	18/24	SS10(spt)	13-13-11-13	Same as above coarse sand	0.2	0.85	0.52
20								
	20-22	18/26	SS11(spt)	14-15-20	POORLY GRADED SAND (SP) 10 yr 5/6 yellowish brown, dry, medium dense; coarse gravel top 4" and coarse- medium sand bottom - 22 4"	0.17	1.08	0.19/1.10
22								
	22-24	13/17	SS12(spt)	25-38-50 (5")	POORLY GRADED SAND (SP) 7.5 yr 6/6 reddish yellow, dry , loose, and grey rock, with weathered fragmented metasedamentary or more likely very fine grained volcanic	0.23	0.8	0.33/0.80

Sampler Signature: J. Sathaye Date: 1/23/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER MW-03	SHEET 3 OF 4

SOIL BORING LOG

PROJECT : East Vieques PIA PI 4 LOCATION : PI-4 DATE: 1/23/2006

WEATHER: Sunny, mod wind, 80's F DRILLING CONTRACTOR : Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED : HSA (2-1/4") B-61 Mobile drill, 6-inch air rotary bit.

WATER LEVELS : START : 0945 END : 1600 LOGGER : J. Sathaye

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole — PIO / FID / PID/FID
24					Began air rotary @ 20' due to collapse of borehole sand and weathered rock fragments (granodiorite and little limestone)	PIO FID PID/FID 0.29/0.99
26						
28					same as above	
30					Granite and granodiorite segments, some quartz/ feldspar; green mineral (epidote?) in whitish volcanic rock (rhyolite?) minor evidence of jointing.	
32						
						0.34/1.25
35						
36						

Sampler Signature: J. Sathaye Date: 1/23/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER MW-03	SHEET 4 OF 4

SOIL BORING LOG

PROJECT : East Vieques PIA | LOCATION : PI-4 | DATE: 1/23/2006

WEATHER: Sunny, mod wind, 80's F | DRILLING CONTRACTOR : Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED : HSA (2-1/4") B-61 Mobile drill, 6-inch air rotary bit.

WATER LEVELS : | START : 0945 | END : 1600 | LOGGER : J. Sathaye

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone PID / Above Hole FID
36					Rotary drilling	PID 0.19 / FID 1.10
39						
					granite and granodiorite fragments moist cuttings; cuttings same as above, to 47" bgs	
42						
44						
47					EOB (end of boring) 47' bgs	
48						
49						

Sampler Signature: J. Sathaye Date: 1/23/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER MW-04	SHEET 1 OF 4

SOIL BORING LOG

PROJECT : East Vieques LOCATION : PI-4 DATE: 1/24/2006

WEATHER: Sunny in the 80's (10-15 men) DRILLING CONTRACTOR : Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED : HSA (4-1/4") B-61 Mobile drill, 2-inch water rotary coring, 5-foot barrel

WATER LEVELS : START : 0800 1/24/2006 END : 1000 1/25/2006 LOGGER : J. Sathaye

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone PIO	Above Hole FID	Above Hole PID/FID
	0-2	12/24	SS1 (spt)	8-13-12-11	POORLY GRADED SAND (SP) , 7.5 yr 4/3 brown dry, medium dense, with coarse gravel, roots, leaves. (top soil), organic matter.	2-8	0.68	0.61/0.90
2	2-6	9/24	SS2 (spt)	8-7-8-6	POORLY GRADED SAND (SP), 7.5 yr 4/3 dry, loose, with cobble, trace roots, leaves	4.1	0.13	5.1/0.63
4	4-6	12/24	SS3 (spt)	11-11-12-20	6" rock fragments (cobble) (fill); dry, loose. 6" - POORLY GRADED SAND (SP), 7.5 yr 5/4 (brown) dry, medium dense, white mottling (lime?)	3.41	0.21	0.41/0.08
6	6-8	20/24	SS4 (spt)	15-11-10-11	9" gray cobble (fill) dry, loose 11" - POORLY GRADED SAND (SP), 7.5 yr 5/6 strong brown, dry, lose to medium dense some white and gray mottling.	0.52	0.45	0.45/0.80
8	8-10	10/24	SS5 (spt)	5-7-5-5	POORLY GRADED SAND (SP), 10 yr 4/6 dark yellowish brown, loose, dry. Granodiorite cobble, bottom 4"	N/A	0.13	N/A/0.25
10	10-12	18/24	SS6 (spt)	5-10-6-8	6" POORLY GRADED SAND (SP), 7.5 yr 3/3 dark brown, loose, moist, cobbles 12" POORLY GRADED SAND (SP), 10 yr 6/6 (brownish yellow) loose moist trace coarse gravel.	N/A	0.64	N/A/0.25
12								

Sampler Signature: J. Sathaye Date: 1/25/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER MW-04	SHEET 2 OF 4

SOIL BORING LOG

PROJECT : East Vieques PI4 LOCATION : PI-4 DATE: 1/24/2006

WEATHER: Sunny in the 80's F Mod wind DRILLING CONTRACTOR : Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED : HSA (4-1/4") B-61 Mobile drill, 2-inch water rotary coring, 5-foot barrel

WATER LEVELS : START : 0800 1/24/2006 END : 1000 1/25/2006 LOGGER : J. Sathaye

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone PIO / FID / Above Hole PID/FID
12						
	12-16	18/24	SS7 (spt)	19-17-11-13	POORLY GRADED SAND (SP), 10 yr 6/6 brownish yellow, loose, mist granite cobble top 6"	PIO 0.85 / PID/FID 0.90
14						
	14-16	18/26	SS8 (spt)	13-17-20-30	14" same as above; (med. dense), no cobbles. 4" - POORLY GRADED SAND (SP), as above with pink (2-5 yr 8/2) mottling	PIO 0.89 / PID/FID 1-12
16						
	16-18	18/24	SS9 (spt)	20-24-29-28	10" -POORLY GRADED SAND (SP), 7.5 yr 6/3 (light brown) dry, med dense 8" POORLY GRADED SAND (SP), 5 yr 5/6, dry medium dense, pink and black mottling	PIO 2.01 / PID/FID 1.65
18						
	18-20	18/24	SS10(spt)	18-30-31-46	9" same as above 9" POORLY GRADED SAND (SP), 5 yr 5/6 and gray/green rock cobble and white mottling, dry, dense pink	PIO 2.2 / PID/FID 2.65
20						
	20-22	16"/24	SS11 (spt)	16-22-28-37	4" - POORLY GRADED SAND (SP), 5 yr 4/6 yellowish red, medium dense, dry, coarse gravel 12" SILTY SAND (SM), 5 yr 5/8 yellowish red , dry, hard w/ coarse gravel (white/pink)	PIO 1.72 / PID/FID 2.11
22						
	22-24	15/24	SS12 (spt)	12-19-20-27	9" - Sand, same as above (20-22 interval) 6" - weathered rock gravel and cobble- greenish grey crystals	PIO 2.24 / PID/FID 2.47
24						

Sampler Signature: J. Sathaye Date: 1/24/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER MW-04	SHEET 3 OF 4

SOIL BORING LOG

PROJECT : East Vieques PI4 LOCATION : PI-4 DATE: 1/25/2006

WEATHER: Sunny in the 80's F Mod wind DRILLING CONTRACTOR : Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED : HSA (4-1/4") B-61 Mobile drill, 2-inch water rotary coring, 5-foot barrel

WATER LEVELS : START : 0800 1/24/2006 END : 1000 1/25/2006 LOGGER : J. Sathaye

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone PIO FID / Above Hole PID/FID
24	24-26	18/26	SS13 (spt)	21-16-12-26	9" - Weathered green - gray rock, volcanic, with coarse gravel, silt, orange, brown, black mottling 9" - fine sand, SP, 5 yr 5/6 yellow brown) dry, medium dense.	n/a - unit out of gas
26	26-28	18/26	SS14(spt)	20-45-30-50 (3")	8" sand fine sand, SP, 7.5 yr 4/4 brown dry, dense, some black, fine mottling. 10" - weathered gray/green. rock in fine sand, silty matrix.	stop 1/24/06 Resume 1/25/06; w/ @0815 coring
28	28-33	11/60	Core 1-NQ		Weathered granite, 2" to 3" size fragments. 1" quartz/feldspar (orthoclase) fragments. 1" 1 mafic (dark gray/ green), fragments coastal with brown silty clay. Rock fragment. All oxidized. No joined/bedding apparent.	
30					Weathered Granite - 2" to 3" size fragments. 1" quartz/feldspar (orthoclase) fragments. 1" /Mafic (dark grey/green) fragments coated- w/ brown silty clay. rock, fragment. joints/bedding apparent.	
32						
33	33-38	36/60	Core 2-NQ		Weathered granite with green clay coating. 3- mafic rock fragments oxidized (greenish coating on some surfaces) 27" - severely weathered granite w/coarse grained sand, granite cobble, friable , granite coated with light green clay.	0.78 ppm /0.01 ppm used - 100 gals (5')
36						

Sampler Signature: J. Sathaye Date: 1/25/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER MW-04	SHEET 4 OF 4

SOIL BORING LOG

PROJECT : East Vieques PI4 LOCATION : PI-4 DATE: 1/25/2006

WEATHER: Sunny, 85 F, Mod wind DRILLING CONTRACTOR : Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED : HSA (4-1/4") B-61 Mobile drill, 2-inch water rotary coring, 5-foot barrel

WATER LEVELS : START : 0800 1/24/2006 END : 1000 1/25/2006 LOGGER : J. Sathaye

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone PID / Above Hole FID
36						
38					No recovery	0.04 PID / -135 FID Used- 100 gals water.
	38-43	0/60	Core 3-NQ			
42						
43						
45						
	43-48	60/60	Core 4-NQ		Weathered granite, with mineralized veins and quartz veins. Vertical joint from - 45 to 46-25' Eight bedding planes/distributed fractures evenly through section. Weathering apparent on planes. Rock is extremely friable, with coating of coarse quartz grains; bedding/fracture surface are oxidized with red brown mottling.	Used - 100 gallons of water 0.04/1.34
48						
	48-49	12/12	Core 5-NQ		Weathered granite. one vertical, mineralized join. Solid rock. Two bedding/fracture planes. 6" apart. Light green. Coating on weakened surfaces.	used 30 gallons of water.
49						

Sampler Signature: J. Sathaye Date: 1/25/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER MW-05	SHEET 1 OF 4

SOIL BORING LOG

PROJECT : East Vieques LOCATION : PI-4 DATE: 1/19/2006

WEATHER: Sunny Windy in the 80's (10-15 mph) DRILLING CONTRACTOR : Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED : HSA (2-1/4") B-61 Mobile drill, 6-inch air rotary bit.

WATER LEVELS : START : 0955 1/19/2006 END : 0830 1/20/2006 LOGGER : J. Sathaye

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone PID	FID	Above Hole PID/FID
					0-5" POORLY GRADED SAND (SP), dark reddish brown (5 yr 3/2), moist, loose-medium density, with roots, fine gravel, trace of silt	0	0	5/2
	0-2	14"/24	SS1 (spt)	8-12-13-11	5-24" - POORLY GRADED SAND (SP), yellowish brown (10yr 5/6), dry, loose w/limestone gravel - medium			
2	2-4	9"/24	SS2 (spt)	10-11-11-15	POORLY GRADED SAND (SP), reddish brown 5 yr 3/3 dry, medium dense, with very fine sand. fragments, trace silt.	0	0	10/2
4	4-6	10"/24	SS3 (spt)	17-18-18-16	POORLY GRADED SAND (SP), brown dry 10 yr 7/6 medium dense, trace fine angular gravel, trace silt.	0	0	6/3
6	6-8	20"/24	SS4 (spt)	15-15-11-9	POORLY GRADED SAND (SP), light brown 10yr7/6 dry, medium dense, trace fines 14"- POORLY GRADED SAND (SP), light brown, dry medium dense, trace fine gravel (quartz) trace gray mottling.	0	0	8/2
8	8-10	24"/24	SS5 (spt)	11-13-13-14	POORLY GRADED SAND (SP), light brown 10yr 7/6 dry, loose, trace pale brown loose, coarse gravel at bottom, some gray mottling.	0	1	5/10
10	10-12	24"/24	SS6 (spt)	8-16-15-20	POORLY GRADED SAND (SP),light brown 10yr 5/4 lose, with coarse grained - 6" then light brown (10 yr 7/14) , dry, medium dense, w/ coarse to very fine gravel,	0	0	2/4

Sampler Signature: J. Sathaye Date: 1/19/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER MW-05	SHEET 2 OF 4

SOIL BORING LOG

PROJECT : East Vieques | LOCATION : PI-4 | DATE: 1/19/2006

WEATHER: Sunny, 80's | DRILLING CONTRACTOR : Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED : HSA (2-1/4") B-61 Mobile drill, 6-inch air rotary bit.

WATER LEVELS : | START : 0955 1/19/2006 | END : 0830 1/20/2006 | LOGGER : J. Sathaye

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole		
						PIO	FID	PID/FID
12					6" - POORLY GRADED SAND (SP), 10 YR 4/4 brown Dry, med, dense, some fine gravel	0	2	0/6
	12-14	15"	SS7 (spt)	17-23-29-34	9" - POORLY GRADED SAND (SP),10 YR 6/4 brown, dense, Gray -pink mottling last 3"			
14	14-16	18"	SS8 (spt)	12-21-35-46	POORLY GRADED SAND (SP) Reddish to dark brown, (10 yr 3/4 to 3/6) , dry dense, coarse sand at bottom with coarse gravel, with black-grey mottling and streaks.	0	6	0/6
16	16-18	12"/21"	SS9 (spt)	19-26-42 50(3")	POORLY GRADED SAND (SP), Reddish brown 2.5YR 4/6, dry, dense to v. dense, with black mottles and trace coarse, sand quartz	0	0	0/6
18	20-21.5	18"	SS10 (spt)	21-25-50- (5")	Same as above; some pink sand- 9" 9" - reddish brown (5 yr 4/6) sand, with weathered (oxidized grey) volcanic rock - rhyodacite? Light grey (bleached)	0	0	0/0
20			Air	Rotary	from cuttings. Gray - dark grey rock and reddish brown sand. (> 50 sand)			

Sampler Signature: J. Sathaye Date: 1/19/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER MW-05	SHEET 3 OF 4

SOIL BORING LOG

PROJECT : East Vieques LOCATION : PI-4 DATE: 1/19/2006

WEATHER: P. Sunny, some rain, 80's DRILLING CONTRACTOR : Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED : HSA (2-1/4") B-61 Mobile drill, 6-inch air rotary bit.

WATER LEVELS : START : 0955 1/19/2006 END : 0830 1/20/2006 LOGGER : J. Sathaye

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone PID FID / Above Hole PID/FID
24			Air hammer		Same as 20-24 (sand + rock - granodiorite) Sand , (>50%) granite /diorite gray dark gray and some (limestone) (white)	PID 0 FID 7
27						
30						
33					Sand - brown > 80% Limestone fragments white	at approximately 1525 0 3
36					Gray and pink granite/ diorite	Harder drilling 1600

Sampler Signature: J. Sathaye Date: 1/19/2006

CH2MHILL	PROJECT NUMBER 183719.FI.02	BORING NUMBER MW-05	SHEET 4 OF 4

SOIL BORING LOG

PROJECT : East Vieques LOCATION : PI-4 DATE: 1/19/06- 1/20/06

WEATHER: Sunny mod, Wind, 80's DRILLING CONTRACTOR : Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED : HSA (2-1/4") B-61 Mobile drill, 6-inch air rotary bit.

WATER LEVELS : START : 0955 1/19/2006 END : 0830 1/20/2006 LOGGER : J. Sathaye

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
36					Same as above	
						C- 1615
37						
					Predominantly rock - granite/granodiorite oxidized brown color and quartz grains and k-feldsp	
						16:30
40		approx.		11/20/2006	moist @ 41 - slightly	stop @ -40,; 1645 drillers offsite 1650- leave right compressor @ site; Rods in hole.
					Predominately granite /granodiorite fragments in cuttings w / v. finely; powdered rock (unable to identify)	
44						
48						
49						
					EOB 49' BGS	

Sampler Signature: J. Sathaye Date: 1/20/2006

CH2MHILL	PROJECT NUMBER 362196.FI.ZZ.01	BORING NUMBER EPI04-MW06 SHEET 1 OF 6

SOIL BORING LOG FOR WELL INSTALLATION

PROJECT : SI/ESI Former VNTR | LOCATION : VE-PI-4 | DATE: 03/10/09 - 3/12/09

WEATHER: Cloudy, Winds 5-10mph NE, ~74°F | DRILLING CONTRACTOR : Jaca and Sierra

DRILLING METHOD AND EQUIPMENT USED : 8" H.S.A. for most of B-61 rig, 24" Stainless steel spoon; From 40'bgs Air rig with 2-1/4" augers 5'rods

WATER LEVELS **42' bgs** | START : 0750; 03/10/09 | END : 0830; 03/12/09 | LOGGER : Toby Stewart/BTR

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone	Above Hole
	0-2'	24/24	SS-1	3 - 7 - 8 - 10 (15)	0-2' bgs SILT (ML), dark brown (7.5YR 3/2) dry, medium density, tree roots, trace fine grained angular gravel, 10-15% fine white shell particles		
2					2.0-3.8' bgs SILT (ML), brown (7.5YR 4/4) dry, medium density, 20-25% fine shell particles, trace fine grained sand	0.0	0.0
	2-4'	22/24	SS-2	10 - 11- 11 - 9 (22)	3.8 - 4.0 No Recovery (N.R.)		
4					4.0-4.8' bgs SILT (ML), brown (7.5YR 4/4) dry, medium density, 20-25% fine shell particles, trace fine grained sand, cobbles at 4.3' and 4.7' bgs	0.0	0.0
	4-6'	15/24	SS-3	11 - 14 - 13 - 12 (27)	4.8-5.25' bgs SILT (ML), brown (7.5YR 4/3) dry, medium density, 15-25% fine to coarse grained angular sand 5.25 - 6.0' bgs NR		
6					6.0-7.6' bgs SILT (ML), mottled reddish brown 5YR 4/4) and light yellowish brown (2.5Y 6/4), dry, medium density, low plasticity, non conhesive, 10-15% fine to coarse grained sand, last 6" is dark yellowish brown (10YR4/4)	0.0	0.0
	6-8'	19/24	SS-4	12 - 15 - 14 - 15 (29)	7.6 - 8.0' bgs NR		
8					8.0-8.4' bgs SILT (ML), yellowish brown (10YR 6/4), dry, medium density, low plasticity, non conhesive, 10-15% fine to coarse grained sand	0.0	0.0
	8-10'	18/24	SS-5	11 - 14 - 13 - 12 (25)	8.4-9.5' bgs SILTY SAND (SW), varigated, dry, medium denisty, noncohesive, fine to coarse grained sand, trace fine grained angular gravel 9.5-10.0' bgs NR		
10					10.0-11.75 SILTY SAND (SW), yellowish brown (10YR 5/6), dry, very loose, fine to coarse grained sands, trace fine grained angular gravel	0.0	0.0
	10-12'	24/24	SS-6	9 - 6 - 6 - 5 (12)	11.75-12.0' bgs SILTY SAND (SM), strong brown (7.5YR 5/6), dry, low plasticity, non cohesive, fine to medium grained sands, trace fine grained gravel		
12						0.0	0.0

Sampler Signature: **T. Stewart** Date: **3/10/2009**

CH2MHILL	PROJECT NUMBER 362196.FI.ZZ.01	BORING NUMBER EPI04-MW06 SHEET 2 OF 6

SOIL BORING LOG FOR WELL INSTALLATION

PROJECT : SI/ESI Former VNTR | LOCATION : VE-PI-4 | DATE: 03/10/09 - 3/12/09

WEATHER: Cloudy, Winds 5-10mph NE, ~74°F | DRILLING CONTRACTOR : Jaca and Sierra

DRILLING METHOD AND EQUIPMENT USED : 8" H.S.A. for most of B-61 rig, 24" Stainless steel spoon; From 40'bgs Air rig with 2-1/4" augers 5'rods

WATER LEVELS **42' bgs** | START : 0750; 03/10/09 | END : 0830; 03/12/09 | LOGGER : Toby Stewart/BTR

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone	Above Hole
	12-14'	18/24	SS-07	8 - 8 - 17 - 19 (25)	12.0-13.25' bgs SILTY SAND (SM-SW), yellowish brown (10YR 5/6), dry, medium density, fine to coarse grained sands, trace fine to coarse grained angular gravels,		
14					13.25 - 14.0' bgs NR	0.0	0.0
	14 - 16'	19/24	SS-8	20 - 16 - 16 - 18 (32)	14.0 - 15.6' bgs SILT (ML), yellowish brown (10YR 5/6), dry, dense, non cohesive, trace fine grained sand		
16					15.6 - 16' bgs NR	0.0	0.0
	16 - 18'	24/24	SS-9	28 - 22 - 20 - 20 (42)	16.0- 18.0' bgs SILT (ML), yellowish brown (10YR 5/6), dry, dense, non cohesive, trace fine grained sandwith trace black vertical laminations with a weak red (10R 5/3) discoloration, 10-15% fine black particles througout		
18						0.0	0.0
	18-20'	11/24	SS-10	19 - 18 - 18 - 24 (36)	18.0-19.1' bgs SILT (ML), yellowish brown (10YR 5/6) dense, dry, trace black vertical laminations with weak red (10R 5/3) discoloration, 10-15% fine to medium black particles, mottled reddish yellow (7.5YR 6/8)		
					19.1- 20.0' bgs NR		
20					20.0-21.2' bgs SILT (ML), yellowish brown (10YR 5/6) dense, dry, trace black vertical laminations with weak red (10R 5/3) discoloration, 10-15% fine to medium black particles, mottled reddish yellow (7.5YR 6/8)	0.0	0.0
	20-22'	22/24	SS-11	32 - 24 - 47 - 85 (71)	21.2 - 21.8' bgs SILTY SAND (SM-SW), varigated, dry, fine to coarse grained sand, very dense 5-10% fine to coarse grained angular gravels		
22					21.8 - 22' bgs NR	0.0	0.0
	22-24'	21/24	SS-12	17 - 18 - 20 - 19 (38)	22.0 - 23.75' bgs SAND (SW), varigated, dry, dense, fine to coarse grained angular to rounded sand, 10-15% fine angular gravel.		
					23.75 - 24.0' bgs NR		
24						0.0	0.0

Sampler Signature: **T. Stewart** Date: **3/10/2009**

CH2MHILL	PROJECT NUMBER 362196.FI.ZZ.01	BORING NUMBER EPI04-MW06 SHEET 3 OF 6

SOIL BORING LOG FOR WELL INSTALLATION

PROJECT : SI/ESI Former VNTR LOCATION : VE-PI-4 DATE: 03/10/09 - 3/12/09

WEATHER: Cloudy, Winds 5-10mph NE, ~74°F DRILLING CONTRACTOR : Jaca and Sierra

DRILLING METHOD AND EQUIPMENT USED : 8" H.S.A. for most of B-61 rig, 24" Stainless steel spoon; From 40'bgs Air rig with 2-1/4" augers 5'rods

WATER LEVELS **42' bgs** START : 0750; 03/10/09 END : 0830; 03/12/09 LOGGER : Toby Stewart/BTR

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone	Above Hole
	24-26'	24/24	SS-13	46 - 65 - 83 - 58 (38)	24.0-26.0' bgs SAND (SW), varigated, dry, dense, fine to coarse grained angular to rounded sand, 15-20% fine angular gravel.		
26					26.0-26.3' bgs SILT (ML), laminated pale olive (5Y 6/3), white, and yellow (2.5Y 8/6), dry, very dense, non to low plasticity, cohesive, potential mineral vein	0.0	0.0
	26-28'	4/24	SS-14	(100/6")	26.3-28.0' bgs NR		
28						0.0	0.0
	28-30'	<1/24	SS-15	(100/1")	28.0 - 28.1' bgs SILT (ML), light yellowish brown (2.5Y 6/3) dry, very dense, non-plastic, non cohesive. 28.1 - 30.0' bgs NR		
30						0.0	0.0
	30-32"	6/24	SS-16	(100/6")	30.0-30.5' bgs SAND (SW), dark olive brown (2.5Y 3/3) and white (peppered in color) dry, very dense,fine to coarse grained sands, mineral rich trace coarse angular gravels 30.5-32.0' bgs NR		
32							
	32-34'	9/24	SS-17	65 - 100/5" (100/5")	32.0 - 32.9' bgs SILT (ML), very dark grayish bown (10YR 3/2) dry, very dense, trace fine grained sand, trace fine grained mineral rich gravel (likely feldspar minerals) 32.9 - 34.0" NR		
34						0.0	0.0
	34-36'	6/24	SS-18	60 - 100/3" (100/3")	34.0 - 34.5' bgs SILT(ML), strong brown (7.5YR 5/8), white, very dark greyish brown (10YR 3/2), dry, very dense, non plastic, cohesive, feldspar and mica grains, trace medium to coarse grained sand 34.5 - 36.0' bgs 3" slough, and NR		
36						0.0	0.0

Sampler Signature: **T. Stewart** Date: **3/10/2009**

CH2MHILL	PROJECT NUMBER 362196.FI.ZZ.01	BORING NUMBER EPI04-MW06 SHEET 4 OF 6

SOIL BORING LOG FOR WELL INSTALLATION

PROJECT : SI/ESI Former VNTR LOCATION : VE-PI-4 DATE: 03/10/09 - 3/12/09

WEATHER: Cloudy, Winds 5-10mph NE, ~74°F DRILLING CONTRACTOR : Jaca and Sierra

DRILLING METHOD AND EQUIPMENT USED : 8" H.S.A. for most of B-61 rig, 24" Stainless steel spoon; From 40'bgs Air rig with 2-1/4" augers 5'rods

WATER LEVELS **42' bgs** START : 0750; 03/10/09 END : 0830; 03/12/09 LOGGER : Toby Stewart/BTR

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
	36-38'	2/24	SS-19	(100/3")	36.0-36.2' bgs SILTY SAND (SM), very dark brown (10YR 2/2), dry, very dense, non-plastic, non-cohesive, fine to coarse grained subangular feldspar sand, mica rich (10-15% silts), trace fine-medinum mica flakes, feldspar grains are white 36.2 - 38.0' bgs 1"slough, NR	
38						0.0 / 0.0
	38-40'	4/24	SS-20	(100/5")	38.0 - 38.3' bgs SAND (SW-SM), white and very dark grayish brown (10YR 3/2) dry, fine to coarse grained feldspar sands, angular, fine to medium mica particles, trace red discoloration 38.3-40.0' bgs 1" slough and NR	
40						0.0 / 0.0
	40-42' ▼	6/24	SS-21	(100/6")	40-40.5' bgs SILT (ML), white and very dark grayish brown (10YR 3/2) dry, fine to coarse grained feldspar sands, angular, medium to coarse mica particles, trace yellowish red (5YR 5/8) stains 40.5 - 42.0' bgs NR	
42						0.0 / 0.0
	42-44'	6/24	SS-22	(100/6")	42.0 - 42.5' bgs SAND (SW-SM), white and very dark grayish brown (10YR 3/2) wet, fine to coarse grained feldspar sands, angular, medium to coarse mica particles, trace yellowish red (5YR 5/8) stains with vertical black (5YR 2.5/1) and red (2.5YR 4/8) staining 42.5-44.0' bgs NR	1415 Driller observes water on tips of rods after drilling w 2 1/4 " augers to 42', before performing SS-22
44						
	44-46'	8/24	SS-23	80 - 100/2" (100/2")	44.0-44.7' bgs SITLY SAND (SM), stained vertically dusky red (10YR 3/4) and yellowish red (5YR 4/6 - 5/8), dry, fine to coarse grained feldspar sands, platey particles vertically aligned and trace coarse gravels. 44.7 ' - 46.0' bgs NR	1505: Using two 2' sticks plus 50' of rods to perform SPTs 1517 Mud returned to surface while drilling to 48' bgs
46						0.0 / 0.0
	46-48'	0/24	SS-24	(100/2")	46-48' bgs NR	1535 Reach 50' bgs with 2 1/4" augers, wait, then measure water level 1605 DTW= ~41' bgs, will use 8" augers (ID) to 50' bgs to install well.
48						

Sampler Signature: **T. Stewart** Date: **3/10/2009**

CH2MHILL	PROJECT NUMBER 362196.FI.ZZ.01	BORING NUMBER EPI04-MW06 SHEET 5 OF 6

SOIL BORING LOG FOR WELL INSTALLATION

PROJECT : SI/ESI Former VNTR LOCATION : VE-PI-4 DATE: 03/10/09 - 3/12/09

WEATHER: Cloudy, Winds 5-10mph NE, ~74°F DRILLING CONTRACTOR : Jaca and Sierra

DRILLING METHOD AND EQUIPMENT USED : 8" H.S.A. for most of B-61 rig, 24" Stainless steel spoon; From 40'bgs Air rig with 2-1/4" augers 5'rods

WATER LEVELS **42' bgs** START : 0750; 03/10/09 END : 0830; 03/12/09 LOGGER : Toby Stewart/BTR

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
	48-50'	0/24	SS-25	(100/2")	48 ' -50' bgs NR	3/11/09 Use 8" augers, refusal @ 40'bgs. Need to use air rig. 3/12/09 Switch to Air rig, no video logging, see next page
50						
						EOB=50' bgs See Monitoring well installation diagram
52						
54						
56						
58						
60						

Sampler Signature: **T. Stewart** Date: **3/10/2009**

CH2MHILL	PROJECT NUMBER 362196.FI.ZZ.01	BORING NUMBER EPI04-MW06	SHEET 6 OF 6

NOTES

PROJECT : SI/ESI Former VNTR | LOCATION : VE-PI-4 | DATE: 3/10/09 - 3/12/09

SOP(s) used (refer to ESI/SI Former VNTR

All appropriate SOPs followed

Were all requirements of the SOP(s) (above) met? Yes

Explanation of exceptions to SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Refusal was encountered at 40' bgs. Air rig was needd. Drill to 50 feet with air rig. Check water level, 41' bgs. Kenji spoke with John about geophysical logging because casing was advanced to 40', water coming in at 41', cant' log and see well below water.

CH2MHILL	PROJECT NUMBER 362196.FI.ZZ.01	BORING NUMBER EPI04-MW07 SHEET 1 OF 4

SOIL BORING LOG FOR WELL INSTALLATION

PROJECT : SI/ESI Former VNTR LOCATION : VE-PI-4 DATE: 3/13/09

WEATHER: Clear ~78°F, Light E. Winds DRILLING CONTRACTOR : JACA and Sierra

DRILLING METHOD AND EQUIPMENT USED : H.S.A For most B-61, 24" SS Spoon, 5'AirRods, 2/14"ID augers, cathead

WATER LEVELS **~32' bgs** START : 0742 ; 3/13/09 END : 1400 ; 3/13/09 LOGGER : Toby Stewart/BTR

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone	Above Hole
	0-2'	19/24	SS-1	4 - 9 - 14 - 11 (23)	0-1.6' bgs SANDY SILT (ML), dark yellowish brown (10YR 4/4) dry, medium dense, 15-20% fine to coarse grained sand (white and light red (2.5YR 7/6)), few organics 1.6'-2.0' bgs No Recoery (NR)		
2					2.0-3.7' bgs SANDY SILT (ML), dark yellowish brown (10YR 4/4) dry, medium dense, 15-20% fine to coarse grained sand, white and light red (2.5YR 7/6)	0.0	0.0
	2-4'	20/24	SS-2	13 - 12 - 13 - 11 (25)	3.7' -4.0' bgs NR		
4					4.0 '-4.6' bgs SANDY SILT (ML), brownish yellow (10YR 6/6), dry, medium density, fine to medium grained sand, white and black in color, trace coarse grained angular gravel	0.0	0.0
	4-6'	24/24	SS-3	12 - 11 - 11 - 11 (22)	4.6-4.9' bgs SILTY SAND (SM), brownish yellow (10YR 6/6) dry, fine to coarse grained sand, white, black and dark greenish gray particles. 4.9 - 6.0' bgs SANDY SILT (ML),brownish yellow (10YR 6/6), dry, medium density, fine to coarse grained sand		
6						0.0	0.0
	6-8'	14/24	SS-4	15 - 22 - 27 - 30 (44)	6.0-7.2' bgs SANDY SILT (ML), brownish yellow (10YR 6/6) dry, dense, trace fine to medium grained black sand, 5-10% white mottling 7.2-8.0' bgs NR		
8						0.0	0.0
	8-10'	14/24	SS-5	14 - 15 - 17 - 16 (32)	6.0-7.2' bgs SANDY SILT (ML), brownish yellow (10YR 6/6) dry, dense, trace fine to medium grained black sand, trace medium grained particles 9.2 - 10.0' bgs NR		
10						0.0	0.0
	10-12'	12/24	SS-6	12 - 11 - 11 - 11 (22)	10.0 - 11.0' bgs SILT (ML), brownish yellow (10YR 6/6), dry, medium density, trace fine grained sands, 15-20% fine black, white particles 11.0-12.0' bgs NR		
12						0.0	0.0

Sampler Signature: **T. Stewart** Date: **3/13/2009**

CH2MHILL	PROJECT NUMBER 362196.FI.ZZ.01	BORING NUMBER EPI04-MW07 SHEET 2 OF 4

SOIL BORING LOG FOR WELL INSTALLATION

PROJECT : SI/ESI Former VNTR | LOCATION : VE-PI-4 | DATE: 3/13/09

WEATHER: Mostly Cloudy ~76°F, Light E. Winds 5-10m | DRILLING CONTRACTOR : JACA and Sierra

DRILLING METHOD AND EQUIPMENT USED : H.S.A For most B-61, 24" SS Spoon, 5'AirRods, 2/14"ID augers, cathead

WATER LEVELS **~32' bgs** | START : 0742 ; 3/13/09 | END : 1400 ; 3/13/09 | LOGGER : Toby Stewart/BTR

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone	Above Hole
	12-14'	24/24	SS-7	16 - 13 - 15 - 16 (28)	12-14' bgs SANDY SILT (ML), brownish yellow (10YR 6/6), dry, medium density, 20-25% fine to coarse grained angular sand of white, reddish yellow, greenish gray grains, trace weak red discoloration at 12'		
14						0.0	0.0
	14-16'	22/24	SS-8	38 - 39 - 38 - 31 (77)	14.0-15.8' bgs SANDY SILT (ML), brownish yellow (10YR 6/6) dry, dense, fine to coarse grained sand, few coarse grained angular gravel, greenish gray rock fragments from 14-15' 15.8 - 16.0' bgs NR		
16						0.0	0.0
	16-18'	24/24	SS-9	38 - 39 - 38 - 31 (77)	16-18' bgs SANDY SILT (ML), brownish yellow (10YR 6/6), dry, dense, fine to coarse grained sand, few coarse grained angular gravel		
18						NM	NM
	18-20'	20/24	SS-10	17 - 13 - 18 - 23 (31)	18.0 - 18.3' bgs SILTY GRAVEL (GW), coarse gravel of greenish gray rock fragments, stained black with strong brown (7.5YR5/8), dry, dense 18.3 - 19.8' bgs SILT (ML), brown (7.5YR 4/4) dry, dense, non- to low plastic, slightly cohesive, trace fine grained sand, 5-7% c0arse black particles, 3-5% med white particles		
20						0.0	0.0
	20-22'	24/24	SS-11	10 - 13 - 19 - 26 (32)	19.8 - 20.0' bgs NR 20-20.6' bgs SILT (ML), brown (7.5YR 4/4) dry to moist, dense, non- to low plastic, slightly cohesive, trace fine grained sand, trace brownish black discoloration 20.6 - 22.0' SILT (ML), mottled dark grayish brown (2.5Y 4/2) and white (2.5Y 8/1), dry, dense, brittle, trace fine grained gravel, non plastic, non cohesive		
22						0.0	0.0
	22-24'	24/24	SS-12	24 - 26 - 32 - 33 (58)	22.0 - 24.0' bgs SILT (ML), mottled grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/6), dry, very dense, trace black coarse grained sand, trace fine grained sand		
24						0.0	0.0

Sampler Signature: **T. Stewart** Date: **3/13/2009**

CH2MHILL	PROJECT NUMBER 362196.FI.ZZ.01	BORING NUMBER EPI04-MW07 SHEET 3 OF 4

SOIL BORING LOG FOR WELL INSTALLATION

PROJECT : SI/ESI Former VNTR | LOCATION : VE-PI-4 | DATE: 3/13/09

WEATHER: Clear ~78°F, Light E. Winds | DRILLING CONTRACTOR : JACA and Sierra

DRILLING METHOD AND EQUIPMENT USED : H.S.A For most B-61, 24" SS Spoon, 5'AirRods, 2/14"ID augers, cathead

WATER LEVELS **~32' bgs** | START : 0742 ; 3/13/09 | END : 1400 ; 3/13/09 | LOGGER : Toby Stewart/BTR

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
	24-26'	22"	SS-13	19 - 39 - 55 - 93	24-25.8' bgs SANDY SILT (ML) mottled grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/6), dry, very dense, trace black coarse grained sand, fine grained sand, trace cobbles, 40-50% fine to medium grained black sand from 24.8 - 25.4' bgs 25.8 - 26.0' bgs NR	
26						0.0 / 0.0
	26-28'	17"	SS-14	24 - 60 - 100/5" (160/11")	26-27.4' bgs SANDY SILT (ML) mottled grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/6), dry, very dense, trace black coarse grained sand, fine grained sand, trace course grained rounded gravel 27.4 - 28' bgs NR	
28						0.0 / 0.0
	28-30' ▼	10"	SS-15	66 - 100/4" (100/4")	28-28.8' bgs SANDY SILT (ML), light olive brown (2.5Y 5/4), dry to moist, very dense, medium to coarse grained angular white sand (feldspars) fine to medium white grains 28.8 - 30.0' bgs NR	
30						0.0 / 0.0
	30-32'	14"	SS-16	73 - 100/4" (100/4")	30-31.2' bgs SILTY SAND (SM-SW), varigated (white, orange, brown), dry, very dense, fine to coarse grained sand, trace fine grained angular gravel 31.2-32' bgs NR	
32 ▼					32-32.5' bgs SILTY SAND (SM-SW), varigated (white, orange, brown), wet, very dense, fine to coarse grained sand, trace fine grained angular gravel	0.0 / 0.0 Saturated on to 1-2", may be from 31'
	32-34'	6"	SS-17	(100/6")	32.5 - 34.0' bgs NR	
34						0.0 / 0.0
	34-36'	6"	SS-18	(100/6")	34-34.5' bgs SILTY SAND (SM-SW), olive brown (2.5Y 4/3), wet, very dense, 20-30% coarse white grains, fine to coarse grained sand	3/13/09; 1322 Wet sample recovered in 32 - 34' bgs sample spoon. GW at 31-32' bgs.
36						EOB: 36' bgs

Sampler Signature: **T. Stewart** Date: **3/13/2009**

CH2MHILL	PROJECT NUMBER 362196.FI.ZZ.01	BORING NUMBER EPI04-MW07	SHEET 4 OF 4

NOTES

PROJECT : SI/ESI Former VNTR LOCATION : VE-PI-4 DATE: 03/13/09

SOP(s) used (refer to ESI/SI Former VNTR

All appropriate SOPs followed

Were all requirements of the SOP(s) (above) met? Yes

Explanation of exceptions to SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Notes below from Carol Peterson/VBO (well install) 3/16/09 1125

DTW = 29.5' bgs. Will utilize 8" I.D. / 12" O.D. augers to ~38' bgs to install well. Will try to use augers for entire depth.

Change to 39' based on 3/13 observation

Used augers to 35' bgs, need air rig (T4 to proceed)

Change 4 bollards to 2 bollards

Change 2' seal to 3' seal

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	BORING NUMBER VEP4-SB16 (MW08)	SHEET 1 OF 3

SOIL BORING LOG

PROJECT : PI-4 Supplemental Expanded Site Inspection | LOCATION : Fmr VNTR, Vieques, PR | DATE: 11/02/11

WEATHER: Partly cloudy, mid to high 80's. | DRILLING CONTRACTOR : Pedro Panzardi and Associates

Drilling method and Eqp used: B61HDX Mobile Drill w/2-1/4"ID 5-1/4" OD and 6" head HSAs, 6.25" air hammer, External IR 750 compressor.

WATER LEVELS : | START : 12/01/11:0850 | END : 12/2/11:0900 | LOGGER : S. Brand/VBO

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: MW-08 DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
0	0-2	1.5	SS-1	3-5-5-7	0-1.5 Fine Sandy Silt, trace clay ML 5YR 2.5/2 dark reddish brown, moist, medium stiff, approx 20% sand, massive, trace roots, sand is fine grained.	Split spoon 0, BZ 0
2	2-4	1.0	SS-2	6-7-7-8	2-3.0 Slightly Sandy Clay, little silt CH. 5YR2.5/2 dark reddish brown, moist, medium stiff, massive, sand fine grained quartz and dark minerals, trace roots.	Split spoon 0, BZ 0
4	4-6	1.0	SS-3	4-7-9-13	4-5.0 Slightly Sandy Clay, little silt CH. 5YR 5/3 reddish brown, moist, medium stiff, massive, sand fine grained quartz and dark minerals, trace roots.	Split spoon 0, BZ 0
6	6-8	1.3	SS-4	10-12-10-12	6-7.3 Sandy Silt, ML 7.5 YR4/3 Brown, Moist, stiff, 30 percent sand, fine grained quarts and dark minerals, massive, few gravel sized pieces, less weathered granodiorite. Looks like very weathered saprolite.	Split spoon 0, BZ 0 Note: soft in split spoon, but blow counts were stiff, suggesting split spoon loosened it up.
8	8-10	1.3	SS-5	5-8-7-8	8-9.3 Medium Sand trace silt SW, 7.5YR5/4 brown, moist loose, medium, some fine sand, rock fragment sand subangular poorly sorted, 0.1 ft siltier zones.	Split spoon 0, BZ 0
10	10-12	1.6	SS-6	11-10-11-17	10-11.6 Same as above. Trace coarse sand mostly rock fragments.	Split spoon 0, BZ 0
12	12-14	1.4	SS-7	14-19-21-22	12-13.4 Interbedded Silt ML and medium to fine Sand little silt SM, both 10YR5/4 yellowish brown, dry, very stiff, semi-lithified, beds 0.2 to 0.6 ft thick.	Split spoon 0, BZ 0
14	14-16	1.4	SS-8	26-34-43-50/5"	14-15.5 Silty clay CH trace fine sand, 3.5YR4/4 brown, dry, hard, semi-lithified, trace black sharp boundary illregularly shaped coarse grain sized pieces possibly carbon, some white unweathered rock.	Split spoon 0, BZ 0
16	16-18	1.1	SS-9	16-24-36-50/4.5"	16-17.1 Same as above	Split spoon 0, BZ 0
18	18-20	1.6	SS-10		18-19.6 Same as above. Slightly more friable from split spooning.	1102 Start air hammering from surface. Formation appears to get tight at 15.5 ft and hammering onward. 20 ft started hammering 1250
20					20 ft Cuttings description Sandy Lean Clay (CL) 10YR 4/3 Brown, moist medium density, medium plasticity, cohesive, fine to medium angular sand, fines 80 percent sand 20 percent, possible limestone pieces.	BZ-0.0 Air hammer 3.5 (moisture from hole)
22						
24					25 ft Cuttings description-same as above.	BZ- 0.0, Air hammer 3.1 (moisture from hole)
26						
28						
30						

Sampler Signature: Stephen Brand/Kenji Butler Date: 11/02/11

Trace<5%, Little 6-15%, Few 16-30%, Some 31-49%

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	BORING NUMBER VEP4-SB16	SHEET 2 OF 3

SOIL BORING LOG

PROJECT : PI-4 Supplemental Expanded Site Inspection LOCATION : Fmr VNTR, Vieques, PR DATE: 11/02/11

WEATHER: Partly cloudy, mid to high 80's. DRILLING CONTRACTOR : Pedro Panzardi and Associates

Drilling method and Eqp used: B61HDX Mobile Drill w/2-1/4"ID 5-1/4" OD and 6" head HSAs, 6.25" air hammer, External IR 750 compressor.

WATER LEVELS : START : 12/01/11:0850 END : 12/2/11:0900 LOGGER : S. Brand/VBO

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
30			Air Rotary	Air rotary cuttings	30 ft. Sandy Lean Clay (CL) 10YR4/4 dark yellowish brown, moist, medium density, medium plasticity, cohesive, 80 percent fines, 20 percent sands	BZ=0.0 Air hammer= 3.3 (moisture from hole)
35					35 ft. Clayey Sand with gravel (SC) 10YR5/4 yellowish brown, moist mediium density, non-plastic, non cohesive, mafic rock pieces (10Y to 56Y 4/2 dark grayish brown)	BZ=0.0 Air hammer= 0.4 (moisture from hole)
						approximately 38 ft bgs appears we hit water.
40					40 ft. Dark mafic plutonic rock, some dark brown staining on fracture surfaces (possibly iron staining) fine grained mafic matrix.	BZ=0.0 Air hammer= 0.8 (moisture from hole)
45					45 ft. Granite to granodiorite material. Quartz, feldspars, some mica, medium crystal size now, some fines 10YR 5/3 brown, material has been broken down by the air rotary drilling process.	BZ=0.0 Air hammer= 0.4 (moisture from hole)
50					TD at 50 ft.	1600 End of air drilling to 50 ft bgs.
55						
60						

Sampler Signature: Stephen Brand/Kenji Butler Date: 11/03/11

Trace<5%, Little 6-15%, Few 16-30%, Some 31-49%

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	BORING NUMBER VEP4-SB-16	SHEET 3 OF 3

SOIL BORING LOG

PROJECT : PI-4 LOCATION : PI-4, Vieques, PR DATE: 11/02/11

NOTES

SOP(s) used (refer to SOP Log)?

Were all requirements of the SAP, PIs and above mentioned SOP(s) met?

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Water level was 32.32 ft btoc at MW-05 10 ft away from current well installation location. Starting on 11/2/11 with setting the well. Will return afterwards to do split spoon soil sampling.

Sampled 16-17 ft bgs because we thought it was just above refusal. Collected one more split spoon, but material much too tight to contain contamination.

Spoke to PM, from now on, we will sample above the zone that is too hard/tight to allow contaminant migration.

With as much rain as we are getting, the assumption is that the water table is at an approximate seasonal high, and we will therefor set the screen for the well aproximately 33-43 ft bgs.

Sampler Signature: **Stephen Brand/Kenji Butler** Date: **11/02/11**

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	BORING NUMBER VEP4-SB17(MW12)	SHEET 1 OF 3

SOIL BORING LOG

PROJECT : PI-4 Supplemental Expanded Site Inspection LOCATION : Fmr VNTR, Vieques, PR DATE: 11/02/11

WEATHER: Partly cloudy, mid to high 80's. DRILLING CONTRACTOR : Pedro Panzardi and Associates

Drilling method and Eqp used: B61HDX Mobile Drill w/2-1/4"ID 5-1/4" OD and 6" head HSAs,

WATER LEVELS : START : 12/01/11:0850 END : 12/2/11:0900 LOGGER : Sbrand

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: MW-12 DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
0	0-2	1.1	SS-1	4-5-7-7	0-1.1 Sandy Silt, some Clay ML 7.5Yr3/2 dark brown, medium stiff, moist, massive, roots, organic material.	Split spoon 0, BZ 0
2	2-4	1.2	SS-2	6-7-9-9	2-3.2 Sandy Silt, some Clay ML7.5YR 4/3 Brown, medium stiff, moist, less organic material than above.	Split spoon 0, BZ 0
4	4-6	1.2	SS-3	3-4-6-7	4-4.5 Sandy Silt, some Clay ML7.5YR 4/3 Brown, medium stiff, moist.	Split spoon 0, BZ 0
6	6-8	1.3	SS-4	7-5-6-9	4.5-5.2 Fine Sand little Silt SM-SP 7.5YR5/4 brown, loose, dry, moderately well sorted, subrounded quartz rock fragement sand. 6-7.3 Same as above	Split spoon 0, BZ 0
8	8-10	1.5	SS-5	11-14-14-17	8-8.9 Sandy Silt ML 10YR 5/4 yellowish brown, dry, sand is fine quartz and rock fragments, subrounded, moderately sorted.	Split spoon 0, BZ 0
10	10-12	1.5	SS-6	20-22-29-35	8.9-9.5 Fine Sand, little Silt SM 10YR 5/4 yellowish brown, dry medium dense 10-11.5 Sandy Silt ML, 10YR 6/6 brownish yellow, dry very stiff, massive, sand is quartz and rock fragments, subangular, poorly sorted.	Split spoon 0, BZ 0 Sample 10-11 ft bgs, VEP4-SB17-1011-1111 10:00 VEP4-EB04-1111 10:55
12	12-14	0.8	SS-7	10-22-34-44	12-12.8 Clayey Silt ML, 5YR 4/6 yellowish red, dry, very stiff, white mineralization on fractures, trace roots, very tight permeability	Split spoon 0, BZ 0
14	14-16	1.2	SS-8	12-18-23-26	14-15.2 Same as above. Little fine sand , very stiff, very low permeability	
16	16-18	1.5	SS-9	10-14-19-23	16-17.5 Sandy Silt ML 10YR 6/6 brownish yellow, dry, very stiff, fine grained subangular quartz and rock fragments, poorly sorted.	
18	18-20	1.6	SS-10	30-49-48-48	18-19.6 Same as above, hard, very tight material.	
20	20-22	1.2	SS-11	29-37-42-51	20-21.2 Same as above	
22	22-24	0.9	SS-12	20-41-50/3"	22-22.9 Same as above	
24	24-24.2	0.1	SS-13	50/2"	24-24.1 Same as above	Continue with 2-1/4-inch ID HSAs 0 BZ
26						
28						
30						

Sampler Signature: Stephen Brand/Kenji Butler Date: 11/02/11

Trace<5%, Little 6-15%, Few 16-30%, Some 31-49%

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	BORING NUMBER VEP4-SB17	SHEET 2 OF 3

SOIL BORING LOG

PROJECT : PI-4 Supplemental Expanded Site Inspection LOCATION : Fmr VNTR, Vieques, PR DATE: 11/11/11

WEATHER: Partly cloudy, mid to high 80's. DRILLING CONTRACTOR : Pedro Panzardi and Associates

Drilling method and Eqp used: B61HDX Mobile Drill w/2-1/4"ID 5-1/4" OD and 6" head HSAs.

WATER LEVELS : START : 12/01/11:0850 END : 12/2/11:0900 LOGGER : S. Brand/VBO

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
30					30-48 ft bgs No sample, cuttings from augers are too disturbed to describe.	Stop at 30 ft bgs, no sign of water
						Stop at 33 ft bgs. Water in cuttings at 33 ft bgs.
35						
40						
45						
						TD at 48 ft bgs. with 2-1/4-inch HSAs 11/14/11 at 1150
50						Driller able to continue drilling with 2-1/4-inch ID HSAs. 4-1/4-inch HSAs arrive this afternoon for pickup tommorrow.
55						
60						

Sampler Signature: Stephen Brand/Kenji Butler Date: 11/02/11

Trace<5%, Little 6-15%, Few 16-30%, Some 31-49%

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	BORING NUMBER VEP4-SB-17	SHEET 3 OF 3

SOIL BORING LOG

PROJECT : LOCATION : Vieques, Puerto Rico DATE: 11/11/11

NOTES

SOP(s) used (refer to SOP Log)?

Were all requirements of the SAP, PIs and above mentioned SOP(s) met?

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Sampled 10-11 ft bgs, directly above stiff/dense tight material, material below that depth too tight/dense to allow significant contaminant flow. PM authorized exception.

11/14/11 Drilling 2-1/4-inch ID HSAs to TD of 48 ft. bgs. Hole collapsed to 35 ft bgs, will use 4-1/4-inch ID HSAs at later date.

11/17/11 4-1/4-inch augers to 45'bgs.

Sampler Signature: **Stephen Brand/Kenji Butler** Date: **11/11/11**

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	BORING NUMBER VEP4-SB18(MW10)	SHEET 1 OF 3

SOIL BORING LOG

PROJECT : PI-4 Supplemental Expanded Site Inspection LOCATION : Fmr VNTR, Vieques, PR DATE: 11/15/11

WEATHER: Clear, sunny high 80's. DRILLING CONTRACTOR : Pedro Panzardi and Associates

Drilling method and Eqp used: B61HDX Mobile Drill w/2-1/4"ID 5-1/4" OD and 6" head HSAs.

WATER LEVELS : START : 12/01/11:0850 END : 12/2/11:0900 LOGGER : S. Brand

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: MW-10 DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm):	Breathing Zone	Above Hole
0	0-2	1.2		2-3-4-7	0-1.2 Sandy Silt OL 7.5 YR 3/1 very dark gray, moist, soft, loots of roots, organic matter, more organic matter in upper 0.3 ft	0 split spoon	0 BZ	
2	2-4	1.4		10-13-12-13	2-2.4 Same as above	0 split spoon	0 BZ	
4	4-6	1.0		4-6-6-5	2.4-3.4 Silty Sand SM 5YR4/4 reddish brown, moist, medium dense, fine sand trace medium and coarse and gravel, some silt, subangular, poorly sorted. 4-4.3 Same as above	0 split spoon	0 BZ	
6	6-8	1.2		5-7-7-8	4.3-5.0 Sandy Clay CL, 7.5YR4/3 brown, moist, medium stiff, sand is fine grained, some sandier zones. 6-6.5 Same as above	0 split spoon	0 BZ	
8	8-10	1.2		6-8-11-13	6.5-7.2 Silty Sand SM, 7.5YR5/4 Brown, moist loose, fine grained trace medium and couarse gravel, quartz and rock fragment sand, subangular, poorly sorted, few 0.1 ft beds sandy clay	0 split spoon	0 BZ	
10	10-12	1.5		13-12-9-16	8-9.2 Sand, trace silt SW, 10YR6/6 brownish yellow, dry, loose, coarse to fine sand , subangular, poorly sorted quartz and rock fragment sand. 10-11.5 Same as above with 11.1-11.4 Sandy Clay CL, moist.	0 split spoon	0 BZ	
12	12-14	1.3		12-20-25-23	12-13.3 Same as above dry sand trace silt.SW	0 split spoon 0805 VEP4-SB18-1214-1111	0 BZ	
14	14-16	1.1		20-31-35-40	14-15.1 Clay trace sand CL, 7.5YR5/6 strong brown, dry, hard, sand is coarse to fine trace black (carbon?) fragments	0 split spoon	0 BZ	
16	16-18	0.9		17-23-28-52	16-16.9 Same as above, very tight material.	0 split spoon	0 BZ	
18	18-20	1.1		29-33-50/5"	18-19.1 Sandy Silt ML, 7.5YR5/4 brown, hard, dry sand is fine grained, massive, crumbles to powder when crushed	0 split spoon	0 BZ	
20	20-22	1.5		22-31-39-51	20-21.3 Same as above 21.3-21.5 Silty Sand SM, 7.5YR5/4 Brown, hard, dry, sand is fine grained, trace medium and coarse, subrounded, poorly sorted	0 split spoon	0 BZ	
22	22-24	0.8		29-38-40-41	22-22.8 Sandy Silt ML, 7.5YR6/6 reddish yellow, dry very stiff, crumbles to find sand and silt.	0 split spoon	0 BZ	
24	24-26	1.3		18-23-30-44	24-25.3 Same as above	0 split spoon	0 BZ	
26	26-28	0.9		32-50-50/5"	26-26.9 Same as above	0 split spoon	0 BZ	
28	28-30	1.6		7-13-16-22	28-29.6 Sandy Clay CL 7.5YR6/8 reddish yellow, moist, stiff, massive	0 split spoon	0 BZ	
30	30-32	1.4			Continued on next page	0 split spoon	0 BZ	

Sampler Signature: Stephen Brand/Kenji Butler Date: 11/15/11

Trace<5%, Little 6-15%, Few 16-30%, Some 31-49%

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	BORING NUMBER VEP4-SB18	SHEET 2 OF 3

SOIL BORING LOG

PROJECT : PI-4 Supplemental Expanded Site Inspection LOCATION : Fmr VNTR, Vieques, PR DATE: 11/15/11

WEATHER: Partly cloudy, mid to high 80's. DRILLING CONTRACTOR : Pedro Panzardi and Associates

Drilling method and Eqp used: B61HDX Mobile Drill w/2-1/4"ID 5-1/4" OD and 6" head HSAs, 6.25" air hammer, External IR 750 compressor.

WATER LEVELS : START : 12/01/11:0850 END : 12/2/11:0900 LOGGER : S. Brand/VBO

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
30	30-32	1.4			30-30.9 Silty Sand SM 7.5YR5/6 strong brown, saturated, fine to medium grained sand, subangular, poorly sorted. 30.9-31.4 Crushed mafic rock and silty sand. Mafic rock pieces originally bigger than core barrel, crushed into angular pieces rock 5Y4/2 olive gray with iron stained fractures, silty sand as above.	0 split spoon 0 BZ Stop split spoons at water table. Continuing to auger with 2-1/2-inch HSAs to 43 ft bgs. Discussed with PM, and he (John Swenfurth) agreed that it was not necessary to split spoon below the water table. Reamed 4-1/4-inch HSAs with nylon plug to 42 ft. TD at 43 ft bgs.
35						
40						
45						
50						
55						
60						

Sampler Signature: Stephen Brand/Kenji Butler Date: 11/15/11

Trace<5%, Little 6-15%, Few 16-30%, Some 31-49%

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	BORING NUMBER VEP4-SB-18	SHEET 3 OF 3

SOIL BORING LOG

PROJECT : LOCATION : Vieques, PR DATE: 11/15/11

NOTES

SOP(s) used (refer to SOP Log)?

Were all requirements of the SAP, PIs and above mentioned SOP(s) met?

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

John Swenfurth, PM authorized not continuing with split spoons below water table.

Sampler Signature: **Kenji Butler/Stephen Brand** Date: **11/15/11**

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	BORING NUMBER VEP4-SB19(MW09)	SHEET 1 OF 3

SOIL BORING LOG

PROJECT : PI-4 Supplemental Expanded Site Inspection LOCATION : Fmr VNTR, Vieques, PR DATE: 11/07/11

WEATHER: Cloudy, high 80's to low 90's. DRILLING CONTRACTOR : Pedro Panzardi and Associates

Drilling method and Eqp used: B61HDX Mobile Drill w/2-1/4"ID 5-1/4" OD and 6" head HSAs, 6.25" air hammer, External IR 750 compressor.

WATER LEVELS : START : 12/01/11:0850 END : 12/2/11:0900 LOGGER : K Butler/VBO

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: MW-09 DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
0	0-2	1.3		3-5-9-9	0-0.8 Fat Clay with Sand (CH) 10YR3/3 dark brown, moist, medium stiffness, high plasticity, 20% sand 75%clay, roots, medium grained sand.	0-2 core 0.0 BZ-0.0 AH-0.1
2	2-4	1.1		6-9-8-9	0.8-3.5 Sandy Fat Clay (CH) 10YR2/2 very dark brown from 0.8-2 ft, and 10YR3/4 dark yellow8ish brown from 2-3.5, moist medium stiffness, high plasticity, cohesive, 35%sand, 60%clay, 5% rooots, meedium grained sand.	2-4 core 0.0 BZ-0.0 AH-0.0
4	4-6	1.3		4-6-7-8	3.5-4.1 Fat clay w/Sand (CH)10YR3/4 dark yellowish brown, moist, medium stiffness, high plasticity, cohesive, 20% sand 78 percent clay, some root fragments, medium sand grains	4-6 core 0.0 BZ-0.0 AH-0.1
6	6-8	1.2		9-12-14-17	4.1-6.4 Clayey Sand (SC) 7.5YR4/6 strong brown, moist, medium stiffness, low plasticity, non-cohesive, sand 80%, fines 20%, medium sand.	6-8 core 0.0 BZ-0.0 AH-0.0
8	8-10	1.1		7-20-20-19	6.4-9.5 Same as above but now stiff, semi-litiified, few gravel fragments, medium to coarse sand, some sections with gley 2. 7/5BG light greenish gray	8-10 core 0.0 BZ-0.0 AH-0.1
10	10-12	0.8		16-19-23-37	9.5-15 Well Graded Sand with Clay and Gravel (SW-SC) 10YR 6/4 light yellowish brown, some black mottling, dry very stiff, non plastic, more dense, medium to coarse sand some gravel, semi-litified, few root pieces	10-12 core 0.0 BZ-0.0 AH-0.0
12	12-14	1.3		27-30-35-32	15-17 Well Graded Sand with Clay (SW-SC) 10YR 5/4 yellowish brown, dry, stiff, medium density, low plasticity, noncohesive, medium sand, some black mottling, 80% sand 20 % fines.	12-14 core 0.0 BZ-0.0 AH-0.0
14	14-16	1		26-26-30-31	17-20 Same as above with coarse and medium grained sand, 7.5 YR 6/4 light brown.	14-16 core 0.0 BZ-0.0 AH-0.0
16	16-18	1.5		18-22-36-38		16-18 core 0.0 BZ-0.0 AH-0.0
18	18-20	1.3		36-43-42-42		18-20 core 0.0 n BZ-0.0 AH-0.0
20					Hollow stem auger refusal at 20 ft. bgs. Continue with Air rotary.	
22					20-26 cuttings show same as above.	
24						
26					26-28 Air hammer cuttings show dark mafic rock fragments along with some granodiorite fragments, some quartz pieces as well, fresh coarse grained matirx. Visible micas.	
28					28-29.5 Air hammer cuttings show Fat Clay with gravel (CH)7.5YR 4/6 strong brown, moist, medium density, fine to coarse pieces of sand and some gravel pieces.	
30						

Sampler Signature: Stephen Brand/Kenji Butler Date: 11/07/11

Trace<5%, Little 6-15%, Few 16-30%, Some 31-49%

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	BORING NUMBER VEP4-SB19	SHEET 2 OF 3

SOIL BORING LOG

PROJECT : PI-4 Supplemental Expanded Site Inspection LOCATION : Fmr VNTR, Vieques, PR DATE: 11/07/11

WEATHER: Partly cloudy, mid to high 80's. DRILLING CONTRACTOR : Pedro Panzardi and Associates

Drilling method and Eqp used: B61HDX Mobile Drill w/2-1/4"ID 5-1/4" OD and 6" head HSAs, 6.25" air hammer, External IR 750 compressor.

WATER LEVELS : START : 12/01/11:0850 END : 12/2/11:0900 LOGGER : S. Brand/VBO

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
30					30-40 Cuttings medium to coarse sand of quartz, feldspar, and mafic minerals associated with granite/granodiroite 10YR5/3 brown from clay. Some mafic gravel sized cuttings, do appear along with granite pieces.	30 ft let hole sit for 30 min, had a small amount of water come in.
35						BZ-0.0 AH-0.0
40					TD boring 42 ft bgs.	
45						
50						
55						
60						

Sampler Signature: Stephen Brand/Kenji Butler Date: 11/07/11

Trace<5%, Little 6-15%, Few 16-30%, Some 31-49%

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	BORING NUMBER VEP4-SB-19	SHEET 3 OF 3

SOIL BORING LOG

PROJECT : PI-4 Supplemental Expanded Site Inspection LOCATION : Vieques, PR DATE: 11/7/11

NOTES

SOP(s) used (refer to SOP Log)?

Were all requirements of the SAP, PIs and above mentioned SOP(s) met?

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Soil sample taken at 0800 Samle ID VEP4-SB19-06-07-1111 from 6-7 ft. Equipment blank taken at 0930 VEP4-EB02-110811 with sample ID.

Sampled at 6-7 ft bgs because it was directly above the start of the semi-lithified layer that is to tight/dense to allow contaminated water to pass.

First borehole drilled starting at 1130 on 11/7/2011 was abandoned on 11/9/11 after air hammering it out to ream the walls of the boring. The first borehole was originally augered 2-1/4-inch ID 5-1/4-inch OD augers to 16 ft,with split spoon refusal at 20 ft bgs. Set up the air hammer, and it had compressor problems. Reamed the hole out after repairing compressor, and abandoned borehole.

2nd hole used for split spoons and reamed to set the well. Started second boring 11/8/11 0710, 0923 split spoon refusal. 1325 air hammer for MW-9.

Sampler Signature: **Kenji Butler/Stephen Brand** Date: **11/07/11**

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	BORING NUMBER VEP4-SB20(MW11)	SHEET 1 OF 3

SOIL BORING LOG

PROJECT : PI-4 Supplemental Expanded Site Inspection LOCATION : Fmr VNTR, Vieques, PR DATE: 11/10/11

WEATHER: Partly cloudy DRILLING CONTRACTOR : Pedro Panzardi and Associates

Drilling method and Eqp used: B61HDX Mobile Drill w/2-1/4"ID 5-1/4" OD and 6" head HSAs, 6.25" air hammer, External IR 750 compressor.

WATER LEVELS : START : 12/01/11:0850 END : 12/2/11:0900 LOGGER : S. Brand

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
0	0-2	1.1		3-3-3-5	0-1.1 Sandy Clay (CL) 7.5YR 2.5/2 very dark brown, moist, soft, moderate plasticity, slightly fewer organic debris with depth, massive.	0 ppm core 0-bz
2	2-4	1.3	S-1	6-7-7-8	2-3.3 Sandy Clay (CL) mixed with clayey sand (SC) 7.5YR 4/4/ brown, moist gradational boundaries, medium dense, trace roots	0 ppm core 0-BZ
4	4-6	1.2		4-4-5-6	4-5.2 Sand little silt (SW), 7.5YR 5/6 strong brown, moist, very loose, massive, trace gravel, sand is subangular.	0 ppm core 0-BZ
6	6-8	1.3		6-8-8-10	6-7.3 Sand (SP-SW) 7.5YR6/6 reddish yellow, moist, some beds calyey sand 0.1 ft thick, sand is fine grained to medium grained moderately sorted, quartz and rock fragments, subangular, trace gravel.	0.6 ppm core 0-BZ Sampled 6-8 ft bgs
8	8-10	1.2		11-9-9-11	8-9.2 Silty Sand (SM) 7.5 YR 5/6 strong brown, moist, loose, massive, sand is fine grained, trace medium grained, trace gravel, subangular.	0 ppm core 0-BZ
10	10-12	1.0		5-9-10-12	10-11.0 Sandy Silt (ML) 7.5YR 5/4 brown, moist, stiff, siltier with depth, trace mafic gravel.	0 ppm core 0-BZ
12	12-14	0.9		18-30-50/6"-50/5"	12-12.9 Silt, little sand trace gravel (ML) 7.5YR 4/4 brown, dry, hard, massive, roots.	0 ppm core 0-BZ
14	14-16	1.3		19-21-27-38	14-15.3 Same as above, very stiff.	0 ppm core 0-BZ
16	16-18	1.0		17-37-45-50/5"	16-17.0 Same as above, hard dry.	0 ppm core 0-BZ
18	18-20	1.5		25-36-48-50	18-19.5 Sandy Silt (ML) 7.5YR 4/3 brown with grains of white weathered mineral, does not look like weathered in place, few fine grained mafic subangular gravel pieces scattered throughout, dry. refusal with split spoons.	0 ppm core 0-BZ Refusal with split spoons at 20 ft bgs, but continued with augers very slowly to 30 ft so far. Same material coming up in cuttings. Spoke to John Swenfurth, PM, who agreed with the decision to discontinue attempting split spoons below 20 ft bgs. Material very tight and will continue with augers as deep as possible (until necessary depth reached).
20						
22						
24						
26						
28						
30						

Sampler Signature: Stephen Brand/Kenji Butler Date: 11/10/11

Trace<5%, Little 6-15%, Few 16-30%, Some 31-49%

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	BORING NUMBER VEP4-SB20	SHEET 2 OF 3

SOIL BORING LOG

PROJECT : PI-4 Supplemental Expanded Site Inspection LOCATION : Fmr VNTR, Vieques, PR DATE: 11/10/11

WEATHER: Partly cloudy DRILLING CONTRACTOR : Pedro Panzardi and Associates

Drilling method and Eqp used: B61HDX Mobile Drill w/2-1/4"ID 5-1/4" OD and 6" head HSAs, 6.25" air hammer, External IR 750 compressor.

WATER LEVELS : START : 12/01/11:0850 END : 12/2/11:0900 LOGGER : S. Brand

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
30						
					33 ft bgs Water in cuttings of augers. Possibly hit water slightly shallower, but best informaton available is for water at 33 ft bgs. 2-1/4" augers continue down slowly. Cuttings hot and steaming with friction.	0 PID BZ
35						
40						
45					45 ft bgs terminate boring with augers, still able to drill further down with augers if needed.	0 PID BZ
50						
55						
60						

Sampler Signature: Stephen Brand/Kenji Butler Date: 11/10/11

Trace<5%, Little 6-15%, Few 16-30%, Some 31-49%

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	BORING NUMBER VEP4-SB-20	SHEET 3 OF 3

SOIL BORING LOG

PROJECT : LOCATION : PI-4 SB20 DATE: 11/10/2011

NOTES

SOP(s) used (refer to SOP Log)?

Were all requirements of the SAP, PIs and above mentioned SOP(s) met?

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Sampled 6-8 ft bgs because of PID reading, as per SAP.

11/10/11 1041 Reached 45 ft bgs with 2-1/4-inch ID augers, pulled augers and hole collapsed to 33 ft bgs. Drilled to 50 ft bgs with 2-1/4-in augers.

11/11/2011 Hole collapsed to 40 ft bgs. Moved to other two locations waiting on 4-1/4-inch augers.

11/16/11 Use 4-1/4-inch ID augers to ream hole and set well. Using teflon plug in bottom of augers. First plug fails, have to remove augers. Installed second plug and installed well (MW-11)

Sampler Signature: **Kenji Butler/Stephen Brand** Date: **11/10/11**

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	BORING NUMBER MW-13	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : PI-4 Supplemental Expanded Site Inspection LOCATION : Fmr VNTR, Vieques, PR DATE: 11/30/11

WEATHER: 80's. DRILLING CONTRACTOR : Pedro Panzardi and Associates

Drilling method and Eqp used: B61HDX Mobile Drill w/2-1/4"ID 5-1/4" OD and 6" head HSAs, 6.25" air hammer, External IR 750 compressor.

WATER LEVELS : START : 12/01/11:0850 END : 12/2/11:0900 LOGGER : None

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
0	0-2				Boring log not completed at the direction of PM. Log not necessary. Boring was air hammered, and cuttings provided no information.	
2	2-4		S-1			
4	4-6					
6	6-8					
8	8-10					
10	10-12					
12	12-14					
14	14-16					
16	16-18					
18	18-20					
20	20-22					
22	22-24					
24	24-26					
26	26-28					
28	28-30					
30	30-32					

Sampler Signature: _____ Date: _____

Trace<5%, Little 6-15%, Few 16-30%, Some 31-49%

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	BORING NUMBER MW-14	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : PI-4 Supplemental Expanded Site Inspection LOCATION : Fmr VNTR, Vieques, PR DATE: 12/01/11

WEATHER: 80's. DRILLING CONTRACTOR : Pedro Panzardi and Associates

Drilling method and Eqp used: B61HDX Mobile Drill w/2-1/4"ID 5-1/4" OD and 6" head HSAs, 6.25" air hammer, External IR 750 compressor.

WATER LEVELS : START : 12/01/11:0850 END : 12/2/11:0900 LOGGER : None

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
0	0-2				Boring log not completed at the direction of PM. Log not necessary. Boring was air hammered, and cuttings provided no information.	
2	2-4		S-1			
4	4-6					
6	6-8					
8	8-10					
10	10-12					
12	12-14					
14	14-16					
16	16-18					
18	18-20					
20	20-22					
22	22-24					
24	24-26					
26	26-28					
28	28-30					
30	30-32					

Sampler Signature: _____ Date: _____

Trace<5%, Little 6-15%, Few 16-30%, Some 31-49%

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER B-01	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 07/30/2013

WEATHER: Hot, humid, 80's | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Lewis Lefever

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 4-1/4" Hollow Stem Augers

WATER LEVEL : | START : 7/30/13 8:10 | END : 07/31/2013 10:10 | LOGGER : B. Wachter

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
	0-5	5/5	HSA-1		0-2' bgs SANDY SILT (ML), grayish brown (10YR 5/2), dry, medium stiff 2-27' bgs SAPROLITE, light yellowish brown (10YR 6/4), dry, drilling gets harder	0 0 0 0
5	5-10	5/5	HSA-2			0 0 0 0
10	10-15	5/5	HSA-3			0 0 0 0
15	15-20	5/5	HSA-4			0 0 0 0
20	20-25	5/5	HSA-5			0 0 0 0
25	25-30	5/5	HSA-6		27-30' bgs SANDY CLAYEY SAPROLITE, brown (10YR 5/3), moist, drilling gets easier	Collect VEP4-GP01-2530 12:30 from 25 to 30 feet bgs Using pensil bailer inside temporary 1" PVC screen 0 0
30						TD=30' bgs

Sampler Signature: B. Wachter Date: 07/30/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER B-02	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 07/30/2013

WEATHER: Hot, Humid, Sunny | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Lewis Lefever

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 4-1/4" Hollow Stem Augers

WATER LEVEL : | START : 7/31/13 8:00 | END : 07/31/2013 09:30 | LOGGER : B. Wachter

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
	0-5	5/5	HSA-1		0-3' bgs SANDY SILT (ML), grayish brown (10YR 5/2), dry, medium stiff	0, 0, 0
5					3-22.5' bgs SAPROLITE, light yellowish brown (10YR 6/4), dry, drilling gets harder	0
	5-10	5/5	HSA-2			0, 0, 0
10						0
	10-15	5/5	HSA-3			0, 0, 0
15						0
	15-20	5/5	HSA-4			0, 0, 0
20						0
	20-25	5/5	HSA-5		22.5 - 25' bgs SANDY CLAYEY SAPROLITE, brown (10YR 5/3), moist, drilling gets easier	Collect VEP4-GP02-2529 At 10:15 am from 25-29' bgs using check valve inside screen point drill rods; 0, 0
25						0
						0, 0
30						TD = 29' bgs

Sampler Signature: B. Wachter Date: 07/31/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER B-03	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 08/01/2013

WEATHER: Mostly sunny, H 87°F | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Lewis Lefever

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 4-1/4" Hollow Stem Augers

WATER LEVEL : | START : 08/01/2013 09:25' | END : 08/01/2013 10:25 | LOGGER : B. Wachter

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
	0-5	5/5	HSA-1		0-4' bgs SANDY SILT (ML), grayish brown (10YR 5/2), dry, medium stiff	
5					4-15' bgs SAPROLITE, light yellowish brown (10YR 6/4), dry, drilling gets harder at 4' bgs	
	5-10	5/5	HSA-2			
10						
	10-15	5/5	HSA-3			
15						
	15-20	5/5	HSA-4		15-20' bgs SANDY SILTY CLAY(CL), brown (10YR 5/3), moist, medium stiff, drilling gets easier at 15' bgs	
20						Collect VEP4-GP03-2024 at 10:40 from 20-24' using check valves inside screen point drilling augers
25						
30						

Sampler Signature: B. Wachter Date: 08/01/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER B-04	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 07/31/2013

WEATHER: Mostly sunny, H 87°F | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Lewis Lefever

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 4-1/4" Hollow Stem Augers

WATER LEVEL : | START : 07/31/2013 13:15 | END : 07/31/2013 14:15 | LOGGER : B. Wachter

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
	0-5	5/5	HSA-1		0-2' bgs SANDY SILT (ML), grayish brown (10YR 5/2), dry, medium stiff 2-23' bgs SAPROLITE, light yellowish brown (10YR 6/4), dry, drilling gets harder at 2ft and easer at 21ft bgs	0 0 0 0
5	5-10	5/5	HSA-2			0 0 0 0
10	10-15	5/5	HSA-3			0 0 0 0
15	15-20	5/5	HSA-4			0 0 0 0
20	20-25	5/5	HSA-5		23-25' bgs SANDY CLAYEY SAPROLITE, brown (10YR 5/3), moist	Collect VEP4-GP04-2024 at 14:40 from 20-24' using check valve inside screen point drill rods 0 0
25						
30						

Sampler Signature: B. Wachter Date: 07/31/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER B-05	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 08/01/2013

WEATHER: Mostly sunny, H 87°F | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Lewis Lefever

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 4-1/4" Hollow Stem Augers

WATER LEVEL : | START : 08/01/2013 13:15 | END :'8/1/2013 14:40 | LOGGER : B. Wachter

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
	0-5	5/5	HSA-1		0-5' bgs SANDY SILT (ML), grayish brown (10YR 5/2), dry, medium stiff	
5	5-10	5/5	HSA-2		5-19' bgs SAPROLITE, grayish brown (10YR 5/2), dry drilling gets harder at 5 ft bgs	
10	10-15	5/5	HSA-3			
15	15-20	5/5	HSA-4			
20	20-25	5/5	HSA-5		19-25' bgs SANDY CLAYEY SAPROLITE, brown (10YR 5/3), moist, drilling gets easer	Collect VEP4-GP05-2024 At 14:50 from 20 to 24' bgs using check valve inside screen drill bit
25						
30						

Sampler Signature: B. Wachter Date: 08/01/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER B-06	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 08/07/2013

WEATHER: Hot, humid, sunny | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Lewis Lefever

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 4-1/4" Hollow Stem Augers

WATER LEVEL : | START : 08/07/2013 07:25 | END : 8/7/2013 8:20 | LOGGER : B. Wachter

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
	0-5	5/5	HSA-1		0-0.25' ASPHALT 0.25-25' bgs SILTY CLAY (CL), light yellowish brown (10YR 6/4), dry, medium stiff, trace sand from 15', drilling gets easer at 18', moist to wet at 21' bgs	
5	5-10	5/5	HSA-2			
10	10-15	5/5	HSA-3			
15	15-20	5/5	HSA-4			
20	20-25	5/5	HSA-5			Collect VEP4-GP06-2125 at 08:30 from 21-25' bgs using check valve inside screen point drill bit
25						TD=24' bgs Augers and drill rods decontaminated using pressure
30						

Sampler Signature: B. Wachter Date: 08/07/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER B-07	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 8/7/2013

WEATHER: Mostly sunny, H 87°F | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Lewis Lefever

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 4-1/4" Hollow Stem Augers

WATER LEVEL : | START : 8/7/2013 10:05' | END :8/7/2013 12:00 | LOGGER : B. Wachter

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
	0-5	5/5	HSA-1		0-8' bgs CLAYEY SANDY SILT (ML), light yellowish brown (10YR 5/2), dry, medium stiff	
5						
	5-10	5/5	HSA-2			
10					8-26' bgs SAPROLITE, light yellowish brown (10YR 5/2), dry, drilling gets harder at 8' bgs	
	10-15	5/5	HSA-3			
15						
	15-20	5/5	HSA-4			
20						
	20-25	5/5	HSA-5			
25						
	25-30	5/5	HSA-6		26-30' bgs SANDY CLAYEY SAPROLITE, grayish brown (10YR 5/2), moist, drilling gets easier at 26' bgs	Collect VEP4-GP07-2529 At 12:15 from 25-29' bgs using check valves inside screen point drill rods
30						
						TD-30' bgs

Sampler Signature: B. Wachter Date: 08/07/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER B-08	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 8/9/2013

WEATHER: Mostly sunny, H 87°F | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Lewis Lefever

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 4-1/4" Hollow Stem Augers

WATER LEVEL : | START : 8/9/2013 10:10 | END : 8/9/2013 12:15 | LOGGER : B. Wachter

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
	0-5	5/5	HSA-1		0-1' bgs SAANDY SILT (ML), grayish brown (10YR 5/2) dry, medium stiff 1-16' bgs SAPROLITE, light yellowish brown (10YR 6/4), dry, drilling gets harder at 1' bgs	
5						
	5-10	5/5	HSA-2			
10						
	10-15	5/5	HSA-3			
15						
	15-20	5/5	HSA-4		16-20' bgs SANDY SILTY CLAY (CL), brown (10YR 5/3), moist, medium stiff, drilling gets easer at 16' bgs	
20						
						Collect VEP4-GP08-2024 At 12:30 from 20-24' bgs using check valve inside screen drill rods
25						TD=24' bgs
30						

Sampler Signature: B. Wachter Date: 08/09/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER B-09	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 8/12/2013

WEATHER: Mostly sunny, H 87°F | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Lewis Lefever

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 4-1/4" Hollow Stem Augers

WATER LEVEL : | START : 8/12/2013 12:05' | END : 8/12/2013 13:01 | LOGGER : B. Wachter

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
	0-5	5/5	HSA-1		0-1' bgs SANDY SILT (ML), grayish brown (10YR 5/2), dry, medium stifff 1-16' bgs SILTY CLAYEY SAPPROLITE, brown (10YR 5/3), moist, medium stiff	
5	5-10	5/5	HSA-2			
10	10-15	5/5	HSA-3			
15	15-20	5/5	HSA-4		16-20' bgs SILTY CLAY (CL), brown (10YR 5/3), moist, medium stiff	
20						Collect VEP4-GP09-2024 at 13:20 from 20-24' bgs using check valve inside screen point drill rods
25						TD=24' bgs
30						

Sampler Signature: B. Wachter Date: 08/12/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER B-10	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 8/13/2013

WEATHER: Mostly sunny, H 87°F | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Lewis Lefever

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 4-1/4" Hollow Stem Augers

WATER LEVEL : | START : 08/13/2013 07:10' | END : 8/13/13 08:10 | LOGGER : B. Wachter

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
	0-5	5/5	HSA-1		0-1' bgs SANDY SILT (ML), grayish brown (10YR 5/2), dry, medium stiff 1-15' bgs SILTY CLAYEY SAPPROLITE, grayish brown (10YR 5/3), moist, medium stiff	
5	5-10	5/5	HSA-2			
10	10-15	5/5	HSA-3			
15	15-20	5/5	HSA-4		15-20' bgs SANDY SILTY CLAY (CL), brown (10YR 5/3), moist, medium stiff	
20						Collect VEP4-GP10-2024 At 08:30 from 20 to 24' bgs using check valve inside screen point drill rods
25						TD=24' bgs
30						

Sampler Signature: B. Wachter Date: 08/13/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER B-11	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 8/14/2013

WEATHER: Mostly sunny, H 87°F | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Lewis Lefever

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 4-1/4" Hollow Stem Augers

WATER LEVEL : | START : 8/14/2013 8:40 | END : 8/14/2013 9:40 | LOGGER : B. Wachter

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
	0-5	5/5	HSA-1		0-2' bgs SANDY SILT (ML), grayish brown (10YR 5/2), dry, medium stiff 2-16' bgs SILTY CLAYEY SAPPROLITE, light yellowish brown (10YR 5/3), dry, drilling gets harder at 2' bgs	
5						
	5-10	5/5	HSA-2			
10						
	10-15	5/5	HSA-3			
15						
	15-20	5/5	HSA-4		16-20' bgs SILTY CLAY (CL), brown (10YR 5/3), dry, moist, medium stiff, drilling gets easier at 16' bgs	
20						
						Collect VEP4-GP11-2024 at 10:00 from 20-24' bgs using check valve inside screen point drill rods
25						TD=24' bgs
30						

Sampler Signature: B. Wachter Date: 08/14/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-13D	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/30/13

WEATHER: Mostly sunny, H 87°F | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Lewis Lefever

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 6 5/8" Hollow Stem Augers

WATER LEVEL : 37.50 ft bgs | START : 05/30/13 0705 | END : 05/30/13 1412 | LOGGER : D. Whitaker

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
0	0 - 2	1.60	SS-1	8-27-11-11 (38)	0.0-0.6 ft: Poorly Graded Silty Sand (SM) very dark grayish brown (10YR 3/2), fine sand and silt with little medium to coarse sand, dense, dry, noncohesive	0.0 0720 Collect VEP4-SS16-0001 soil sample for select VOCs, and TOC
	2 - 4	1.00	SS-2	15-17-19-19 (36)	0.6-1.0 ft: Limestone Rock white, fine grained limestone 1.0-1.6 ft: Silt (ML) very dark grayish brown (10YR 3/2) silt with some fine to medium sand, very stiff, dry, noncohesive	0.0
5	4 - 6	2.00	SS-3	7-8-8-9 (16)	1.6-2.0 ft: No Recovery 2.0-6.0 ft: Poorly Graded Sand (SP) brown (7.5YR 4/4) fine sand with trace medium to coarse sand, dense, dry	0.0 0750 Collect VEP4-SB16-0406 soil sample for select VOCs, and TOC
	6 - 8	1.15	SS-4	7-12-12-19 (24)	6.0-8.8 ft: Well Graded Sand (SW) strong brown (7.5YR 4/6) fine to medium sand with trace coarse sand, silt, and clay, medium dense, dry, no to low plasticity and cohesiveness	0.0
10	8 - 10	2.00	SS-5	4-6-12-16 (18)	8.0-10.0 ft: Poorly Graded Sand (SP) brown (7.5YR 4/4) fine sand with trace medium sand and silt, medium dense, dry, noncohesive	0.0
	10 - 12	1.60	SS-6	10-12-12-13 (24)	10.0-13.1 ft: Well Graded Sand (SW) strong brown (7.5YR 5/6) fine to coarse sand, medium dense, trace black magnetite and calcite	0.0
	12 - 14	1.10	SS-7	17-15-14-20 (29)	13.1-14.0 ft: No Recovery	0.0
15	14 - 16	2.00	SS-8	12-14-19-20 (33)	14.0-16.0 ft: Well Graded Sand (SW) strong brown (7.5YR 5/6) fine to coarse sand, dense, trace black magnetite and calcite and silt	0.0
	16 - 18	1.00	SS-9	20-21-29-30 (50)	16.0-19.2 ft: Poorly Graded Sand (SP) strong brown (7.5YR 4/6) fine sand with sand sized magnetite and trace white limestone, very dense, dry, noncohesive	0.0
20	18 - 20	2.00	SS-10	8-10-10-12 (20)	19.2-26.0 ft: Well Graded Sand (SW) light yellowish brown (10YR 6/4) fine to coarse sand with trace fine angular gravel, medium dense, dry, trace sand size green mineral, quartz, and magnetite	0.0
	20 - 22	1.60	SS-11	12-12-10-9 (22)		0.0
24	22 - 24	1.60	SS-12	9-12-11-12 (23)		0.0

Sampler Signature: D. Whitaker Date: 05/21/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-13D	SHEET 2 OF 2

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/30/13

WEATHER: Mostly sunny, H 87°F | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Lewis Lefever

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 6 5/8" Hollow Stem Augers

WATER LEVEL : 37.50 ft bgs | START : 05/30/13 0705 | END : 05/30/13 1412 | LOGGER : D.Whitaker

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
25	24 - 26	1.80	SS-13	18-10-15-12 (25)		0.0
	26 - 28	1.70	SS-14	10-15-15-16 (30)	26.0-28.7 ft: Poorly Graded Sand (SP) dark yellowish brown (10YR 4/6) fine sand with trace silt and clay, dense, dry to moist at 27.3 ft, no to low plasticity and cohesiveness	0.0
	28 - 30	1.70	SS-15	16-13-9-9 (22)	28.7-31.0 ft: Clayey Sand (SC) strong brown (7.5YR 4/6) poorly graded fine sand and clay with trace medium sand and silt, very stiff, moist, low to medium plasticity, trace coarse sand size quartz and magnetite	0.0
30	30 - 32	2.00	SS-16	6-9-12-15 (21)	31.0-32.0 ft: Lean Clay (CL) brown (7.5YR 4/4) clay with silt and trace fine sand, very stiff, dry, medium plasticity, trace mint green druzy and trace black magnetite	0.0
	32 - 34	2.00	SS-17	7-9-14-22 (23)	32.0-33.5 ft: Clayey Sand (SC) reddish brown (5YR 4/4) fine sand and clay, medium dense to dense, dry to saturated at 33 ft bgs, medium plsaticity	0.0
35	34 - 36	2.00	SS-18	7-14-19-21 (33)	33.5-38.0 ft: Silty Sand (SM) yellowish red (5YR 5/6) silty fine sand with trace cly and trace mint green druzy and medium sand, dense, dry to saturated at 37.5 ft bgs, no to low plasticity	0.0
	36 - 38	2.00	SS-19	10-17-21-38 (38)		0.0
40					Split-spooning complete @ 38 ft bgs	Lithology viewed while augering to total depth of 79 ft bgs: Silty Sand to Sandy Silt (SM to ML) variable moist to saturated layers with trace clay throughout
45						
48						

Sampler Signature: D. Whitaker Date: 05/21/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-15	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/21/13

WEATHER: Warm, clear, 80°F | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Kevin White

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 6 5/8" Hollow Stem Augers

WATER LEVELS : 38.00 ft bgs | START : 05/21/13 1447 | END : 05/23/13 1505 | LOGGER : S. Brand

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
0					First few feet clean, dry sand	
						0.0
5						
						0.0
10						
						0.0
15						
						0.0
20					19.0 ft: Silt, dry	
						24 ft: stop on 05/21/13- start on 05/22/13
25					29.0 ft: Dry	0.0

Sampler Signature: S. Brand Date: 05/21/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-15	SHEET 2 OF 2

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 5/22/13

WEATHER: Warm, clear, 80°F | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Kevin White

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 6 5/8" Hollow Stem Augers

WATER LEVELS : 38.00 ft bgs | START : 05/21/13 1447 | END : 05/23/13 1505 | LOGGER : S. Brand

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
25						
						0.0
30						
						0.0
35						
						0.0
40					39 ft: Dry cuttings but water in the hole, water level at 38 ft bgs	
					44 ft: Hit bedrock at 44' bgs, switch to hammer drilling	0.0
45						
					49 ft: granodiorite, gold mica, solid rock 44-49 ft, water flowing out of well at ~ 5-10 gpm	
50					Total Depth = 50.0 ft bgs	Reach total depth on 05/23/13

Sampler Signature: S. Brand Date: 05/21/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-16	SHEET 1 OF 3

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/15/13

WEATHER: Warm, Clear 80° | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Lewis Lefever

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 6 5/8" Hollow Stem Augers

WATER LEVEL : 44.00 ft bgs | START : 05/15/13 0656 | END : 05/15/13 1552 | LOGGER : S. Brand

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
0						0.0
					0.0-19.0 ft: Silty Sand (SM) unconsolidated, dry, moderately easy drilling with 6-5/8" augers from top down to 19 ft	
5						0.0
10						0.0
15						0.0
					19.0-24.0 ft: hard drilling	
20						0.0
25						0.0

Sampler Signature: S. Brand Date: 05/15/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-16	SHEET 2 OF 3

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/15/13

WEATHER: Warm, Clear 80° | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Lewis Lefever

DRILLING METHOD AND EQUIPMENT USED : Diedrich D-SO W/6-5/8 HAS

WATER LEVELS : 44.00 ft bgs | START : 05/15/13 0656 | END : 05/15/13 1552 | LOGGER : S. Brand

DEPTH BELOW SURFACE (FT)	RECOVERY (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
25						
					29.0 ft: soil still hard, dry	
30						0.0
					31.0 ft: moist soil	
						0.0
35						
					39.0 ft: dry soil	0.0
40						
					44 ft: Soft saturated mud	0.0
45						
						0.0
					49.0 ft: soil cuttings drier but still soft moist mud	
50						

Sampler Signature: S. Brand Date: 05/15/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-16	SHEET 3 OF 3

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/15/13

WEATHER: Warm, Clear 80 degrees | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Lewis Lefever

DRILLING METHOD AND EQUIPMENT USED : Diedrich D-SO W/6-5/8 HAS

WATER LEVEL : 44.00 ft bgs | START : 05/15/13 0656 | END : 05/15/13 1552 | LOGGER : S. Brand

DEPTH BELOW SURFACE (FT)	RECOVERY (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
50					52.0 ft: saturated soil	
					Total Depth = 54.0 ft bgs	
55						
60						
65						
70						
75						

Sampler Signature: S. Brand Date: 05/15/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-17	SHEET 1 OF 3

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/28/13

WEATHER: 80° F, Partly Cloudy, chance of thrunderstorms | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Lewis Lefever and Todd Muench

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 6 5/8" Hollow Stem Augers

WATER LEVEL : 41.00 ft bgs | START : 05/28/13 1210 | END : 05/29/13 0932 | LOGGER : S. Brand

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
0					0.0-13.0 ft: Fine grained soil, dry	
5						0.0
10						0.0
					13.0 ft: two small pieces of perforated steel plate came up with the soil cuttings	
15						0.0
20						0.0
					20.0 ft: hit hard soil switch to air hammer, then soil gets soft almost immediately	
25						

Sampler Signature: S. Brand Date: 05/15/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-17	SHEET 2 OF 3

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/28/13

WEATHER: 80° F, Partly Cloudy, chance of thrunderstorms | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Lewis Lefever and Todd Muench

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 6 5/8" Hollow Stem Augers

WATER LEVEL : 41.00 ft bgs | START : 05/28/13 1210 | END : 05/29/13 0932 | LOGGER : S. Brand

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
25						
30					31.0 ft: Stopped drilling for 15 minutes - no water	0.0
35					36.0 ft: Stopped drilling for 15 minutes - no water	0.0
40					41.0 ft: Stopped drilling for 20 minutes, saturated - about 2-3 gallons of water in the hole	0.0
45					47.0 ft: hit bedrock	0.0
50						

Sampler Signature: S. Brand Date: 05/15/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-17	SHEET 3 OF 3

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/29/13

WEATHER: 80° F, Partly Cloudy, chance of thrunderstorms | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Lewis Lefever and Todd Muench

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 6 5/8" Hollow Stem Augers

WATER LEVEL : 41.00 ft bgs | START : 05/28/13 1210 | END : 05/29/13 0932 | LOGGER : S. Brand

DEPTH BELOW SURFACE (FT)	RECOVERY (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
50						Air pushing out water at ~ 5 gal/min
					Total Depth = 53.0 ft bgs	
55						
60						
65						
70						
75						

Sampler Signature: S. Brand Date: 05/15/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-17D	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 06/05/13

WEATHER: Partly Cloudy, breezy, humid, H 87°F | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Lewis Lefever

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 6 5/8" Hollow Stem Augers

WATER LEVEL : 36.00 ft bgs | START : 06/05/13 0700 | END : 06/05/13 1315 | LOGGER : D. Whitaker

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
0	0 - 2	2.00	SS-1	3-5-16-10 (21)	0.0-0.8 ft: Sandy Silt (ML) very dark grayish brown (10YR 3/2) silt and fine sand with clay, medium dense, dry, medium plasticity and cohesiveness	0.0 0705 Collect VEP4-SS17-0001 soil sample for select VOCs, and TOC
	2 - 4	0.90	SS-2	10-15-19-23 (34)	0.8-2.9 ft: Sandy Silt (ML) dark brown (10YR 3/3) fine to coarse silt and sand, very stiff, dry, noncohesive, semi-cemented 2.9-4.0 ft: No Recovery	0710 Collect VEP4-SS17P-0001 soil sample for select VOCs
5	4 - 6	1.00	SS-3	4-8-10-10 (18)	4.0-8.0 ft: Silty Sand to Sandy Silt (SM - ML) strong brown (7.5YR 5/6) well graded fine to medium sand and silt with trace clay, medium dense/very stiff, dry, no to low plasticity and cohesiveness	0.0 0725 Collect VEP4-SB17-0406 soil sample with MS/MSD for select VOCs and TOC
	6 - 8	0.80	SS-4	7-10-12-20 (22)		0.0
10	8 - 10	2.00	SS-5	10-12-14-19 (26)	8.0-11.0 ft: Sandy Silt (ML) brown (7.5YR 5/4) fine to medium sand and silt with little magnetite and trace green mineral and organics, dry, noncohesive	0.0
	10 - 12	1.00	SS-6	5-5-10-12 (15)	11.0-12.0 ft: No Recovery	0.0
	12 - 14	1.20	SS-7	12-14-16-24 (30)	12.0-13.2 ft: Sandy Silt (ML) reddish brown (2.5YR 4/4) silt and fine to medium sand with trace clay, very stiff, dry, cohesive, no to low plasticity, trace black magnetite 13.2-14.0 ft: No Recovery	0.0
15	14 - 16	1.30	SS-8	3-6-9-14 (15)	14.0-17.2 ft: Sandy Silt (ML) brown (7.5YR 4/4) silt and fine to medium sand with trace clay, stiff, dry, cohesive, no to low plasticity, trace black magnetite and white gravel; 16-17.2 ft: high mineral content with quartz, magnetite, and green minerals	0.0
	16 - 18	1.20	SS-9	17-18-18-20 (36)	17.2-18.0 ft: No Recovery	0.0
20	18 - 20	1.10	SS-10	10-15-15-18 (30)	18.0-21.2 ft: Silty Sand to Sandy Silt (SM to ML) strong brown (7.5YR 4/4) fine to coarse sand and quartz, magnetite and green minerals, dense/very stiff, dry, noncohesive	0.0
	20 - 22	1.50	SS-11	10-12-14-10 (26)	21.2-21.5 ft: Well Graded Sand with Silt (SW-SM) yellowish brown (10YR 5/6) fine to medium sand with silt, medium dense, trace coarse sand, dry, noncohesive	0.0
24	22 - 24	1.80	SS-12	10-14-18-18 (32)	21.5-22.0 ft: No Recovery	0.0

Sampler Signature: D. Whitaker Date: 05/21/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-17D	SHEET 2 OF 2

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 06/05/13

WEATHER: Partly Cloudy, breezy, humid, H 87°F | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Lewis Lefever

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 6 5/8" Hollow Stem Augers

WATER LEVEL : 36.00 ft bgs | START : 06/05/13 0700 | END : 06/05/13 1315 | LOGGER : D. Whitaker

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
25	24 - 26	1.70	SS-13	10-13-12-14 (25)	22-25.7 ft: Well Graded Sand (SW) brownish yellow (10YR 6/6) fine to coarse sand with trace silt and trace green fine gravel, dense to medium dense, dry	0.0
	26 - 28	2.00	SS-14	12-29-30-30 (59)	25.7--26.0 ft: No Recovery 26.0-29.3 ft: Silty Sand (SM) brown (7.5YR 4/4) poorly graded fine sand with siltand trace clay and medium to coarse sand, very dense, dry, cohesive, no to low plasticity	0.0
	28 - 30	1.70	SS-15	16-8-9-9 (17)	29.3-29.7 ft: Sand with Silt (SP-SM) dark yellowish brown (10YR 6/6) fine sand with silt, medium dense, drym noncohesive	0.0
30	30 - 32	1.00	SS-16	8-10-10-11 (20)	29.7-30.0 ft: No Recovery 30.0-35.0 ft: Silt with Sand (ML) dark brown (10YR 3/3) silt with fine sand, very stiff, dry, cohesive	0.0
	32 - 34	1.00	SS-17	15-20-15-15 (35)		0.0
35	34 - 36	2.00	SS-18	12-8-9-11 (17)	34.0-35.0 ft: No Recovery 35.0-36.0 ft: Sand with Silt (SP-SM) dark yellowish brown (10YR 4/6) fine sand with silt and clay, medium dense, moist, no to low cohesiveness and plasticity	0.0
	36 - 38	2.00	SS-19	12-19-16-14 (35)	36.0-38.0 ft: Poorly Graded Sand (SP) strong brown (7.5YR 5/8) fine sand with trace silt and clay, dense, saturated, noncohesive	0.0
40					Split-spooning complete @ 38 ft bgs	Hit Limestone Rock at 45 ft bgs. Total drilling depth = 88 ft bgs. Water flowing from formation from 45-88 ft bgs at rate of ~ 1-2 gal/min
45						
48						

Sampler Signature: D. Whitaker Date: 05/21/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-18	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/17/13

WEATHER: Warm, Clear, 80s | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Kevin White

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 6 5/8" Hollow Stem Augers

WATER LEVEL : ~35.00 ft bgs | START : 05/17/13 0945 | END : 05/20/13 1500 | LOGGER : S. Brand

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
0					0.0-10.0 ft: soft unconsolidated dry soil	0.0
5						
						0.0
10					10.0-12.0: Soil harder then soft again at around 15 ft	
15						
						0.0
20					20.0 ft: very hard drilling	
						0.0
25					24.0 ft: very hard drilling, dry	

Sampler Signature: S. Brand Date: 05/17/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-18	SHEET 2 OF 2

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/17/13

WEATHER: Warm, Clear, 80s | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Kevin White

DRILLING METHOD AND EQUIPMENT USED : Diedrich D-SO W/6-5/8 HAS

WATER LEVEL : ~35.00 ft bgs | START : 05/17/13 0945 | END : 05/20/13 1500 | LOGGER : S. Brand

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
25					26.0-27.0 ft: moist soil cuttings	
						0.0
30					29.0 ft: pushed soil plug out of augers- no water	
					32.5 ft: moist soil cuttings	
						0.0
35					34.0 ft: push soil plug out of augers to check for water, waited 23 minutes- dry	
						0.0
40					39.0 ft: push soil plug out of augers to check for water, ~10 ft of water in hole. Let sit overnight and check water level = 27.30 ft bgs. Believe that water table is at ~35.00 ft bgs.	
						0.0
45					46.0 ft: Total depth of original hole, used air hammer to clean out hole and overdrilled to 49.0 ft	
50					Total Depth = 49 ft bgs	

Sampler Signature: S. Brand Date: 05/20/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-19	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/14/13

WEATHER: Hot, sunny, 80s | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Kevin White

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 6 5/8" Hollow Stem Augers

WATER LEVEL : 29.00 ft bgs | START : 05/13/13 1520 | END : 05/14/13 0952 | LOGGER : S. Brand

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
0					0.0-13.0 ft: Sand and silt, unconsolidated, dry, dense, slow drilling	0.0
5						0.0
10						0.0
					13.0 ft: Slightly easier drilling	
15						0.0
					16.0 ft: Hard drilling	
					19.0 ft: Hard drilling, very slow drilling	
20						0.0
25						

Sampler Signature: S. Brand Date: 05/17/19

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-19	SHEET 2 OF 2

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/14/13

WEATHER: Hot, sunny, 80s | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Kevin White

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 6 5/8" Hollow Stem Augers

WATER LEVEL : 29.00 ft bgs | START : 05/13/13 1520 | END : 05/14/13 0952 | LOGGER : S. Brand

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
25						
					29.0 ft: Softer, moist to saturated soil	0.0
30						
					34.0 ft: saturated soil	
35						
40						
					Total Depth = 41.0 ft bgs	
45						
50						

Sampler Signature: S. Brand Date: 05/17/19

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-20	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 06/10/13

WEATHER: Mostly Sunny, 90 ° F | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Todd Muench

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 4 1/4" Hollow Stem Augers

WATER LEVEL : 38.00 ft bgs | START : 06/10/13 0910 | END : 06/10/13 1226 | LOGGER : D.Whitaker

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
0					0.0-2.0 ft: Silt (ML) very dark brown (10YR 2/2), silt with trace fine sand and clay, medium plasticity, cohesive, moist, trace organics	0.0
					2.0-5.0 ft: Silty Sand (SM) dark yellowish brown (10YR 4/4), fine sand and silt, trace clay, dry, trace cohesion, low plasticity	
5					5.0-38.0 ft: Well Graded Sand with Silt (SW-SM) dark brown (10YR 2/2), fine to coarse sand with silt and fine subrounded gravel, dry, noncohesive	
10						0928 @ 10 ft bgs 0.0
15						0950 @ 15 ft bgs - Using hammer to push through subsurface from 15-20 ft bgs, hard drilling
20						1000 @ 20 ft bgs 0.0
25						1010 @ 25 ft bgs

Sampler Signature: D. Whitaker Date: 06/10/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-20	SHEET 2 OF 2

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 06/10/13

WEATHER: Mostly Sunny, 90 ° F | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Todd Muench

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 4 1/4" Hollow Stem Augers

WATER LEVEL : 38.00 ft bgs | START : 06/10/13 0910 | END : 06/10/13 1226 | LOGGER : D.Whitaker

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
25						
30						1022 @ 30 ft bgs At 30 ft- pull soil plug from auger to see if there is water in the hole- dry
35						1102 @ 35' bgs- put rod and bit down hole to check for water let sit for ~15-20 minutes- dry 1122 Moist at 34 ft bgs, not saturated will continue to auger to see moist soil and until get saturated (not moist) conditions
					38.0 ft: Saturated soil, will overdrill to 51 ft bgs	
40						
45						
50						

Sampler Signature: D. Whitaker Date: 06/10/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-20	SHEET 3 OF 3

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 06/10/13

WEATHER: Mostly Sunny, 90 ° F | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Todd Muench

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 4 1/4" Hollow Stem Augers

WATER LEVEL : 38.00 ft bgs | START : 06/10/13 0910 | END : 06/10/13 1226 | LOGGER : D.Whitaker

DEPTH BELOW SURFACE (FT)	RECOVERY (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
50						
					Total Depth = 51.0 ft bgs	
55						
60						
65						
70						
75						

Sampler Signature: D. Whitaker Date: 06/10/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-21	SHEET 1 OF 3

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 06/20/13

WEATHER: Mostly Cloudy ~86° F, humid | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Todd Muench

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 4 1/4" Hollow Stem Augers

WATER LEVEL : ~50.00 ft bgs | START : 06/20/13 1515 | END : 06/21/13 0900 | LOGGER : D. Whitaker

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
0					0.0-5.0 ft: Silt (ML) very dark grayish brown (10YR 3/2) silt with organics, moist, cohesive to noncohesive	0.0
5					5.0-20.0 ft: Sandy Silt (ML) brown (7.5 YR 4/4) silt with fine to medium sand (well graded), dry, cohesive	1535 @ 5 ft bgs 0.0
10						1541 @ 10 ft bgs 0.0
15						1552 @ 15 ft bgs 0.0
20					20.0-38.0 ft: Silt (ML) brown (10YR 5/3) silt with cobble size green mineral, dry, noncohesive; 20-21 ft hard drilling	1605 @ 20 ft bgs 0.0
25						0.0 1612 @ 25 ft bgs 06-20-13

Sampler Signature: D. Whitaker Date: 06/20/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-21	SHEET 2 OF 3

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 06/20/13

WEATHER: Mostly Cloudy ~86° F, humid | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Todd Muench

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 4 1/4" Hollow Stem Augers

WATER LEVEL : ~50.00 ft bgs | START : 06/20/13 1515 | END : 06/21/13 0900 | LOGGER : D. Whitaker

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
25						Begiin drilling on 06/21/13
30						0.0
35						0.0
					38.0-60.5 ft: Siltstone/Clayey Silt (ML) brown (10YR 4/3), dense, clayey silt interbedded with siltstone, dry to saturated at 50 ft bgs	
40						0.0
45						0.0
50						0.0

Sampler Signature: D. Whitaker Date: 06/21/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-21	SHEET 3 OF 3

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 06/20/13

WEATHER: Mostly Cloudy ~86° F, humid | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Todd Muench

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 4 1/4" Hollow Stem Augers

WATER LEVELS : ~50.00 ft bgs | START : 06/20/13 1515 | END : 06/21/13 0900 | LOGGER : D. Whitaker

DEPTH BELOW SURFACE (FT)	RECOVERY (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
50						
55						0.0
60						0.0
					Total Depth = 60.5 ft bgs	
65						
70						
75						

Sampler Signature: D. Whitaker Date: 06/21/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-22	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 06/18/13

WEATHER: Overcast, humid, little rain, ~85° F | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Todd Muench

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 4 1/4" Hollow Stem Augers

WATER LEVEL : 28.00 ft bgs | START : 06/18/13 0630 | END : 06/18/13 0815 | LOGGER : D. Whitaker

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
0					0.0-4.0 ft: Silt (ML) very dark grayish brown (10YR 3/2), silt with fine sand and trace clay, cohesive, low plasticity to non-cohesive/ non plastic, dry	0.0
5					4.0-8.0 ft: Poorly Graded Sand (SP) dark yellowish brown (10YR 4/4) fine sand with trace silt and clay, cohesive to noncohesive, nonplastic, dry gravel to cobbles	0.0
10					8.0-15.0 ft: Silty Sand (SM) dark yellowish brown (10YR 4/4) poorly graded silty fine sand, cohesive to noncohesive, non-plastic, dry	0.0
15					15.0-25.0 ft: Well Graded Sand with Silt (SM) dark yellowish brown (10YR 4/4) mostly fine with medium to coarse sand with silt, non cohesive, dry	0.0
20						0.0
25						0.0 0725 @ 25 ft bgs

Sampler Signature: D. Whitaker Date: 06/18/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-22	SHEET 2 OF 2

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 06/18/13

WEATHER: Overcast, humid, little rain, ~85° F | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Todd Muench

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 4 1/4" Hollow Stem Augers

WATER LEVEL : 28.00 ft bgs | START : 06/18/13 0630 | END : 06/18/13 0815 | LOGGER : D. Whitaker

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
25					25.0-30.0 ft: Well Graded Sand with Silt (SM) dark yellowish brown (10YR 4/4) mostly fine with medium to coarse sand with silt, trace clay, non cohesive and nonplastic, dry to saturated at 28.0 ft	
30					30.0-40.0 ft: Silt (ML) dark yellowish brown (10YR 4/4) clayey silt with fine sand, cohesive, medium plasticity, saturated	0.0 0735 @ 30 ft bgs
35						
40						
					Total Depth = 40.0 ft bgs	
45						
50						

Sampler Signature: D. Whitaker Date: 06/18/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-23	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 06/19/13

WEATHER: Mostly sunny, high 90° F | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Todd Muench

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 4 1/4" Hollow Stem Augers

WATER LEVEL : ~ 28.00 ft bgs | START : 06/19/13 0630 | END : 06/19/13 0750 | LOGGER : D. Whitaker

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
0					0.0-12.0 ft: Well Graded Sand with Silt (SW-SM) dark brown (10YR 3/3) well graded fine to medium sand with silt and trace clay, moist, noncohesive, nonplastic with trace medium plasticity	0.0
5						0.0
10						0.0
					12.0-22.0 ft: Well Graded Sand with Silt (SW-SM) yellowish brown (10YR 5/6) well graded fine to medium sand with silt and trace clay, moist, noncohesive, nonplastic with trace medium plasticity	
15						0.0 0656 at 15 ft bgs
20						0.0
					22.0-32.0 ft: Well Graded Clayey Sand (SC) yellowish brown (10YR 5/6) fine to medium sand and clay with silt, trace coarse sand, moist to saturated at 28 ft, cohesive, medium plasticity	
25						0715 @ 25 ft bgs

Sampler Signature: D. Whitaker Date: 06/19/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-23	SHEET 2 OF 2

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 06/19/13

WEATHER: Mostly sunny, high 90° F | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Todd Muench

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 4 1/4" Hollow Stem Augers

WATER LEVEL : ~ 28.00 ft bgs | START : 06/19/13 0630 | END : 06/19/13 0750 | LOGGER : D. Whitaker

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
25						0.0
30						0.0 0725 @ 30 ft bgs
					32.0-40.0 ft: Clayey Sand to Sandy Lean Clay (SC/CL) dark grayish brown (10YR 4/2) lean clay and fine sand, trace medium sand and silt, moist to saturated depending on clay content, medium plasticity	
35						0.0
40						0.0
					Total Depth = 40.0 ft bgs	
45						
50						

Sampler Signature: D. Whitaker Date: 06/19/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-24	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 06/20/13

WEATHER: Overcast ~81° F | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Todd Muench

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 4 1/4" Hollow Stem Augers

WATER LEVEL : 32.00 ft bgs | START : 06/20/13 0640 | END : 06/20/13 0940 | LOGGER : D. Whitaker

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
0					0.0-2.0 ft: Silt (ML) very dark grayish brown (10YR 3/2) silt with fine sand, dry, noncohesive, little organics	0.0
					2.0-6.0 ft: Silt with Sand (ML) dark yellowish brown (10YR 4/6) silt with some very pale brown (10YR 7/4) fine sand, moist, non cohesive	
5						0.0
					6.0-20.0 ft: Silt (ML) dark yellowish brown (10YR 4/4) silt with <15% fine sand, partially cemented, moist, noncohesive	
10						0.0
15						0.0
20					20.0-30.0 ft: Poorly Graded Sand with Silt (SP-SM) brown (10YR 5/3) fine sand with silt, dry, noncohesive	0.0
25						0.0

Sampler Signature: D. Whitaker 06/20/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-24	SHEET 2 OF 2

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 06/20/13

WEATHER: Overcast ~81° F | DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Todd Muench

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 4 1/4" Hollow Stem Augers

WATER LEVEL : 32.00 ft bgs | START : 06/20/13 0640 | END : 06/20/13 0940 | LOGGER : D. Whitaker

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
25						
30					30.0-46.0 ft: Poorly Graded Sand with Silt (SP-SM) brown (10YR 4/3), fine sand with silt and trace clay, moist to saturated at 32 ft, cohesive, nonplastic to low plasticity	0.0 Clay/Silt at 32', not sure how good will produce water in this zone, so set the well screen where more saturated 35-45 ft, will overdrill to 46 ft bgs
35						0.0
40						0.0
45						0.0
					Total Depth = 46.0 ft bgs	
50						

Sampler Signature: D. Whitaker Date: 06/20/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-24D	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation — LOCATION : Vieques, Puerto Rico — 8/19/2014

WEATHER: 85° F, partly sunny, NE 11mph — DRILLING CONTRACTOR : Parratt-Wolff Inc.; C. Lefever, V. Wilson

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 6 5/8" Hollow Stem Augers

WATER LEVEL : — START : 08/19/14 1037 — END : 08/28/14 1326 — LOGGER : T. Stewart

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm):	Breathing Zone	Above Hole
0					0-8' silt with sand and clay (ML), reddish-brow (2.5 yr 4/4), dry, non-low plastic, dense, fine to medium grain, trace coarse sands	0-5'	0.0	0.0
5							5' @ 1116	
					8-21' sand with silt (SM), yellowish brown (10 yr 5/6), dry, medium density, low plastic, medium grain	5-10'	0.0	0.0
10							10' @ 1133	
						10-15'	0.0	0.0
15							15 @ 1148	
						15-20'	0.0	0.0
20							20' @ 1159	Drillers Lunch
					21-33' silty sand (SM), brown, 10 yr 5/3), dry, loose, non-plastic, coarse, poorly graded	21-25'	0.0	0.0
25							25' @ 1400	

Sampler Signature: T. Stewart — 08/19/14

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-24D	SHEET 2 OF 2

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation — LOCATION : Vieques, Puerto Rico — 8/19/2014

WEATHER: 85° F, partly sunny, NE 11mph — DRILLING CONTRACTOR : Parratt-Wolff Inc.; C. Lefever, V. Wilson

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 6 5/8" Hollow Stem Augers

WATER LEVEL : — START : 08/19/14 1037 — END : 08/28/14 1326 — LOGGER : T. Stewart

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
25						25-30' 0.0 0.0
						DR: hard drilling again @28 bgs (soft 21-28' bgs)
30						30' @ 1413
						30-35' 0.0 0.0
					33' silty sand (SM), grayish brown to dark grayish brown, (10 yr 5-4/2), moist, medium density, non-low plastic, fine, fine-medium grain, trace coarse sands/minerals	Moist @ 32.5-33 DR: hard drilling @ 33'
35						38' @ 1426 prep for air rotary
						70 @ 35 bgs with augers on 8/19/14 Tuesday; will resume with air rotary on 8/20/14
40						
45					21-33' silty sand (SM), brown, 10 yr 5/3), dry, loose, non-plastic, coarse, poorly graded	
50						

Sampler Signature: T. Stewart — 08/19/14

CH2MHILL	PROJECT NUMBER	BORING NUMBER	
	433193.FI.FK.20	MW-25	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation — LOCATION : Vieques, Puerto Rico — DATE: 08/27/2013

WEATHER: Hot, Clear, 90°F — DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 6 5/8" Hollow Stem Augers

WATER LEVEL: — START : 0645 08/27/2013 — END : 0759 08/27/2013 — LOGGER : S. Brand

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
					Auger cuttings log	
					0-19' dry hard cuttings	
					19' softer, cuttings coming up wet	5
					19 - 31' saturated cuttings	10 0.0 ppm
					TD 31' bgs	15
						20 0.0 ppm
						25 0.0 ppm
						30 0.0 ppm

Sampler Signature: Stephen Brand Date: 08/27/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-25D	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation — LOCATION : Vieques, Puerto Rico — 8/15/2014

WEATHER: 85° F, overcast — DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 6 5/8" Hollow Stem Augers

WATER LEVEL : — START : 08/15/14 0900 — END: 08/26/14 1535 — LOGGER : R. Fields

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
0				HSA Cuttings	0-5' silt (ML), 2.5 yr 4/6 (red), dry, cohesive, non-plastic, loose silt, drill cuttings from Hollow Stem Auger	Breathing Zone (BZ) = 0.0 ppm 0-5' drill cuttings = 0.0 ppm
5					5-19' silt with sand (ML), 7.5 yr 4/4 (brown), dry, cohesive, non-plastic, medium silt with very fine to fine graned sand drill cuttings from Hollow Stem Auger	BZ = 0.0 ppm 5-10' drill cuttings = 0.0 ppm
10						BZ = 0.0 ppm @ 1045 10-15' drill cuttings = 0.0 ppm
15						BZ = 0.0 ppm @ 1100 15-20' drill cuttings = 0.0 ppm
20					19-40' lean clay with sand (CL), 7.5 yr 3/4 (dark brown), dry, cohesive, medium plasticity, medium, stiff, lean clay with fine to medium grained sand Drill cuttings from Hollow Stem Auger	BZ = 0.0 ppm @ 1115 20-25' drill cuttings = 0.0 ppm at 23' bgs, driller said it got soft
25						

Sampler Signature: R. Fields — 08/15/14

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	BORING NUMBER MW-25D	SHEET 2 OF 2

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | 8/15/2014

WEATHER: 85° F, overcast | DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 6 5/8" Hollow Stem Augers

WATER LEVEL : | START : 08/15/14 0900 | END: 08/26/14 1535 | LOGGER : R. Fields

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
25				HSA Cuttings	Logged by Hollow Stem Auger drill cutttings	Breathing Zone (BZ) = 0.0 ppm @ 1125 25-30' drill cuttings = 0.0 ppm
30						BZ = 0.0 ppm @ 0825 30-35' drill cuttings = 0.0 ppm T. Stewart logging 8/18/14 Monday a.m.
35					SAA except, very stiff to hard, some white laminations, up to 20% poorly graded rock/minerals, gravel, med-high plasticity	BZ = 0.0 ppm @ 0855 35-40' drill cuttings = 0.0 ppm wet returns @ 35-36' advancement, 5-ft auger connections are very tight and may be casing off water to interior of hollow stem auger tools
40					Logged from air blown cuttings 46-48' rock fragments, dust, light green and gray (gray 1 8/104), dry	Switch to air rotary stsyem with diverter and tub BZ = 0.0 ppm at 1023 air cuttings 40-45' = 0.0 ppm
45					48' wet rock fragments, med-sized, greenish gray (gray 1 6/104-564) Set 4" PVC casing @ 48' bgs	DR: color change @ 46-48' bgs, loss of moisture, dusty returns DR: 48' wet rock returns Reach 50' @ 1040
50						4 PVC isolation casing installed 48' bgs, cemented in place on 8/18/14 1545

Sampler Signature: R. Fields 08/15/14

CH2MHILL	PROJECT NUMBER	BORING NUMBER	
	433193.FI.FK.20	MW-26	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 8/26/13

WEATHER: 87°F | DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 6 5/8" Hollow Stem Augers

WATER LEVEL : | START : 0828 8/26/2013 | END : 1015 8/26/13 | LOGGER : S. Brand

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
					0-19' dry cuttings, hard drilling	
					19' Softer drilling, cuttings moist then wet	
					TD Hole 31' bgs	
5						
10						
15						0.0 ppm
20						0.0 ppm
25						0.0 ppm
30						0.0 ppm

Sampler Signature: Stephen Brand Date: 08/26/13

CH2MHILL	PROJECT NUMBER	BORING NUMBER	
	433193.FI.FK.20	MW-27	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 08/27/2013

WEATHER: 87°F | DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 6 5/8" Hollow Stem Augers

WATER LEVEL : | START : 1319 08/27/2013 | END : 1501 8/27/13 | LOGGER : S. Brand

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
					0-14' Dry cuttings	
					14-18' moist cuttings	
					18-19' wet cuttings, may have wet materal definitely in it at 19' bgs	
					TD 31' bgs	
					Water rises to `7' bgs	

Sampler Signature: Stephen Brand Date: 08/27/13

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CH2MHILL	PROJECT NUMBER	BORING NUMBER	
	433193.FI.FK.20	MW-28	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation — LOCATION : Vieques, Puerto Rico — DATE: 8/29/13

WEATHER: Hot, 90°F — DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 6 5/8" Hollow Stem Augers

WATER LEVEL : — START : 0710 08/29/13 — END : 1045 0/829/13 — LOGGER : S. Brand

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
					0-15' Dry cuttings	
					15' Hit water	

Sampler Signature: Stephen Brand Date: 08/29/13

CH2MHILL	PROJECT NUMBER	BORING NUMBER	
	433193.FI.FK.20	MW-28D	SHEET 1 OF 3

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation — LOCATION : Vieques, Puerto Rico — DATE: 8/21/14

WEATHER: Sun & clouds, showers, 87°F — DRILLING CONTRACTOR : Parratt-Wolff Inc./ C. Lefever, V. Wilson

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O, 6 5/8" ID Hollow Stem Augers

WATER LEVEL : — START : 0730 08/21/14 — END : 08/25/2014 — LOGGER : T. Stewart

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
0	0-5'	Hollow Stem Auger	Hollow Stem Auger	Lithology logged from Hollow Stem Auger cuttings	0-5' silt with sand (ML), red, (10R 5/6), dry, low plasticity, very fine to fine sands, med. Density	0-5': 0.0 / 0.0
					5-15' clay with silt & sand (CL), brown (7.5YR 4/4), dry-moist, low plasticity, stiff, f-med sands	5-10': 0.0 / 0.0
5	5-10'		Hollow Stem Auger			
						10' @ 0818
10	10-15'		Hollow Stem Auger			10-15: 0.0 / 0.0
						DR: soft @ 14' BGS, likely water
15	15-20'		Hollow Stem Auger		15-25' clayey sand/clay with sand (SC/CL) brown (7.5YR 4/2-3), moist, high plasticity, stiff, f-med grain sands	15' @ 0829 15-20': 0.0 / 0.0
20	20-25'		Hollow Stem Auger		mud returns from 25-35' BGS	20' @ 0850 Transfer IDW 20-25': 0.0 / 0.0 25' @ 0922

Sampler Signature: T. Stewart — Date: 08/25/14

CH2MHILL	PROJECT NUMBER	BORING NUMBER	SHEET 2 OF 3
	433193.FI.FK.20	MW-28D	

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 8/21/14

WEATHER: Sun & clouds, showers, 87°F | DRILLING CONTRACTOR : Parratt-Wolff Inc./ C. Lefever, V. Wilson

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O, 6 5/8" ID Hollow Stem Augers

WATER LEVEL : | START : 0730 08/21/14 | END : 08/25/2014 | LOGGER : T. Stewart

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
25	25-30'	Hollow Stem Auger			Logged from air rotary clippings	25-30': 0.0 — 0.0
30		Air rotary				30' @ 0935 30-35': 0.0 — 0.0 DR: potential non-soil/rock material from 34-35' BGS
35						35' @ 0956 (switch to air rotary drilling) 1052 resume drilling w/air rotary tooling, new bit, tricone roller bit 35-38': 0.0 — 0.0 Dry returns 36.5-38' BGS 1117 @ 38' (stroke adjusted)
					42-43' coarse, angular rock fragments	38-43': 0.0 — 0.0
40						1141 @ 43' BGS w/drill bit
					Switch to air hammer on 8/22/14 0830	1145 driller lunch 1217 clear tub before final clean-out of boreho 1510 4-pvc isolation casing grouted in place to 48 feet bgs.
45					>5 gal minute water purge rate Isolation casing set @ 48' BGS	0830 8/22/14 resume drilling w/air hammer 5' length numa patriot 35A
50						

Sampler Signature: T. Stewart Date: 08/25/14

CH2MHILL	PROJECT NUMBER	BORING NUMBER	
	433193.FI.FK.20	MW-28D	SHEET 3 OF 3

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 8/21/14

WEATHER: Sun & clouds, showers, 87°F | DRILLING CONTRACTOR : Parratt-Wolff Inc./ C. Lefever, V. Wilson

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O, 6 5/8" ID Hollow Stem Augers

WATER LEVEL : | START : 0730 08/21/14 | END : 08/25/2014 | LOGGER : T. Stewart

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
50					48-70' coarse angular rock fragments	Note: 200-225 gal water 0933 @ 50' bgs 8/22/14
	50-55'	Air hammer				8/25/14 resume drilling to target depth of ≈68 BGS, air rotary drilling 0800 @ ≈53' BGS Borehole generating ≈ 120 gals every 5'
55						BZ = 0.0 ppm Borehole - 0.0 ppm
	55-60'					
60						
	60-65'					0925 down to ≈ 60' BGS BZ = 0.0 ppm Borehole = 0.0 ppm
65						
						0950 down to ≈ 65' BGS Borehole still making about 120 gal per 5' of drilling. BZ = 0.0 ppm
						1040 down to ≈ 68 ft BGS BZ = 0.0 ppm Borehole = 0.0 ppm
70					TD = 70' BGS	14-55 gal drums of water generated
75						

Sampler Signature: T. Stewart Date: 08/25/14

CH2MHILL	PROJECT NUMBER	BORING NUMBER	
	433193.FI.FK.20	MW-29	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE:08/28/2013

WEATHER: Hot, clear 90°F | DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 6 5/8" Hollow Stem Augers

WATER LEVEL : | START : 0935 08/28/2013 | END : 1140 8/28/13 | LOGGER : S. Brand

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
					0-13' bgs dry cuttings	
					13' Softened cuttings balling up, but no sign on bit	
					18' Water in hole	
					TD 28' bgs	

Sampler Signature: Stephen Brand Date: 08/28/13

EN0316151045VBO

CH2MHILL	PROJECT NUMBER	BORING NUMBER	
	433193.FI.FK.20	MW-30	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 08/29/2013

WEATHER: | DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 6 5/8" Hollow Stem Augers

WATER LEVEL : | START : 1315 08/29/2013 | END : 0710 8/30/2013 | LOGGER : S. Brand

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
					0-18.5 ' bgs Dry cuttings	
					Hot water between 18.5 and 19' bgs	
					TD 31' bgs	

Sampler Signature: Stephen Brand Date: 08/30/13

EN0316151045VBO

CH2MHILL	PROJECT NUMBER	BORING NUMBER	
	433193.FI.FK.20	MW-31	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Remedial Investigation of VNTR Vieques | LOCATION : SWMU-20 | DATE: 08/29/2014

WEATHER: Overcast 85°F | DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 4 1/2 ID (6 5/8" OD) Hollow Stem Auger

WATER LEVEL : | START : 0930 08/29/2014 | END : 1300 09/02/2014 | LOGGER : R. Fields

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
	0- 5'	HSA Drill Cuttings			0 - 8' (SW-SM), well graded, sand with silt, 10 yr 7/2 (light gray), dry, non-cohesive, non plastic, fine to medium grained sand with same silt.	BZ = 0.0 ppm Borehole = 0.0 ppm
5					8' - 17' Lean clay (CL), 10 yr 4/6 (dark yellowish brown). Cohesive, medium plasticity, with trace sand. 17' - 25' encountered boulders. 25' - 30' Tight formation cobbles, moist. Take borehole to 31' BGS.	BZ = 0.0 ppm Borehole = 0.0 ppm
	5 - 10'					
10						BZ = 0.0 ppm Borehole = 0.0 ppm
	10 - 15'					DTW 4.64' BGS 09/02/2014
15		Hollow Stem Auger Cuttings!				BZ = 0.0 ppm Borehole = 0.0 ppm
	15 - 20'					
20						BZ = 0.0 ppm Borehole = 0.0ppm
	20 - 25'					
25						

Sampler Signature: R. Fields Date: 09/02/14

CH2MHILL	PROJECT NUMBER	BORING NUMBER	
	433193.FI.FK.20	MW-31	SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Remedial Investigation of VNTR Vieques — LOCATION : SWMU-20 — 8/29/2014

WEATHER: Overcast 85°F — DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 4 1/2 ID (6 5/8" OD) Hollow Stem Auger

WATER LEVEL : — START : 0930 09/02/2014 — END : 1300 09/02/2014 — LOGGER : R. Fields

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
25	25 - 30"	HSA Cuttings!			Stop Drilling 08/29/2014 Resume drilling 09/02/2014	BZ = 0.0 ppm Borehole = 0.0 ppm
30					TD = 31' BGS	BZ = 0.0 ppm Borehole = 0.0 ppm
35						
40						
45						
50						

Sampler Signature: R. Fields 09/02/14

CH2MHILL	PROJECT NUMBER	BORING NUMBER	
	433193.FI.FK.20	MW-32	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : Remedial Investigation of VNTR Vieques — LOCATION : SWMU-20 — 9/10/2004

WEATHER: Sunny/Hot ~ 89° — DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-5O with 4 1/4" ID Hollow Stem Auger (6 5/8" OD)

WATER LEVEL : — START : 1425 — END: 1500 — LOGGER : R. Fields

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
0					0-3 silt with sand (ML) and fine shell hash, 10 yr 4/2 (dark grayish brown), moist, cohesive, med. plasticity soft, silt with fine to medium grained sand and little shell hash.	0.0 / 0.0 HSA Cuttings = 0.0 ppm
	0 - 5'	HSA Drilling - Cuttings			HSA Cuttings!	
					3 - 13' fat clay with sand (CH), 2.5Y5/4 (light olive brown), very moist, cohesive, high plasticity, very soft, clay with very fine to fine sand.	
5						BZ = 0.0 ppm Borehole = 0.0 ppm HSA Cuttings = 0.0 ppm
	5 - 10'					
10						BZ = 0.0 ppm Borehole = 0.0 ppm HSA Cuttings = 0.0 ppm
	10 - 15'					
		HSA Drilling - Cuttings			~13 - 25 fat clay with sand 2.5Y5/4 (light olive brown), less moist, cohesive, high plasticity, soft, clay with very fine to fine sand.	
15						BZ = 0.0 ppm Borehole = 0.0 ppm HSA Cuttings = 0.0 ppm
20	20 - 25'					BZ = 0.0 ppm Borehole = 0.0 ppm HSA Cuttings = 0.0 ppm
25					TD = 25'	Stop @ 25 let set for water overnight

Sampler Signature: R. Fields — Date: 09/10/14

CH2MHILL	PROJECT NUMBER	BORING NUMBER	
	433193.FI.FK.20	MW-33	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : Remedial Investigation of VNTR Vieques — LOCATION : SWMU-20 — 9/9/2014

WEATHER: Sunny/Partly Cloudy 88°F — DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50/HSA 4 1/4" ID (6 5/8" OD)

WATER LEVEL : — START : 1445 9-9-2014 — END: 1640 9-9-2014 — LOGGER : R. Fields

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
0					0 - 5.5' Fat clay with sand (CH), 10 yr 4/2 (dark grayish brown), moist, cohesive, high plasticity, soft	0.0 / 0.0
	0 - 5'	HSA Drilling - Cuttings			HSA Drill cuttings!	
5	5 - 10'	HSA Drilling - Cuttings			5.5 - 15' well graded sand with silt (SW), 10 yr 4/3 (brown), wet, non-cohesive, non plastic, loose, medium to fine grained sand with silt.	BZ = 0.0 ppm Borehole = 0.0 ppm Cutting = 0.0 ppm
10	10 - 15'	HSA Drilling - Cuttings				BZ = 0.0 ppm Borehole = 0.0 ppm Cuttings = 0.0 ppm
15					TD = 15'	
20						
25						

Sampler Signature: R. Fields — Date: 09/09/14

EN0316151045VBO

CH2MHILL	PROJECT NUMBER	BORING NUMBER	
	433193.00	SS/SB-21	SHEET 1 OF 3

SOIL BORING LOG

PROJECT : Remedial Investigation of VNTR Vieques — LOCATION : SWMU-20 — 9/17/2014

WEATHER: Sunny ~ 85°F — DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 w/HSA 4 1/4" ID with 2 ' x 2" HSA Splitspoon/140 lb Hammer

WATER LEVEL : — START : 0650 9-17-2014 — END: 1530 9-17-2014 — LOGGER : R. Fields

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
0	0 - 2'	18"	SS1	8-14-14-12	0 -0.3' Silt (ML) 10 yr 3/3 (dark brown), moist, cohesive, non plastic, medium silt, organic debris roots.	0700 Collect Samples VEP4-SS21-0001 + FD Splitspoon = 0.0 ppm BZ = 0.0 ppm
	2 - 4'	18"	SS2	18-10-10-14	0.3 - 0.6' Silt with sand (ML) 10 yr 7/4 (very pale brown), dry, very stiff, non cohesive non plastic, silt with very fine to fine grained sand.	Splitspoon = 0.0 ppm (SS) Breathing Zone = 0.0 ppm (BZ) Borehole = 0.0 ppm (BH)
	4 - 6'	23"	SS3	5-10-13-11	0.6 - 4' Silty sand (SM) 10 yr 3/2 (very drak grayish brown) dry, non cohesive, non plastic medium dense very fine to fine grained sand with silt weathered minerals.	0725 Collect Sample VEP4-SB21-0406 SS = 0.0 ppm, BZ = 0.0 ppm
6	6 - 8'	21"	SS4	15-20-22-14	4' - 4.7' Silt with sand (ML) 10 yr 6/3 (pale brown), dry non cohesive, non plastic, stiff, silt with fine to medium grained sand.	6 - 8 SS = 0.0 ppm BZ = 0.0 ppm
	8 - 10'	18"	SS5	14-21-21-21	4.7' - 6.8' Silt with sand (ML) 10 yr 4/4 (dark yellowish brown) dry, non cohesive, non plastic stiff, silt with very fine grained sand.	8 - 10 SS = 0.0 ppm BZ = 0.0 ppm
	10 - 12'	14"	SS6	9-9-13-13	6.8' - 8' Silty sand (SM) 7.5 yr 5/6 (strong brown), dry non cohesive, non plastic, medium dense, fine to medium grained sand with some silt.	10 - 12' SS = 0.0 ppm BZ = 0.0 ppm
12	12 - 14'	22"	SS7	11-11-13-14	8' - 8.4' Silt (ML) 10 yr 8/3 (very pale brown), dry non cohesive, non plastic, very stiff silt.	12' - 14' SS = 0.0 ppm BZ = 0.0 ppm
	14 - 16'	24"	SS8	12-13-20-24	8.4' - 10.3' Silty sand (SM) 10 yr 5/8 (yellowish brown), dry non cohesive, non plastic, medium dense, fine to medium grained sand with silt, evidence of insitu weathering of minerals.	14 - 16' SS = 0.0 ppm BZ = 0.0 ppm
	16 - 18'	18"	SS9	25-27-27-26	10.3' - 16' Silt (ML) 7.5 yr 5/6 (strong brown), dry non cohesive, non plastic, stiff silt, trace weathered minterals	16 - 18' SS = 0.0 ppm BZ = 0.0 ppm
18	18 - 20'	24"	SS10	15-18-17-20	16' - 22' Silty sand (SM) 7.5 yr 4/6 (strong brown), dry non cohesive, non plastic, medium dense, very fine to fine grained sand, with silt and some weathered minerals/crystals. Minerals larger in size 1 - 2 mm in size.	18 - 20' SS = 0.0 ppm BZ = 0.0 ppm
	20 - 22'	24"	SS11	29-18-17-30	22'-22.6' Silt with Sand and Gravel (ML) 7.5yr4/4 (brown), dry, non cohesive, non plastic, very stiff, silt with fine to medium sand, with small to large subangular to subrounded gravel.	20 - 22' SS = 0.0 ppm BZ = 0.0 ppm
24	22 - 24'	19"	SS12	33-35-27-25	22.6' - 28.4' Silty sand (SM) 7.5 yr 4/6 (strong brown), dry, non cohesive, non plastic, dense, very fine to fine grained sand with silt. Weathered minerals coarsening downward, more abundant.	22 - 24' SS = 0.0 ppm BZ = 0.0 ppm

Sampler Signature: R. Fields — Date: 09/17/14

PROJECT NUMBER	BORING NUMBER	
433193.00	SS/SB-21	SHEET 2 OF 3

SOIL BORING LOG

PROJECT : Remedial Investigation of VNTR Vieques — LOCATION : SWMU-20 — 9/17/2014

WEATHER: Sunny ~ 87°F — DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 RIC w/HSA 4 1/4" ID with 2 ' x 2" HSA Splitspoon/140 lb Hammer

WATER LEVEL : — START : 0650 — END: 1530 — LOGGER : R. Fields

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
24						
	24 - 26'	16"	SS13	15-17-50/4		24 - 26 SS = 0.0 ppm BZ = 0.0 ppm BH = 0.0 ppm
	26 - 28'	17"	SS14	16-15-50/5		26 - 28' SS = 0.0 ppm BZ = 0.0 ppm
	28 - 30'	5"	SS15	50/5"	28.4' - 30' No Recovery	28 - 30' SS = 0.0 ppm BZ = 0.0 ppm
30						
	30 - 32'	20"	SS16	13-9-14-15	30' - 30.2' Large subangular gravel, 7.5 yr 5/1 (gray)	30 - 32' SS = 0.0 ppm BZ = 0.0 ppm
	32 - 34'	18"	SS17	25-19-16-23	30.2' - 40' Weathered Rock 10 yr 6/4 (light yellowish brown) saprolytic weathering. Large crystals in tact.	32 - 34' SS = 0.0 ppm BZ = 0.0 ppm
	34 - 36'	24"	SS18	19-18-30-39		34 - 36' SS = 0.0 ppm BZ = 0.0 ppm
36						
	36 - 38'	19"	SS19	9-16-37-50/4		36 - 38' SS = 0.0 ppm BZ = 0.0 ppm
	38 - 40'	20"	SS20	11-13-29-36		38 - 40' SS = 0.0 ppm BZ 0.0 ppm
	40 - 42'	24"	SS21	10-14-20-24	40' - 49.5 Continuous saprolytic weathering, minterals becoming less defined. Same as above.	40 - 42' SS = 0.0 ppm BZ = 0.0 ppm
42						
	42 - 44'	24"	SS22	10-16-25-31	Note color change downward 10 yr 7/1 (light gray)	42 - 44' SS = 0.0 ppm BZ = 0.0 ppm
	44 - 46'	24"	SS23	12-18-13-28		44 - 46' SS = 0.0 ppm BZ = 0.0 ppm
	46 - 48'	24"	SS24	12-45-48-50/5		46 - 48 SS = 0.0 ppm BZ = 0.0 ppm
48						

Sampler Signature: R. Fields — Date: 09/17/14

CH2MHILL	PROJECT NUMBER	BORING NUMBER	
	433193.00	SS/SB-21	SHEET 3 OF 3

SOIL BORING LOG

PROJECT : Remedial Investigation of VNTR Vieques — LOCATION : SWMU-20 — 9/17/2014

WEATHER: Sunny hot = 90°F — DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 RIC w/HSA 4 1/4" ID with 2 ' x 2" HSA Splitspoon/140 lb Hammer

WATER LEVEL : START : 0650 END: 1530 LOGGER : R. Fields

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
48	48 - 50'	24" RF	SS25	81-75-49-50/3		48 - 50' SS = 0.0 ppm BZ = 0.0 ppm
	50 - 52'	24"	SS26	19-30-23-40	49.5' - 52' Saprolite, weathering. The same as above, however more competent than above.	50 - 52' SS = 0.0 ppm BZ = 0.0 ppm
	52 - 54'	NR	SS27	25-50/5 NR	52' - 54' Attempted down to ~ 53' BGS - Refusal No Recovery	NR
54					TD = 53' BGS	TD = 53'
			TD = 53' BGS			
60						
66						
72						

Sampler Signature: R. Fields Date: 09/17/14

CH2MHILL.	PROJECT NUMBER 433193	BORING NUMBER SS/SB-22	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Remedial Investigation of VNTR Vieques — LOCATION : SWMU-20 — 9/16/2014

WEATHER: Sunny 89°F — DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 w/HSA 4 1/4" ID with 2 ' x 2" HSA Splitspoon/140 lb Hammer

WATER LEVEL : — START : 0700 — END: 1435 — LOGGER : R. Fields

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
0	0 - 2'	23"	SS1	7-11-11-9	0 - 0.4' silt with gravel (ML) 10 yr 3/3 (dark brown), dry non cohesive, non plastic, stiff, silt with small sub-rounded gravel	0715 Collect Sample VEP4-SS22-0001 + MS/MSD SS = 0.0 ppm, BZ 0.0 ppm
	2 - 4'	22"	SS2	8-5-5-4	0.4 - 1.2' silt with sand (ML) 10 yr 3/4 (dark yellowish brown); dry non cohesive, non plastic, stiff silt with fine to medium grained sand.	2 - 4 SS = 0.0 ppm BZ = 0.0 ppm BH = 0.0 ppm
	4 - 6'	23"	SS3	3-5-9-2	1.2 - 2.4' silty sand (SM) 10 yr 4/4 (dark yellowish brown) non-cohesive, dry, non plastic loose, medium to coarse grained sand with silt	0800 Collect Sample VEP4-SB22-0406 SS = 0.0 ppm, BZ 0.0 ppm, BH = 0.0 ppm
6	6 - 8'	22"	SS4	8-9-12-12	2.4 - 5.5' silty sand (SM) 7.5 yr 3/4 (dark brown), dry cohesive, non plastic, loose fine to medium grained sand with silt	6 - 8 SS = 0.0 ppm BZ = 0.0 ppm BH = 0.0 ppm
	8 - 10'	23"	SS5	4-7-8-10	5.5 - 7.8' silt with sand (ML) 7.5 yr 4/6 (strong brown), dry non cohesive, non plastic, stiff, silt with very fine to fine grained sand. Mottled with 7.5 yr 7/3 (pink) silt.	8 - 10 SS = 0.0 ppm BZ = 0.0 ppm BH = 0.0 ppm
	10 - 12'	24"	SS6	7-8-8-8	7.8' - 10.4' silty sand (SM) 7.5 yr 3/3 (dark brown), moist cohesive, non plastic, loose fine to medium grained sand with silt	10 - 12' SS = 0.0 ppm BZ = 0.0 ppm BH = 0.0 ppm
12	12 - 14'	22"	SS7	8-10-13-10	10.4' - 12.8' silty sand (SM) 7.5 yr 4/6 (strong brown), moist cohesive, non plastic, loose fine to medium grained sand with salt. Mottled with silt 7.5 yr 6/1 (gray). Also roots.	12' - 14' SS = 0.0 ppm BZ = 0.0 ppm
	14 - 16'	17"	SS8	6-8-9-8	12.8' - 14' silty sand (SM) 7.5 yr 5/4 (brown), dry, cohesive, non plastic, loose medium to coarse grained sand with silt, saprolytic weathering evident	14 - 16' SS = 0.0 ppm BZ = 0.0 ppm
	16 - 18'	24"	SS9	7-6-6-5	14' - 14.5' silt (ML) 7.5 yr 3/4 (dark brown), dry cohesive, non plastic, medium stiff, silt	16 - 18' SS = 0.0 ppm BZ = 0.0 ppm
18	18 - 20'	24"	SS10	8-9-9-9	14.5' - 18.0' silty sand (SM) 7.5 yr 5/4 (brown), dry cohesive, non plastic, loose medium to coarse grained sand with silt, saprolytic weathering crystals weathering in place one large subangular stone	18 - 20' SS = 0.0 ppm BZ = 0.0 ppm
	20 - 22'	23"	SS11	7-11-13-14	18.0 - 18.5' silt with sand (SM) 7.5 yr 2.5/2 (very dark brown) moist, cohesive, non plastic medium, silt with very fine to fine grained sand.	20 - 22' SS = 0.0 ppm BZ = 0.0 ppm
24	22 - 24'	22"	SS12	15-21-22-19	18.5' - 19.8' silty sand (SM) 7.5 yr 5/4 (brown), dry, cohesive, non plastic, loose medium to coarse grained sand with silt, saprolytic weathering.	22 - 24' SS = 0.0 ppm BZ = 0.0 ppm

Sampler Signature: R. Fields — Date: 09/16/14

CH2MHILL.	PROJECT NUMBER	BORING NUMBER	
	433193.00	SS/SB-22	SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Remedial Investigation of VNTR Vieques — LOCATION : SWMU-20 — 9/16/2014

WEATHER: Sunny 89°F — DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 w/HSA 4 1/4" ID with 2 ' x 2" HSA Splitspoon/140 lb Hammer

WATER LEVEL : — START : 0700 — END: 1435 — LOGGER : R. Fields

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
24	24 - 26'	24"	SS13	7-9-12-15	19.8; - 21.2; silt with gravel (ML) 7.5 yr 5/6 (strong brown), moist, cohesive, non plastic, medium silt with small subangular to angular gravel.	24 - 26 SS = 0.0 ppm BZ = 0.0 ppm
	26 - 28'	24"	SS14	14-19-15-17	21.2' - 22' silt with sand (ML) 10 yr 4/6 (dark yellowish brown) moist cohesive, non plastic medium silt with very fine to fine sand. Weathered minerals present.	26 - 28' SS = 0.0 ppm BZ = 0.0 ppm
	28 - 30'	24"	SS15	10-14-15-18	22' - 24' silt with sand (ML) 7.5 yr 4/6 (strong brown), moist cohesive, non plastic, stiff to very stiff, silt with very fine to fine grained sand.	28 - 30' SS = 0.0 ppm BZ = 0.0 ppm BH = 0.0 ppm
30	30 - 32'	24"	SS16	5-9-10-14	24' - 24.5' silt with sand (ML) 7.5 yr 3/2 (dark brown), moist cohesive, non plastic, medium stiff, silt with very fine to fine grained sand, trace large subangular gravel	30 - 32' SS = 0.0 ppm BZ = 0.0 ppm
	32 - 34'	24"	SS17	7-14-14-18	24.5' - 26.8 silt (ML) 7.5 yr 4/6 (strong brown), moist cohesive, non plastic, medium stiff, silt.	32 - 34' SS = 0.0 ppm BZ = 0.0 ppm
	34 - 36'	24"	SS18	21-22-44-37	26.8' - 35.1 silt (ML) 5 yr 4/4 (reddish brown), moist cohesive, low plasticity, stiff, silt with trace weathered crystals	*Note tooling got stuck inside augers, used = 15 gal water to try and free what was hung. Not successful had to trip out tools.
36	36 - 38'	5"	SS19	50/5	35.1' - 38' saprolytic rock-weathered bedrock diorite?	TD = 38' BGS Refusal with HSA & SS
		TD = 38' BGS			Refusal @ 38' BGS TD = 38' BGS	
		Refusal w/HSA and SS				
42						
48						

Sampler Signature: R. Fields — Date: 09/16/14

CH2MHILL.

PROJECT NUMBER	BORING NUMBER	
433193	SS/SB-23	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Remedial Investigation of VNTR Vieques — LOCATION : SWMU-20 — 9/15/2014

WEATHER: Sunny/Partly Cloudy 87°F — DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 RIC w/HSA 4 1/4" ID with 2 ' x 2" HSA Splitspoon/140 lb Hammer

WATER LEVEL : — START : 0840 — END: 1300 — LOGGER : R. Fields

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
0	0 - 2'	22"	SS	2-4-10-13	0 - 1.7' silt with sand (ML) 7.5 yr 3/3 (dark brown), dry; non-cohesive, non plastic soft to medium, silt with very fine to fine grained sand.	0.0 ppm split spoon BZ = 0.0 ppm B.H. = 0.0 ppm 0900 collect sample VEP4 - SS23-0001
	2 - 4'	16"	SS	23-17-15-17	1.7 - 4.7 silt with sand (ML) 7.5 yr 4/3 (brown), dry, non cohesive, non plastic, medium to stiff, silt with fine to medium grained sand sapolitic structured	2 - 4 SS = 0.0 ppm BZ = 0.0 ppm BH = 0.0 ppm
	4 - 6'	24"	SS	5-8-11-13	4.7' - 6.6' silty sand (SM) 7.5 yr 4/3 (brown), dry non cohesive, non plastic, medium dense, very fine to fine grained sand with silt.	0915 collect sample VEP4 - SB23-0406 4 - 6 SS = 0.0 ppm BZ = 0.0 ppm BH = 0.0 ppm
6	6 - 8'	24"	SS	18-14-15-14	6.6' - 8' silt with sand (ML) 7.5 yr 5/4 (brown), dry, non cohesive, non plastic, medium dense, silt with very fine to fine grounded sand - saprolytic structure.	6 - 8 SS = 0.0 ppm BZ = 0.0 ppm BH = 0.0 ppm
	8 - 10'	19"	SS	5-10-13-15	8 - 9' same as above with more pronounced saprolytic structure	8 - 10 SS = 0.0 ppm BZ = 0.0 ppm BH = 0.0 ppm
	10 - 12'	22"	SS	6-9-10-11	9' - 12' silt with sand (ML) 7.5YR4/4 (brown), dry non cohesive, non plastic medium to stiff, silt with very fine to fine sand. Less saprolytic.	10 - 12' SS = 0.0 ppm BZ = 0.0 ppm BH = 0.0 ppm
12	12 - 14'	23"	SS	8-17-13-14	12 - 18' silt (ML) 10YR5/4 (yellowish brown), dry, non cohesive, non plastic, stiff, silt	12' - 14' SS = 0.0 ppm BZ = 0.0 ppm BH = 0.0 ppm
	14 - 16'	20"	SS	13-17-11-9		14 - 16' SS = 0.0 ppm BZ = 0.0 ppm BH = 0.0 ppm
	16 - 18'	19"	SS	9-11-11-14		16 - 18' SS = 0.0 ppm BZ = 0.0 ppm BH = 0.0 ppm
18	18 - 20'	23"	SS	8-22-15-21	18.2 - 21.2' silt with sand (ML) 10 yr 4/4 (dark yellowish brown) dry, non cohesive, non plastic very stiff, silt with fine to medium grained sand, evidence saprolytic weathering	18 - 20' SS = 0.0 ppm BZ = 0.0 ppm BH = 0.0 ppm
	20 - 22'	22"	SS	5-11-11-10	21.2' - 22' silty sand (SM) 10 yr 4/6 (dark yellowish brown) dry, non cohesive, non plastic, medium dense, sand - fine to medium grained with silt.	20 - 22' SS = 0.0 ppm BZ = 0.0 ppm BH = 0.0 ppm
24	22 - 24'	22"	SS	10-12-10-12	22' - 24.6' silt (ML) 7.5 yr 4/6 (strong brown), dry cohesive, non plastic, stiff silt.	22 - 24' SS = 0.0 ppm BZ = 0.0 ppm BH = 0.0 ppm

Sampler Signature: R. Fields — Date: 09/09/14

CH2MHILL.	PROJECT NUMBER 433193	BORING NUMBER SS/SB-23	SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Remedial Investigation of VNTR Vieques — LOCATION : SWMU-20 — 9/15/2014

WEATHER: Sunny/Partly Cloudy 87°F — DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 RIC w/HSA 4 1/4" ID with 2 ' x 2" HSA Splitspoon/140 lb Hammer

WATER LEVEL : — START : 0840 — END: 1300 — LOGGER : R. Fields

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
24	24 - 26'	24"	SS	11-11-12-12	24.6' - 28.5 silt with sand (ML) 7.5 yr 4/4 (brown), dry, cohesive non plastic, stiff, silt with fine to medium grained sand saprolytic weathering evidence.	24 - 26 SS = 0.0 ppm BZ = 0.0 ppm BH = 0.0 ppm
	26 - 28'	19"	SS	5-14-16-18		26 - 28' SS = 0.0 ppm BZ = 0.0 ppm BH = 0.0 ppm
	28 - 30'	20"	SS	21-48-50/45	28.5 30.5' silty sand (SM) 7.5 yr 4/3 (brown), dry non cohesive, non plastic, dense, medium to fine grained sand with silt, weathered saprolite.	28 - 30' SS = 0.0 ppm BZ = 0.0 ppm BH = 0.0 ppm
30	30 - 32'	14"	SS	40 - 50/3	30.5 - 32.0" Saprolite (weathered rock) 7.5 yr 5/2 (brown), weathered crystals.	30 - 32' SS = 0.0 ppm BZ = 0.0 ppm BH = 0.0 ppm
	32 - 34'	NR	NR	50/3 NR	32 - 34 - Refusal (HSA & Split Spoon).	32 - 34' No rotary TD = 32' BGS
36						
42						
48						

Sampler Signature: R. Fields — Date: 09/09/14

CH2MHILL.	PROJECT NUMBER	BORING NUMBER	
	433193.00	SS/SB-24	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Remedial Investigation of VNTR Vieques — LOCATION : SWMU-20 — 9/18/2014

WEATHER: Sunny, 85°F — DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 w/HSA 4 1/4" ID with 2 ' x 2" HSA Splitspoon/140 lb Hammer

WATER LEVEL : 35.3 ft btoc — START : 0705 09/18/14 — END: 1130 09/18/14 — LOGGER : R. Fields

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
0	0 - 2'	18"	SS1	7-16-14-10	0 - 0.5' Silt with sand (ML) 7.5 yr 4/3 (brown), moist. Cohesive, non plastic, medium silt with very fine to fine sand and organic debris-roots.	0715 Collect Samples VEP4-SS24-0001 Splitspoon = 0.0 ppm BZ = 0.0 ppm
	2 - 4'	19"	SS2	10-14-20-20	0.5 - 1' Silt with gravel (ML) 10 yr 8/3 (very pale brown), dry, non cohesive, non plastic stiff silt with large to small subangular gravel.	Splitspoon = 0.0 ppm (SS) Breathing Zone = 0.0 ppm (BZ) 0730 collect VPE4-SB24-0406
	4 - 6'	20"	SS3	9-8-11-12	1' - 4.3' Sandy silt (ML) 7.5 yr 3/2 (dark brown) dry non cohesive, non plastic stiff, silt with fine to medium grained sand.	4-6 SS = 0.0 ppm, BZ = 0.0 ppm
6	6 - 8'	12"	SS4	15-19-19-20	4.3' - 8.4' Silty sand (SM) 7.5 yr 4/4 (brown), dry, non cohesive, non plastic medium dense, very fine to fine grained sand.	6 - 8 SS = 0.0 ppm BZ = 0.0 ppm
	8 - 10'	24"	SS5	11-12-6-6	8.4' - 10.5' Sandy silt (ML) 7.5 yr 4/6 (strong brown), dry cohesive, non plastic, stiff silt with very fine to fine grained sand.	8 - 10 SS = 0.0 ppm BZ = 0.0 ppm
	10 - 12'	24"	SS6	10-11-11-13	10.5' - 12' Silt (ML), 7.5 yr 4/6 (strong brown), dry, cohesive, non plastic, stiff silt with few weathered minerals.	10 - 12' SS = 0.0 ppm BZ = 0.0 ppm
12	12 - 14'	22"	SS7	18-20-24-17	12' - 14.9' Silt (ML) 10 yr 4/6 (dark yellowish brown) dry, cohesive, non plastic, very stiff silt with little weathered minerals (black).	12' - 14' SS = 0.0 ppm BZ = 0.0 ppm
	14 - 16'	11"	SS8	7-14-25-26	14.9' - 16' No Recovery. Lost spoon cutting shoe.	14 - 16' SS = 0.0 ppm BZ = 0.0 ppm BH = 0.0 ppm
	16 - 18'	23"	SS9	18-30-34-22	16' - 17.3; Silty sand (SM) 7.5 yr 4/4 (brown, dry, non cohesive, non plastic, dense very fine to fine grained sand	16 - 18' SS = 0.0 ppm BZ = 0.0 ppm
18	18 - 20'	19"	SS10	13-16-20-21	17.3' - 26.1' Silty sand (SM), 10 yr 4/6 (dark yellowish brown) dry non cohesive, non plastic, dense, very fine to fine grained sand, with trace large to small subrounded gravel.	18 - 20' SS = 0.0 ppm BZ = 0.0 ppm
	20 - 22'	24"	SS11	11-17-14-15		20 - 22' SS = 0.0 ppm BZ = 0.0 ppm BH = 0.0 ppm
24	22 - 24'	16"	SS12	13-14-15-15		22 - 24' SS = 0.0 ppm BZ = 0.0 ppm

Sampler Signature: R. Fields — Date: 09/18/201

CH2MHILL.	PROJECT NUMBER	BORING NUMBER	
	433193.00	SS/SB-24	SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Remedial Investigation of VNTR Vieques — LOCATION : SWMU-20 — 9/18/2014

WEATHER: Sunny, 87°F — DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 RIC w/HSA 4 1/4" ID with 2 ' x 2" HSA Splitspoon/140 lb Hammer

WATER LEVEL : 35.3 ft btoc — START : 0705 9/18/14 — END: 1130 9/18/14 — LOGGER : R. Fields

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone / Above Hole
24						
	24 - 26'	24"	SS13	8-9-9-10		24 - 26 SS = 0.0 ppm BZ = 0.0 ppm
	26 - 28'	24"	SS14	9-11-16-16	26.1' - 28.9' Silt (ML) 7.5 yr 4/4 (brown), moist cohesive, non plastic, stiff silt.	26 - 28' SS = 0.0 ppm BZ = 0.0 ppm
	28 - 30'	24"	SS15	5-8-14-16	28.9' - 30.7' Silty sand (SM) 10 yr 4/6 (dark yellowish brown) moist, cohesive, non plastic medium dense, fine to medium grained sand with silt and trace subangular small to medium gravel.	28 - 30' SS = 0.0 ppm BZ = 0.0 ppm
30						
	30 - 32'	24"	SS16	10-9-14-12	30.7' - 34.7' Silt (ML), 7.5 yr 5/8 (strong brown), moist cohesive, low plasticity, stiff silt mottled with **lean** Clay (CL) 10 yr 6/1 (gray).	30 - 32' SS = 0.0 ppm BZ = 0.0 ppm
	32 - 34'	24"	SS17	11-12-13-14		32 - 34' SS = 0.0 ppm BZ = 0.0 ppm
	34 - 36'	24"	SS18	11-20-23-40	34.7' - 38' Well graded sand with gravel (SW), 10 yr 4/6 dark yellowish brown wet cohesive, non plastic, medium dense to dense, coarse to very coarse	34 - 36' SS = 0.0 ppm BZ = 0.0 ppm
36						
	36 - 38'	24"	SS19	20-22-26-42	grained sand with little silt and large to small sub angular gravel, water bearing zone.	36 - 38' SS = 0.0 ppm BZ = 0.0 ppm
						Water Bearing zone @ 34.7 - 38 BGS
						Stop spilt spoon.
						35.2' BGS water level
						@ 36.8 Saprolite present
42						TD = 38' BGS
48						

Sampler Signature: R. Fields — Date: 09/17/14

CH2MHILL.	PROJECT NUMBER 433193.00	BORING NUMBER SS/SB-25	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Remedial Investigation of VNTR Vieques — LOCATION : SWMU-20 — 9/18/2014

WEATHER: Sunny = 92°F — DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 w/HSA 4 1/4" ID with 2 ' x 2" Splitspoon/140 lb **Hammer**

WATER LEVEL : — START : 1245 09/18/14 — END: 1715 09/18/14 — LOGGER : R. Fields

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
0	0 - 2'	24"	SS1	5-5-4-4	0 - 0.3' Sandy silt (ML) 7.5 yr 4/3 (brown), dry, non cohesive, non plastic, soft-medium silt with fine to medium grained sand.	1300 Collect Samples VEP4-SS25-0001 Splitspoon = 0.0 ppm
	2 - 4'	19"	SS2	8-11-8-15	0.3 - 2' Silt (ML) 10 yr 4/3 (brown), dry, non-cohesive, non plastic, soft medium, silt.	2 - 4' SS = 0.0 ppm BZ = 0.0 ppm
	4 - 6'	23"	SS3	7-6-6-6	2' - 4.5' Sandy silt (ML) 7.5 yr 4/6 (strong brown), dry, non cohesive, non plastic, medium silt with very fine to fine sand.	1320 Collect Sample VEP4-SB25-0406 SS = 0.0 ppm, BZ = 0.0 ppm
6	6 - 8'	17"	SS4	16-15-14-15	4.5' - 10' Silty sand (SM) 7.5 yr 4/6 (strong brown), dry non cohesive, non plastic medium dense, fine to medium grained sand with silt.	6 - 8 SS = 0.0 ppm BZ = 0.0 ppm
	8 - 10'	24"	SS5	6-7-7-8		8 - 10 SS = 0.0 ppm BZ = 0.0 ppm
	10 - 12'	23"	SS6	8-9-11-13	10' - 17.4' Silty sand (SM) 10 yr 5/6 (yellowish brown), dry non cohesive, non plastic medium dense, fine to medium grained sand with silt weathered minerals present(few 16 - 30%)	10 - 12' SS = 0.0 ppm BZ = 0.0 ppm
12	12 - 14'	18"	SS7	15-13-13-13		12' - 14' SS = 0.0 ppm BZ = 0.0 ppm
	14 - 16'	22"	SS8	10-16-18-19		14 - 16' SS = 0.0 ppm BZ = 0.0 ppm
	16 - 18'	17"	SS9	9-14-16-18	17.4' - 18.5' Silty sand (SM) 7.5 yr 4/6 (strong brown), dry non cohesive, non plastic medium dense. Fine to medium grained sand with silt. Abundant weathered minerals some (31 - 49%)	16 - 18' SS = 0.0 ppm BZ = 0.0 ppm
18	18 - 20'	23"	SS10	15-19-26-28	18.5' - 22.3' Weathered saprolite (severely weathered) dry brittle.	18 - 20' SS = 0.0 ppm BZ = 0.0 ppm
	20 - 22'	18"	SS11	18-19-17-43		20 - 22' SS = 0.0 ppm BZ = 0.0 ppm
	22 - 24'	4"	SS12	50/4	22.3-24 No recovery	22 - 24' SS = 0.0 ppm BZ = 0.0 ppm
24						

Sampler Signature: R. Fields — Date: 09/18/201

CH2MHILL	PROJECT NUMBER	BORING NUMBER	
	433193.00	SS/SB-25	SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Remedial Investigation of VNTR Vieques — LOCATION : SWMU-20 — 9/18/2014

WEATHER: Hot!!! — DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 RIC w/HSA 4 1/4" ID with 2 ' x 2" Splitspoon/140 lb Hammer

WATER LEVEL : — START : 1245 9/18/14 — END: 1715 9/18/14 — LOGGER : R. Fields

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
24					24 - 26.4 Saprolite, weathered bedrock.	24 - 26 SS = 0.0 ppm BZ = 0.0 ppm
	24 - 26'	24"	SS13	18-30-37-50/5		
					26.4' - 28' No Recovery	26 - 28' SS = 0.0 ppm BZ = 0.0 ppm
	26 - 28'	5"	SS14	50/5 Recovery		
					28.0 - 28.4' Saprolite/weathered bedrock	28 - 30' SS = 0.0 ppm BZ = 0.0 ppm
	28 - 30'	5"	SS15	50/5		
30					28.4 - 30' No Recovery	30 - 32' SS = 0.0 ppm BZ = 0.0 ppm
	30 - 32'	5"	SS16	50/5		
					30 - 30.4' Saprolite weathered bedrock	32 - 34' SS = 0.0 ppm BZ = 0.0 ppm
	32 - 34'	11"	SS17	40-50/5		
					30.4 - 32' No Recovery	34 - 36' SS = 0.0 ppm BZ = 0.0 ppm
	34 - 36'	5"	SS18	50/5		
36					32 - 33' Saprolite weathered bedrock	36 - 38' SS = 0.0 ppm BZ = 0.0 ppm
	36 - 38'	5"	SS19	50/5		
					33 - 34' No Recovery 34 - 34.4' Saprolite weathered bedrock 34.4 - 36' No Recovery	Wet - Water Encountered Wet Spoon
					36 - 36.4' Saprolite weathered bedrock (wet) TBD = 38' BGS	
42						
48						

Sampler Signature: R. Fields — Date: 09/17/14

Appendix B
Monitoring Well Completion Logs

PROJECT NUMBER	WELL NUMBER	
183719.FI.02	MW-01	SHEET 1 OF 1

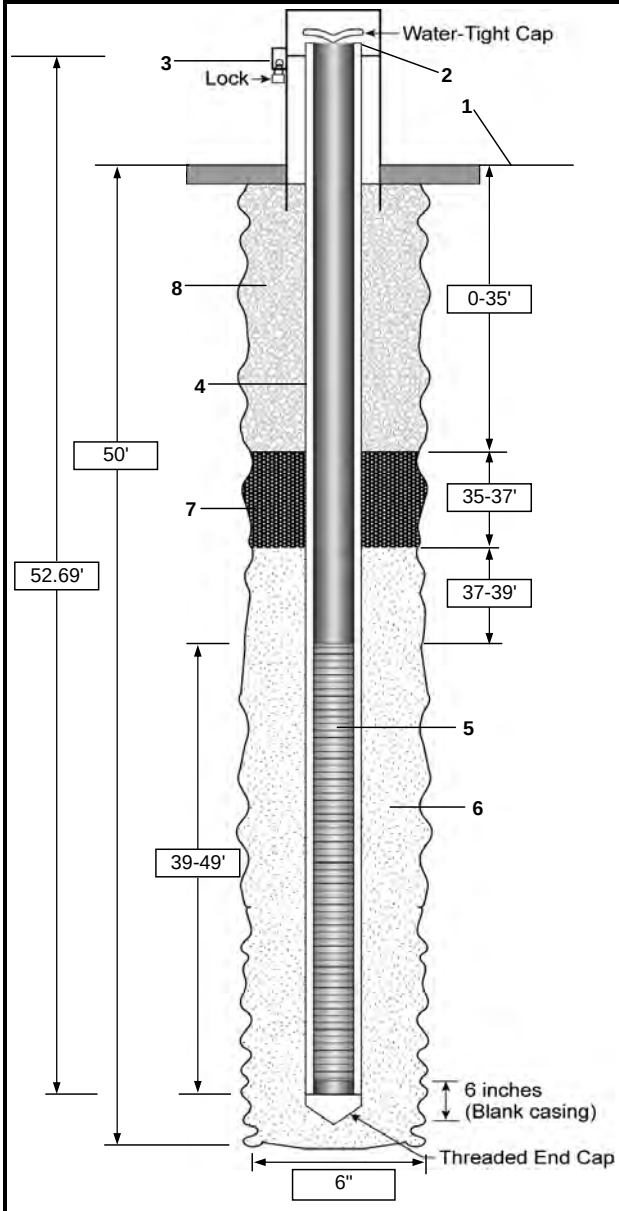
WELL COMPLETION DIAGRAM

PROJECT : East Vieques PI-4 LOCATION PI-4

DRILLING CONTRACTOR : Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED : Mobile Drill B-61, Hollow Stem Auger, Air Hammer

WATER LEVEL : 39.05 BTOC START : 1/27/2006 END : 1/30/2006 LOGGER : J. Sathaye



1- Ground elevation at well: ~33.8'

2- Top of casing elevation: 37.20'

3- Wellhead protection cover type: Metal locking cover with 4 cement filled bollards

a) concrete pad dimensions: 3 X 3'

4- Dia./type of well casing: 2" Sch. 40 PVC

5- Screen slot size: 10 slot (0.01")

6- Type screen filter: Clean Standard Sand & Silica

a) Quantity used: 5 bags (50 lbs bags)

7- Type of seal: 3/8" bentonite chips

a) Quantity used: ~ 25 lbs

8- Grout

a) Grout mix used: 20:1 ratio of Cement and Bentonite Powder. 11x 47lbs cement

b) Method of placement: Poured from surface

c) Vol. of well casing grout: ~ 105 gallons

Development method: Surge and submersible pump

Volume purged during development: ~40 gallons

Comments

PROJECT NUMBER	WELL NUMBER	
183719.FI.02	MW-02	SHEET 1 OF 1

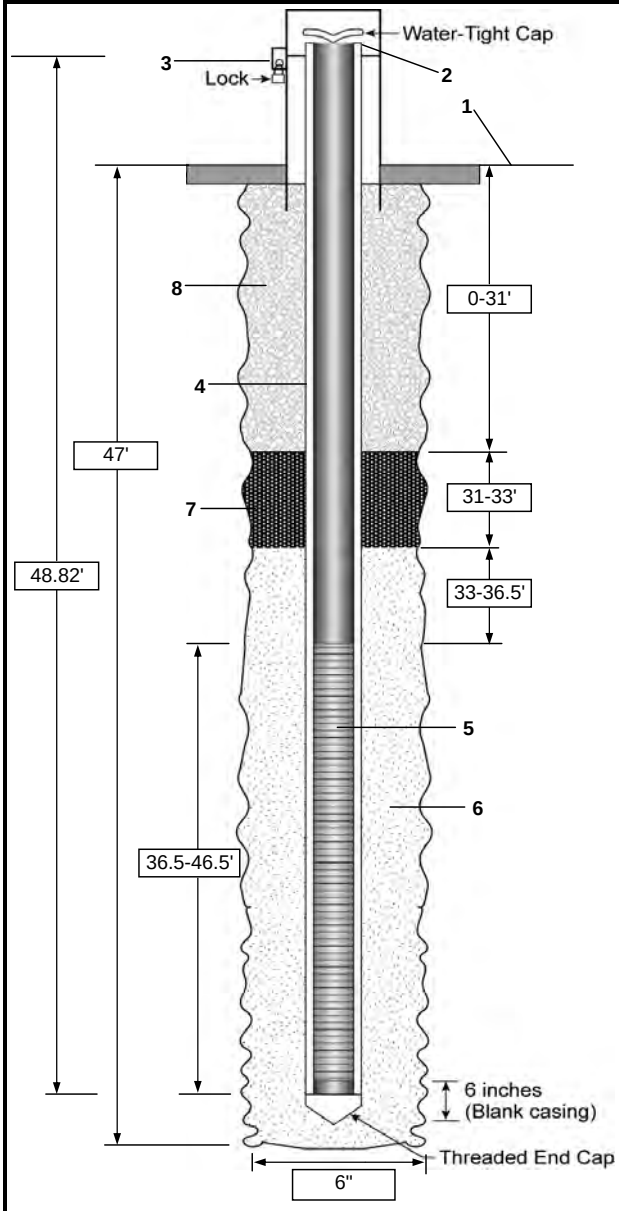
WELL COMPLETION DIAGRAM

PROJECT : East Vieques PI-4 LOCATION PI-4

DRILLING CONTRACTOR : Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED : Mobile Drill B-61, Hollow Stem Auger, Air Hammer

WATER LEVEL : 43.38 BTOC START : 1/26/2006 END : 2/2/2006 LOGGER : J. Sathaye



1- Ground elevation at well ~40.0'

2- Top of casing elevation 42.11'

3- Wellhead protection cover type Metal locking cover with 4 cement filled bollards

a) concrete pad dimensions 3 X 3'

4- Dia./type of well casing 2" Sch. 40 PVC

5- Screen slot size 10 slot (0.01")

6- Type screen filter Clean Standard Sand & Silica

a) Quantity used 7 bags (50 lbs bags)

7- Type of seal 3/8" bentonite chips

a) Quantity used ~25 lbs

8- Grout

a) Grout mix used 20:1 ratio of Cement and Bentonite Powder. x 47lbs cement

b) Method of placement Poured form surface

c) Vol. of well casing grout ~ 80 gallons

Development method Surge and submersible pump

Volume purged during development ~ 37 gallons

Comments

PROJECT NUMBER	WELL NUMBER	
183719.FI.02	MW-03	SHEET 1 OF 1

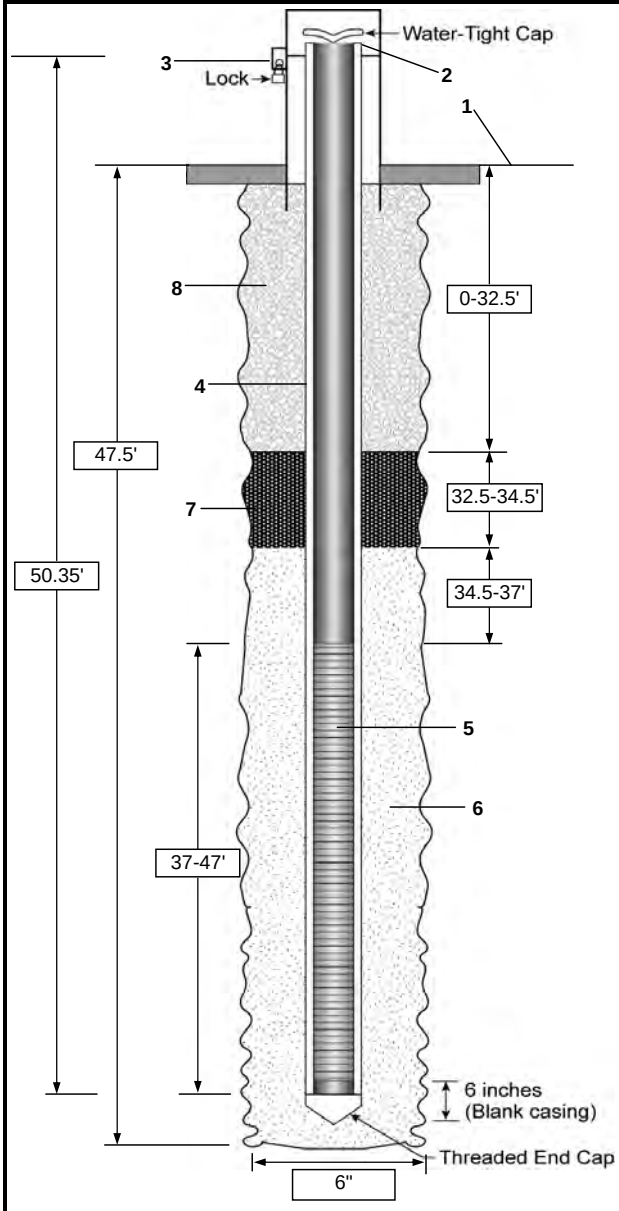
WELL COMPLETION DIAGRAM

PROJECT : East Vieques PI-4 LOCATION : PI-4

DRILLING CONTRACTOR : Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED : Mobile Drill B-61, Hollow Stem Auger, Air Hammer

WATER LEVEL : 46.03 BTOC START : 1/23/2006 END : 1/23/2006 LOGGER : J. Sathaye



1- Ground elevation at well ~41.0'

2- Top of casing elevation 44.10'

3- Wellhead protection cover type Metal locking cover with 4 cement filled bollards

a) concrete pad dimensions 3 X 3'

4- Dia./type of well casing 2" Sch. 40 PVC

5- Screen slot size 10 slot (0.01")

6- Type screen filter Clean Standard Sand & Silica

a) Quantity used 7 bags (50 lbs bags)

7- Type of seal 3/8" bentonite chips

a) Quantity used ~25 lbs

8- Grout

a) Grout mix used 20:1 ratio of Cement and Bentonite Powder. x 47lbs cement

b) Method of placement Poured from surface

c) Vol. of well casing grout ~ 50gallons

Development method Surge and submersible pump

Volume purged during development ~ 49.50 gallons

Comments

PROJECT NUMBER	WELL NUMBER	
183719.FI.02	MW-04	SHEET 1 OF 1

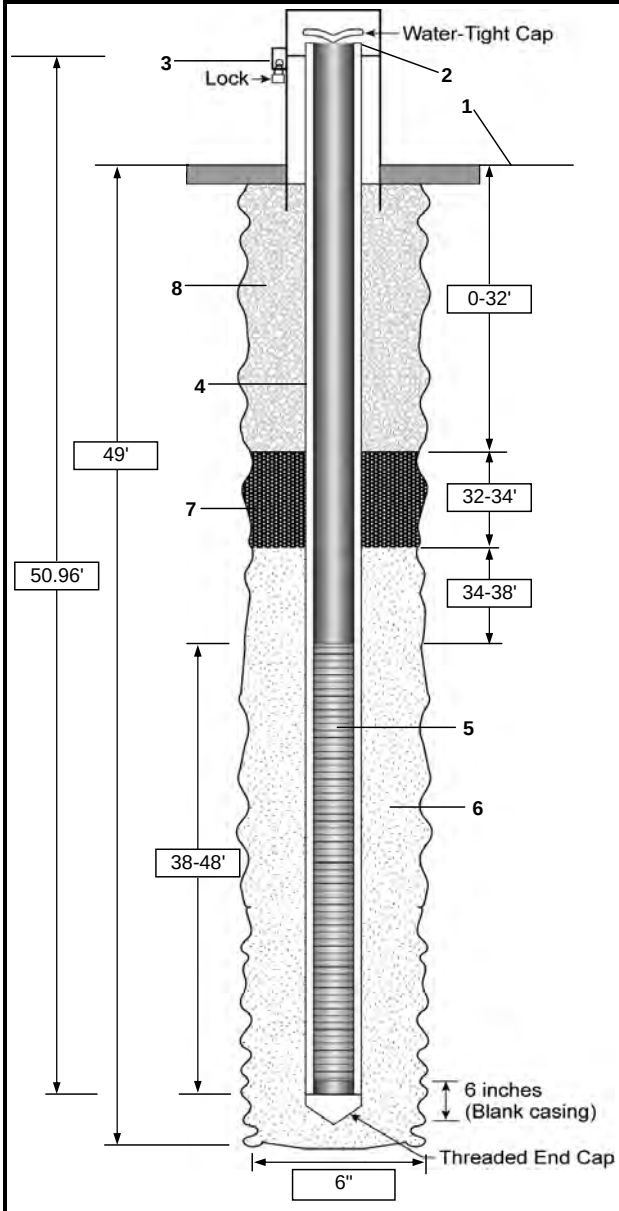
WELL COMPLETION DIAGRAM

PROJECT : East Vieques PI-4 LOCATION PI-4

DRILLING CONTRACTOR : Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED : Mobile Drill B-61, Hollow Stem Auger, Air Hammer

WATER LEVEL : 43.71 BTOC START : 1/24/2006 END : 1/27/2006 LOGGER : J. Sathaye



1- Ground elevation at well: ~38.6'

2- Top of casing elevation: 41.28'

3- Wellhead protection cover type: Metal locking cover with 4 cement filled bollards

a) concrete pad dimensions: 3 X 3'

4- Dia./type of well casing: 2" Sch. 40 PVC

5- Screen slot size: 10 slot (0.01")

6- Type screen filter: Clean Standard Sand & Silica

a) Quantity used: 6 bags (50 lbs bags)

7- Type of seal: 3/8" bentonite chips

a) Quantity used: ~ 25 lbs

8- Grout

a) Grout mix used: 20:1 ratio of Cement and Bentonite.10 x 47lbs cement

b) Method of placement: Poured from surface

c) Vol. of well casing grout: ~ 55 gallons

Development method: Surge and submersible pump

Volume purged during development: ~85 gallons

Comments

PROJECT NUMBER	WELL NUMBER	
183719.FI.02	MW-05	SHEET 1 OF 1

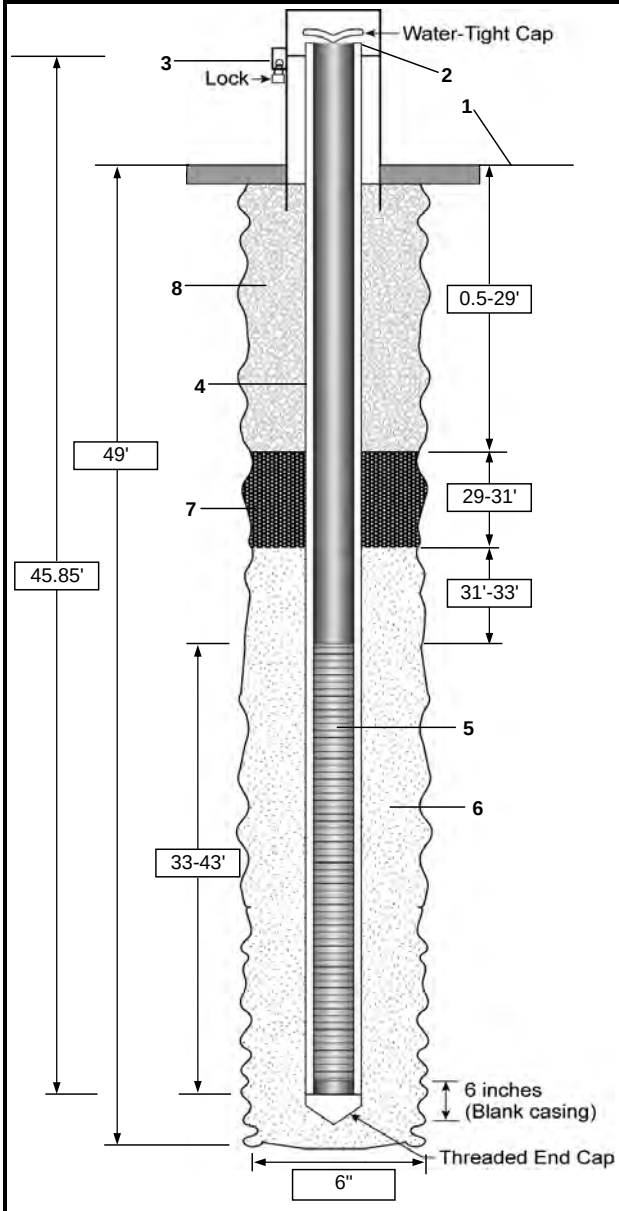
WELL COMPLETION DIAGRAM

PROJECT : East Vieques PI-4 LOCATION PI-4

DRILLING CONTRACTOR : Geoworks, Inc.

DRILLING METHOD AND EQUIPMENT USED : Mobile Drill B-61, Hollow Stem Auger, Air Hammer

WATER LEVEL : 37.46 BTOC START : 1/19/2006 END : 1/23/06 LOGGER : J. Sathaye



1- Ground elevation at well ~32.1

2- Top of casing elevation 34.71'

3- Wellhead protection cover type Metal locking cover with 4 cement filled bollards

a) concrete pad dimensions 3 X 3'

4- Dia./type of well casing 2" Sch. 40 PVC

5- Screen slot size 10 slot (0.01")

6- Type screen filter Clean Standard Sand & Silica

a) Quantity used 7 bags (50 lbs bags)

7- Type of seal 3/8" bentonite chips

a) Quantity used ~ 25 lbs

8- Grout

a) Grout mix used 20:1 ratio of Cement and Bentonite Powder. x 47lbs cement

b) Method of placement Poured from Surface

c) Vol. of well casing grout ~ 23 gallons

Development method Surge and submersible pump

Volume purged during development ~102 gallons

Comments

PROJECT NUMBER	WELL NUMBER	
362196.FI.ZZ.01	EPI04-MW06	Sheet 1 of 2

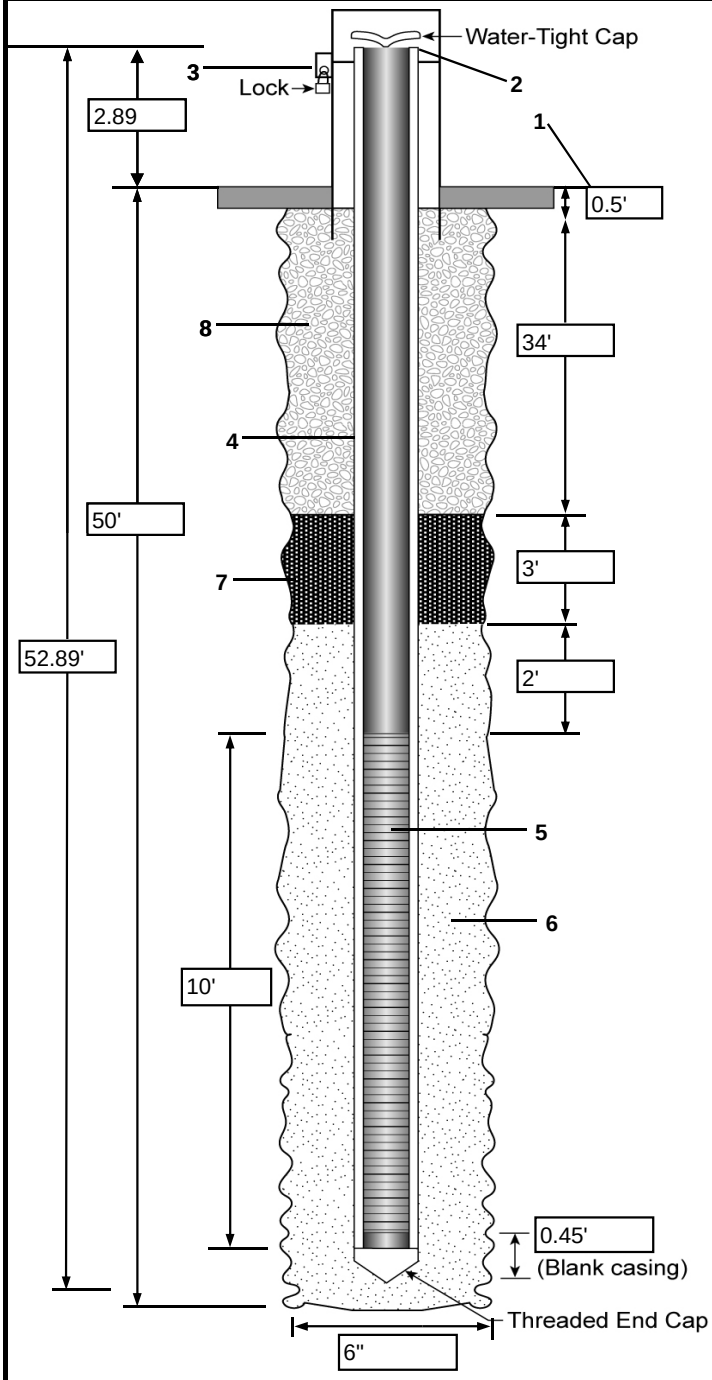
WELL COMPLETION DIAGRAM

PROJECT : SI/ESI Former VNTR LOCATION VE-PI-4 DATE: 3/12/2009

DRILLING CONTRACTOR : Jaca & Sierra, Inc.

DRILLING METHOD AND EQUIPMENT USED : Auger Rig, Air Rotary Rig (T-4)

WATER LEVEL : 42.44' BTOC (3/26/09) DATE/TIME Start: 3/12/09 1040 End:3/13/09 0950 LOGGER : M. Young



1-	Ground elevation at well	37.60 ft AMSL (Survey Report June 2009)
2-	Top of casing elevation	40.06 ft AMSL (Survey Report June 2009)
3-	Wellhead protection cover type	Flush-mount
	a) concrete pad dimensions	3'x3'x6"
4-	Dia./type of well casing	2" diameter PVC schedule 40.
5-	Screen slot size	0.010" slot size.
6-	Type screen filter	20-30 Sand
	a) Quantity used	6ea - 50lb bags
7-	Type of seal	PelPlug 3/8" Bentonite Chips
	a) Quantity used	3ea 5-gallon buckets
8-	Grout	
	a) Grout mix used	Portland Cement / Gel ex mix
	b) Method of placement	Tremie Pipe
	c) Vol. of well casing grout	40ea 47lb bags PC/2ea 50lb bags Gr ~140 gallons
	Development method	Surge Block and Pumping
	Purge Volume	30 gallons

Comments:

Completed Grouting Well (Date/Time): 03/12/09; 1515

Completed Pad Install (Date/Time): 03/13/09; 0950

Completed Well Development (Date/Time): 3/18/09; 0921

Well Depth(BTOC): 53.04 ft (3/26/09)

Casing Height (#2 - #1) : 2.34 ft

BTOC: Below Top of Casing

CH2MHILL	PROJECT NUMBER 362196.FI.ZZ.01	WELL NUMBER EPI04-MW06	Sheet 2 of 2

NOTES

PROJECT : **SI/ESI Former VNTR** LOCATION : **VE-PI-4** DATE: 3/12/2009

SOP(s) used (refer to ESI/SI Former VNTR

All appropriate SOPs followed

Were all requirements of the SOP(s) (above) met? Yes

Explanation of exceptions to SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

PROJECT NUMBER	WELL NUMBER	
362196.FI.ZZ.01	EPI04-MW07	Sheet 1 of 2

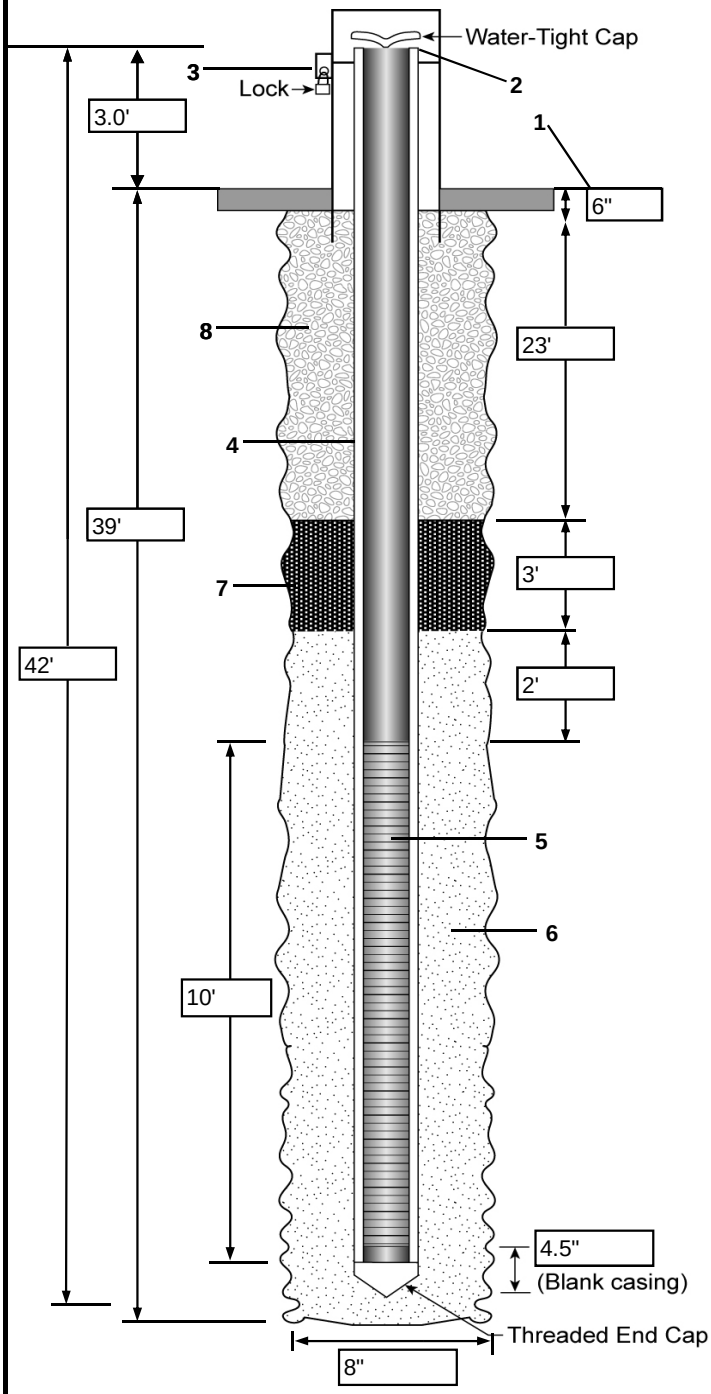
WELL COMPLETION DIAGRAM

PROJECT : SI/ESI Former VNTR LOCATION VE-PI-4 DATE: 3/16/2009

DRILLING CONTRACTOR : Jaca and Sierra Inc.

DRILLING METHOD AND EQUIPMENT USED : Hollow Stem Auger Rig

WATER LEVEL : 32.21 ft BTOC (4/3/09) DATE/TIME Start: 03/16/09 1440 End: 3/18/09 0927 LOGGER : Carol Peterson



1-	Ground elevation at well	27.13 ft AMSL (Survey Report June 2009)
2-	Top of casing elevation	29.74 ft AMSL (Survey Report June 2009)
3-	Wellhead protection cover type	Flush-mount
	a) concrete pad dimensions	3'x3'x6" (LxWxH)
4-	Dia./type of well casing	2" diameter PVC schedule 40.
5-	Screen slot size	0.010" slot size.
6-	Type screen filter	20-30 Sand (Standard Sand & Silica Co)
	a) Quantity used	14 1/2 ea 50lb bags
7-	Type of seal	PEL Plug 3/8" Bentonite Chips
	a) Quantity used	3.5 five gallon buckets
8-	Grout	Portland Cement Type I 47# bags
	a) Grout mix used	Gelex Bentonite mix 50# bags
	b) Method of placement	Tremie Pipe
	c) Vol. of well casing grout	3bags (141lbs) Portland
		1.2 (60lbs) GelX Bentonite
	Development method	Surge Block and Pumping
	Purge Volume	80 gallons

Comments:

Completed Grouting Well (Date/Time): 03/18/09; 0927

Completed Pad Install (Date/Time): 03/19/09; 0830

Completed Well Development (Date/Time): 3/31/09; 1015

Well Depth(BTOC): 42.43 ft (4/3/09)

Casing Height (#2 - #1) : 2.61 ft

BTOC: Below Top of Casing

CH2MHILL	PROJECT NUMBER 362196.FI.ZZ.01	WELL NUMBER EPI04-MW07	Sheet 2 of 2

NOTES

PROJECT : **SI/ESI Former VNTR** LOCATION : **VE-PI-4** DATE: 3/18/2009

SOP(s) used (refer to ESI/SI Former VNTR

All appropriate SOPs followed

Were all requirements of the SOP(s) (above) met? Yes

Explanation of exceptions to SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Change 4 bollards to 2 bollards

Change 2' seal to 3' seal

PROJECT NUMBER	WELL NUMBER	
403743.FI.FK.P4	MW-08 (SB-16)	SHEET 1 OF 2

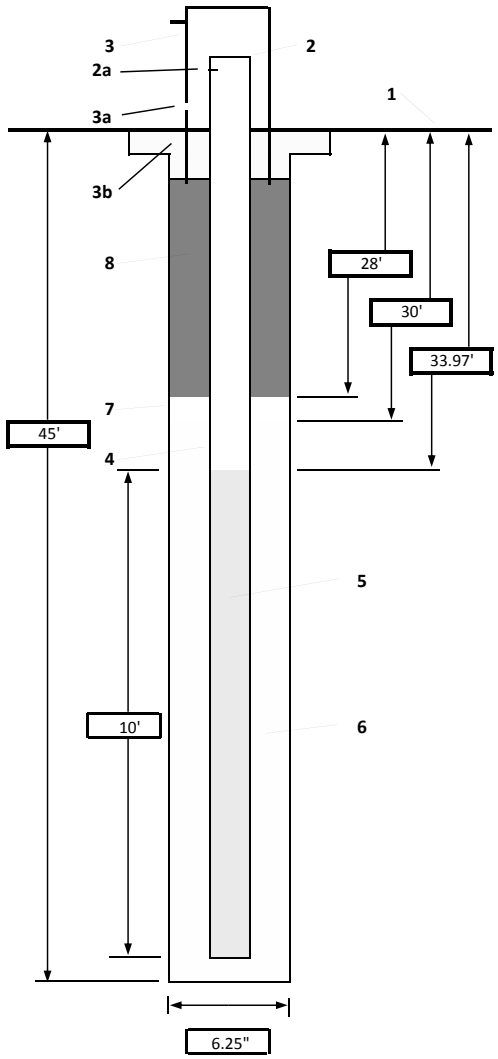
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 (PI-4) Supplemental expanded Site Inspection. LOCATION : East Vieques, PR

DRILLING CONTRACTOR : Pedro Panzardi and Associates (PPA)

DRILLING METHOD AND EQUIPMENT USED : Mobile Drill B61-HDX with 2-1/4-inch ID augers and 6.25-inch air hammer, external IR750 compressor.

WATER LEVELS : START : 11/02/11:0925 END : 11/03/11:1647 LOGGER : S. Brand



1-	Ground elevation at well	35.74' agl
2-	Top of casing elevation	
	a) vent hole?	
3-	Wellhead protection cover type	5 ft (3 ft above ground) steel protective casing
	a) weep hole?	Yes
	b) concrete pad dimensions	3 ft X3 ft.
4-	Dia./type of well casing	2-inch schedule 80 PVC
5-	Type/slot size of screen	10 slot (0.010-inch)
6-	Type screen filter	Quartz 60/20 sand
	a) Quantity used	10 bags, 50-lbs each
7-	Type of seal	Hole plug bentonite chips
	a) Quantity used	1-50-lb bag
8-	Grout	
	a) Grout mix used	47 lb sack cement, 2.5 lb bentonite, 4 gal H2O
	b) Method of placement	Pour from surface with shovels
	c) Vol. of well casing grout	6- 47 lb sacks cement
	Development method	Surging with surge block by hand and pumping
	Development time	3 hours
	Estimated purge volume	159 gallons

Comments Screen to 43.97, bottom cap flat, adds 0.3ft, bottom of well to 44.27 ft bgs relative to concrete pad.
Borehole to 50 ft bgs, collapsed to 45 ft bgs.

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	WELL NUMBER MW-08	SHEET 2 OF 2

WELL COMPLETION DIAGRAM

PROJECT : LOCATION :Vieques, PR SWMU 20 (PI-4) DATE: 11/03/11

NOTES

SOP(s) used (refer to SOP Log)? D-1, D-2, E-1, E-2, H-1, H-2

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes except below.

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Drilled original borehole to 50 ft with air hammer, pulled rods and air bit out and set well in open hole. Hole collapsed to 45 ft bgs. Used 6/20 sand with approval of PM. Sand is slightly coarser than specified, but will work fine.

Sampler Signature: Stephen Brand Date: 11/3/2011

PROJECT NUMBER	WELL NUMBER		
403743.FI.FK.P4	MW-09 (SB-19)	SHEET 1	OF 2

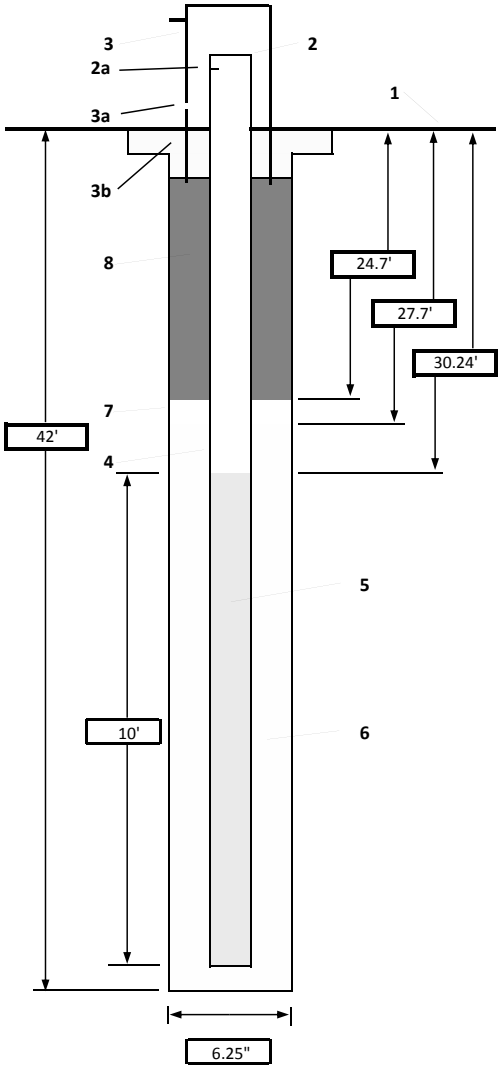
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 (PI-4) Supplemental expanded Site Inspection. LOCATION : East Vieques, PR

DRILLING CONTRACTOR : Pedro Panzardi and Associates (PPA)

DRILLING METHOD AND EQUIPMENT USED : Mobile Drill B61-HDX with 2-1/4-inch ID augers and 6.25-inch air hammer, external IR750 compressor.

WATER LEVELS : START : 11/08/11:0716 END : 11/09/11:1450 LOGGER : S. Brand



1- Ground elevation at well	34.79' agl
2- Top of casing elevation	2.26' above pad
a) vent hole?	
3- Wellhead protection cover type	5 ft (3 ft above ground) steel protective casing
a) weep hole?	Yes
b) concrete pad dimensions	3 ft X3 ft., 2 bollards
4- Dia./type of well casing	2-inch schedule 80 PVC
5- Type/slot size of screen	10 slot (0.010-inch)
6- Type screen filter	Quartz 60/20 sand
a) Quantity used	13 bags, 50-lbs each
7- Type of seal	3/8-inch Hole plug bentonite chips
a) Quantity used	1-50-lb bag
8- Grout	
a) Grout mix used	47 lb sack cement, 2.5 lb bentonite, 4 gal H2O
b) Method of placement	Pour from surface with shovels
c) Vol. of well casing grout	6- 47 lb sacks cement
Development method	Surging with surge block by hand and pumping
Development time	2 hours
Estimated purge volume	70 gallons

Comments Screen to 42.80 btoc, 40.54 bgs. bottom cap flat, adds 0.3ft,
Abandoned boring adjacent ot MW-09 with 3 bags of portland.
Possible cavity at about 30 ft bgs used much more sand at about 30 ft bgs.

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	WELL NUMBER MW-09	SHEET 2 OF 2

WELL COMPLETION DIAGRAM

PROJECT : LOCATION :Vieques, PR SWMU 20 (PI-4) DATE: 11/09/11

NOTES

SOP(s) used (refer to SOP Log)? D-1, D-2, D-3, E-1, E-2, H-1, H-2

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Used 6/20 sand with approval of PM. Sand is slightly coarser than specified, but will work fine.

Split spoon refusal at 20 ft bgs , air hammer to 30 ft bgs, wait 30 minutes, water encountered at or above 30 ft bgs. Screen 30-40 ft bgs Drill air hammer to 42 ft bgs

Sampler Signature: Stephen Brand Date: 11/9/2011

PROJECT NUMBER	WELL NUMBER	
403743.FI.FK.P4	MW-10 (SB-18)	SHEET 1 OF 2

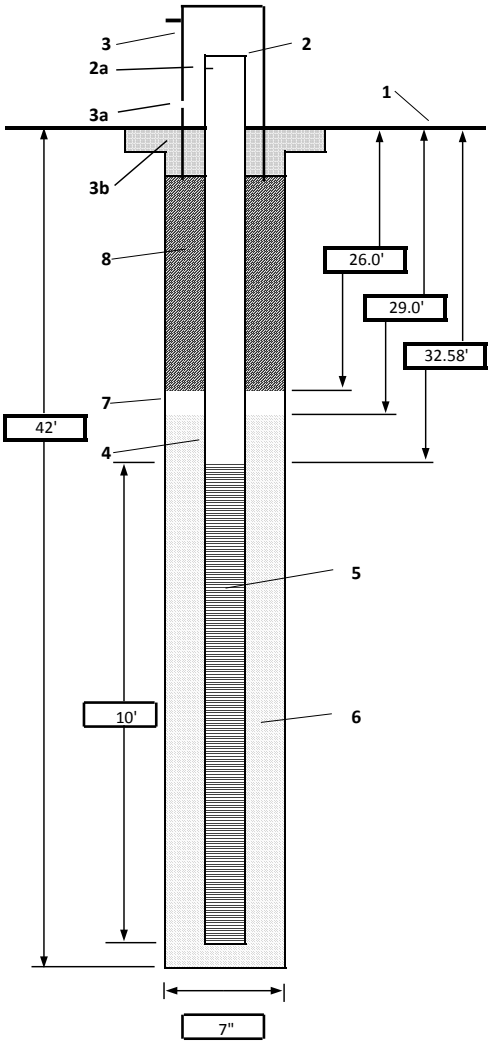
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 (PI-4) Supplemental expanded Site Inspection. LOCATION : East Vieques, PR

DRILLING CONTRACTOR : Pedro Panzardi and Associates (PPA)

DRILLING METHOD AND EQUIPMENT USED : Mobile Drill B61-HDX with 2-1/4-inch ID augers also 4-1/4-inch ID augers, 7-inch OD, no air hammer.

WATER LEVELS : START : 11/15/11:0650 END : 11/16/11:1600 LOGGER : S. Brand



1-	Ground elevation at well	35.50' agl
2-	Top of casing elevation	2.25' above pad
	a) vent hole?	
3-	Wellhead protection cover type	5 ft (3 ft above ground) steel protective casing
	a) weep hole?	Yes and sand between casings
	b) concrete pad dimensions	3 ft X3 ft., 2 bollards
4-	Dia./type of well casing	2-inch schedule 40 flush threaded
5-	Type/slot size of screen	10 slot (0.010-inch)
6-	Type screen filter	Quartz 60/20 sand
	a) Quantity used	7 bags, 50-lbs each
7-	Type of seal	3/8-inch Hole plug bentonite chips
	a) Quantity used	1/2 of 50-lb bag
8-	Grout	
	a) Grout mix used	47 lb sack cement, 2.5 lb bentonite, 4 gal H2O
	b) Method of placement	Pour from surface with shovels
	c) Vol. of well casing grout	13- 47 lb sacks cement
	Development method	Surging with surge block by hand and pumping
	Development time	2 hours 16 min.
	Estimated purge volume	70 gallons

Comments Well to 42.88 bgs bottom cap flat 0.3ft,
Note, augers stuck when pulling to set bentonite seal, 1.0 ft fill between filter pack and bentonite.

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	WELL NUMBER **MW-10**	SHEET 2 OF 2

WELL COMPLETION DIAGRAM

PROJECT : LOCATION :Vieques, PR SWMU 20 (PI-4) DATE11/15/11

NOTES

SOP(s) used (refer to SOP Log)? D-1, D-2, D-3, E-1, E-2, H-1, H-2

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Used 6/20 sand with approval of PM. Sand is slightly coarser than specified, but will work fine.

Note: 11/15/11 Augered with 2-1/4-inch ID 5-1/4-inch OD augers to 43 ft bgs. Ran 4-1/4-inch ID 7-inch OD augers to 42 ft with nylon plug. Set well to bentonite chip seal on 11/15/11, grouted bentonite/cement grout in annulus on 11/16/11 1600. Pulled augers after setting bentonite on 11/15/11 Bentonite to 27.3 ft bgs.

ON 11/16 before running grout, hole up to 25.5 ft so 1.8 ft fill between bentonite and bentonite/cement grout.

Sampler Signature: Stephen Brand Date: 11/15/2011

PROJECT NUMBER	WELL NUMBER	
403743.FI.FK.P4	MW-11 (SB-20)	SHEET 1 OF 2

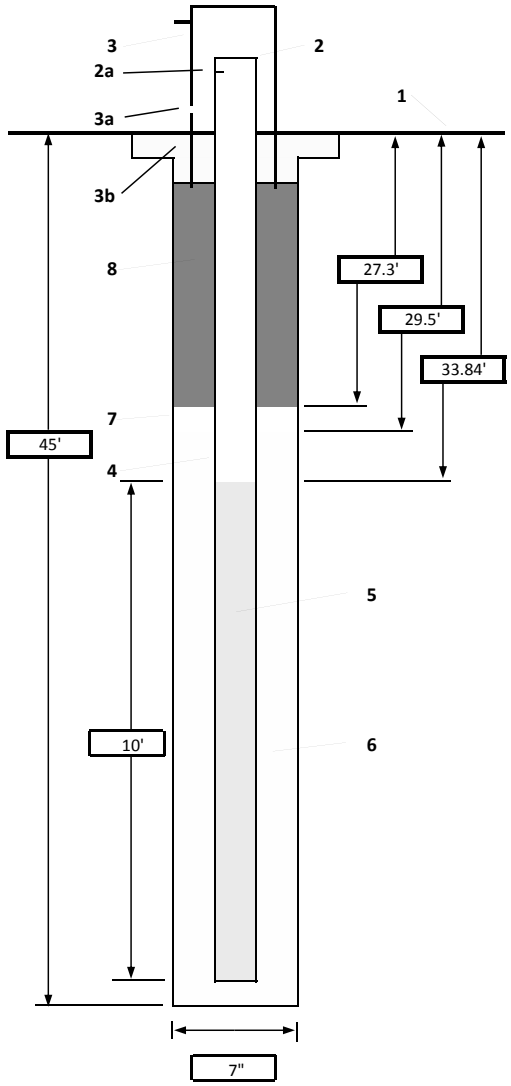
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 (PI-4) Supplemental expanded Site Inspection. LOCATION : East Vieques, PR

DRILLING CONTRACTOR : Pedro Panzardi and Associates (PPA)

DRILLING METHOD AND EQUIPMENT USED : Mobile Drill B61-HDX with 2-1/4-inch ID augers also 4-1/4-inch ID augers,7-inch OD, no air hammer.

WATER LEVELS : START : 11/10/11:0712 (soil sampling) END : 11/17/11:0930 LOGGER : S. Brand



7-inch OD, 4-1/4-inch ID Augers.

1- Ground elevation at well	36.06' agl
2- Top of casing elevation	2.49' above pad
a) vent hole?	
3- Wellhead protection cover type	5 ft (3 ft above ground) steel protective casing
a) weep hole?	Yes
b) concrete pad dimensions	3 ft X3 ft., 2 bollards
4- Dia./type of well casing	2-inch schedule 40 flush threaded
5- Type/slot size of screen	10 slot (0.010-inch)
6- Type screen filter	Quartz 60/20 sand
a) Quantity used	6 bags, 50-lbs each
7- Type of seal	3/8-inch Hole plug bentonite chips
a) Quantity used	1.75 50-lb bags
8- Grout	
a) Grout mix used	47 lb sack cement, 2.5 lb bentonite, 4 gal H2O
b) Method of placement	Pour from surface with shovels
c) Vol. of well casing grout	17- 47 lb sacks cement
Development method	Surging with surge block by hand and pumping
Development time	8 hours 15 min.
Estimated purge volume	61 gallons

Comments Bottom well to 44.14 bgs bottom cap flat, 0.3ft

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	WELL NUMBER MW-11	SHEET 2 OF 2

WELL COMPLETION DIAGRAM

PROJECT : LOCATION :Vieques, PR SWMU 20 (PI-4) DATE11/17/11

NOTES

SOP(s) used (refer to SOP Log)? D-1, D-2, D-3, E-1, E-2, H-1, H-2

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Soil sampling/split spoon sampling starts 11/10/11 0712. Stop augering for split spoon samples at 33 ft bgs because of water in cuttings, continued drilling with 2-1/4-inch ID, 5-1/4-inch OD flights with 6-inch OD head on augers. Continued with augers to 45 ft bgs, pulled augers to see if hole would stay open, collapsed to 33 ft bgs.

Drilled to 50 ft bgs with 2-1/4-inch ID augers, when augers removed on 11/11/11, hole only stayed open to 40 ft bgs.

Mobilized back on hole on 11/16/11, drilled with 4-1/4-inch ID augers, 7-inch OD to 45 ft bgs with nylon plug in bottom of augers. Plug popped out. Pulled augers and redrilled to 45 ft bgs, hole open to 45 ft bgs, set well.

Used 6/20 sand with approval of PM. Sand is slightly coarser than specified, but will work fine.

Sampler Signature: Stephen Brand Date: 11/17/2011

PROJECT NUMBER	WELL NUMBER		
403743.FI.FK.P4	MW-12 (SB-17)	SHEET 1	OF 2

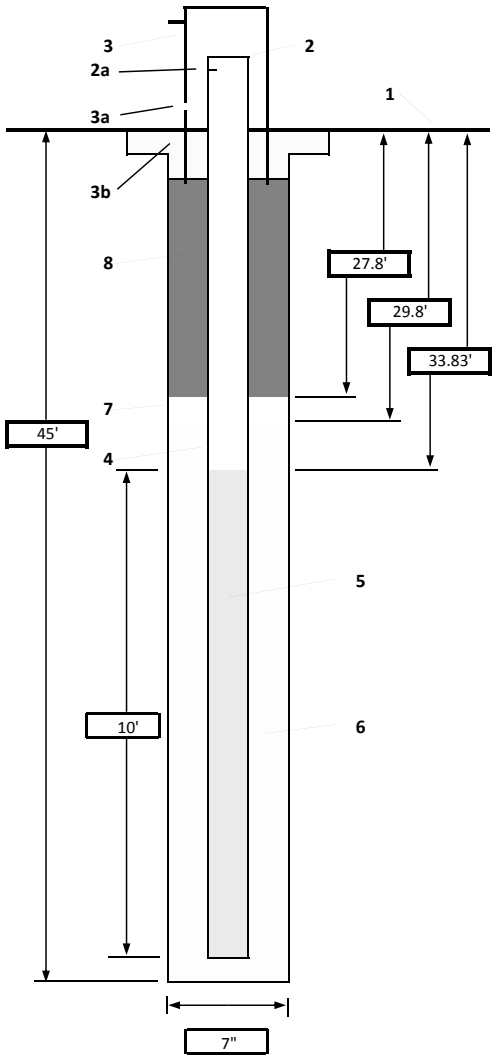
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 (PI-4) Supplemental expanded Site Inspection. LOCATION : East Vieques, PR

DRILLING CONTRACTOR : Pedro Panzardi and Associates (PPA)

DRILLING METHOD AND EQUIPMENT USED : Mobile Drill B61-HDX with 4-1/4-inch ID augers,7-inch OD, no air hammer.

WATER LEVELS : START : 11/17/11:1048 END : 11/17/11:1720 LOGGER : S. Brand



1-	Ground elevation at well	35.89' agl
2-	Top of casing elevation	2.53' above pad
	a) vent hole?	
3-	Wellhead protection cover type	5 ft (3 ft above ground) steel protective casing
	a) weep hole?	Yes
	b) concrete pad dimensions	3 ft X3 ft., 2 bollards
4-	Dia./type of well casing	2-inch schedule 40 flush threaded
5-	Type/slot size of screen	10 slot (0.010-inch)
6-	Type screen filter	Quartz 60/20 sand
	a) Quantity used	9 bags, 50-lbs each
7-	Type of seal	3/8-inch Hole plug bentonite chips
	a) Quantity used	1 50-lb bags
8-	Grout	
	a) Grout mix used	47 lb sack cement, 2.5 lb bentonite, 4 gal H2O
	b) Method of placement	Pour from surface with shovels
	c) Vol. of well casing grout	13- 47 lb sacks cement
	Development method	Surging with surge block by hand and pumping
	Development time	2 hours.
	Estimated purge volume	98 gallons

Comments Bottom well to 44.13 bgs bottom cap flat, 0.3ft

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	WELL NUMBER MW-12	SHEET 2 OF 2

WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 (PI-4) LOCATION :Vieques, PR SWMU 20 (PI-4) DATE11/17/11

NOTES

SOP(s) used (refer to SOP Log)? D-1, D-2, D-3, E-1, E-2, H-1, H-2

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

11/14/11 Drilled hole in preparation for setting well, hit water at 33 ft bgs, possibly shallower using 2-1/4-inch HSAs. TD on 2-1/4-inch HSAs at 48 ft bgs. Pulled back augers and hloe collapsed to 35 ft bgs.

11/17/11, Video boring of SB-17, 4-1-4-inch ID augers to 45 ft. Plug broke at first attempt, plus dropped rods down hole. , fished them out, drilled back down again to 45 ft bgs with 4-1/4-inch augers. Set well.

Used 6/20 sand with approval of PM. Sand is slightly coarser than specified, but will work fine.

Sampler Signature: Stephen Brand Date: 11/17/2011

PROJECT NUMBER	WELL NUMBER		
403743.FI.FK.P4	MW-13	SHEET 1	OF 2

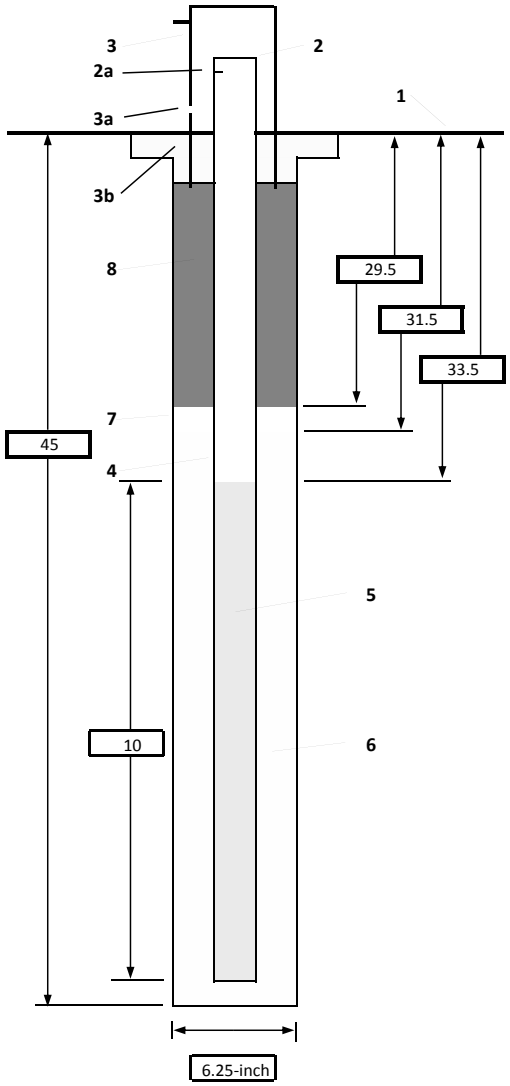
WELL COMPLETION DIAGRAM

PROJECT : PI-4 (SWMU 20) Supplemental expanded Site Inspection. LOCATION : East Vieques, PR

DRILLING CONTRACTOR : Pedro Panzardi and Associates (PPA)

DRILLING METHOD AND EQUIPMENT USED : Mobile Drill B61-HDX with 2-1/4-inch ID augers and 6.25-inch air hammer, external IR750 compressor.

WATER LEVELS : START : 11/30/11:1257 END : 12/01/11:1535 LOGGER : K. Butler



1- Ground elevation at well	35.83' agl
2- Top of casing elevation	
a) vent hole?	
3- Wellhead protection cover type	5-ft (3 ft above ground) steel square casing
a) weep hole?	yes
b) concrete pad dimensions	3 ft X 3 ft by 4-inches,
4- Dia./type of well casing	2-inch schedule 40 PVC
5- Type/slot size of screen	10 slot schedule 40 PVC
6- Type screen filter	Standard sand (60/20)
a) Quantity used	10 bags, 50 lbs each.
7- Type of seal	3/8-inch hole plug bentonite chips
a) Quantity used	1 bag chips
8- Grout	
a) Grout mix used	96 lbs of cement, 5 lbs bentonite, 6 gal. H2O
b) Method of placement	Poured from surface
c) Vol. of well casing grout	Approx. 55 gallons
Development method	Surge and pump
Development time	Approximately 4 hours
Estimated purge volume	Approximately 130 gallons

Comments Very hard drilling from about 27 to 30 ft bgs.
Well cap

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	WELL NUMBER **MW-13**	SHEET 2 OF 2
	WELL COMPLETION DIAGRAM		

PROJECT : LOCATION :Vieques, PR SWMU 20 (PI-4) DATE: 12/01/11

NOTES

SOP(s) used (refer to SOP Log)?

Were all requirements of the SAP, PIs and above mentioned SOP(s) met?

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Sampler Signature: Kenji Butler Date: 12/1/2011

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	MW-13D	SHEET 1 OF 1

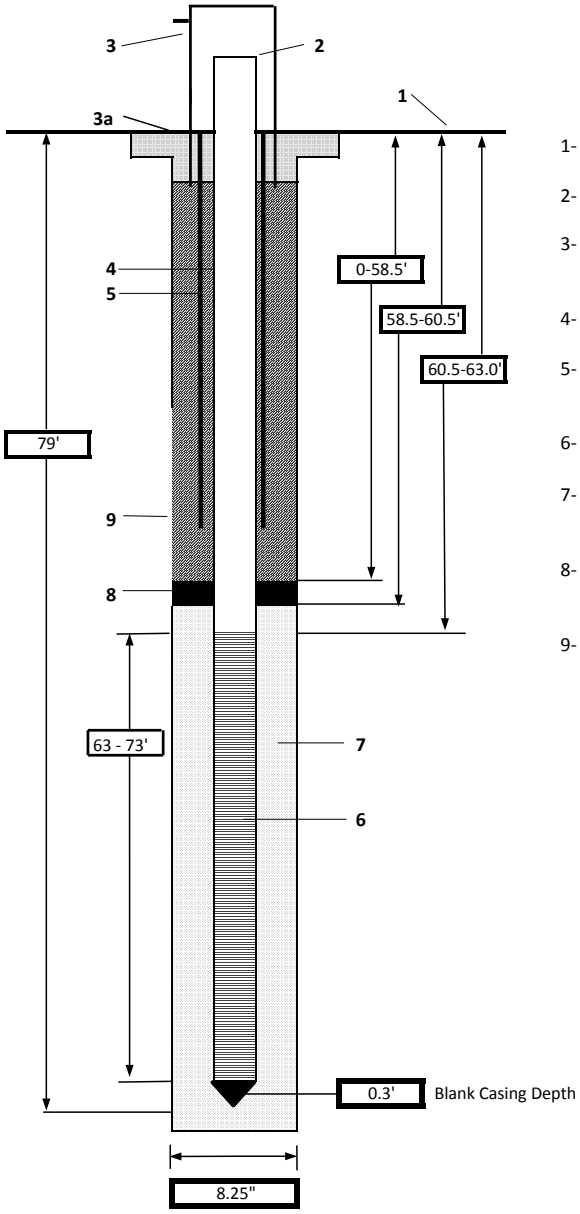
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | Date: 06/24/13

DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller:

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 with 4 1/4" hollow stemmed augers and 6" air hammer

WATER LEVEL : 38.00 ft bTOC | START : 06/24/13 0600 | END : 06/24/13 0915 | LOGGER : T. Horn



1- Ground elevation at well	TBD
2- Top of casing elevation	33.455 ft above msl
3- Wellhead protection cover type	4" x 4" square top aluminum riser
a) concrete pad dimensions	3' wide x 3' long x 6" deep
4- Dia./type of well casing	2" ID Schedule 40 PVC
5- Dia./type of outer casing	3.5" ID PVC casing
Depth of outer casing	0-54 ft bgs
6- Screen slot size	0.010 slot
7- Type screen filter	#2 Silica Sand
a) Quantity used	2- 50 lb bags
8- Type of seal	3/8" bentonite pellets Haliburton Hole Plug
a) Quantity used	15 lbs
9- Grout	
a) Grout mix used	Ponce cement/5% bentonite powder/H_2O
b) Method of placement	from surface
c) Vol. of well casing grout	Not Recorded
Development Method	Hurricane Pump/Surge Block
Development Volume	52 gallons
Completed Development	06/27/13 1010

Comments

PROJECT NUMBER	WELL NUMBER		
403743.FI.FK.P4	MW-14	SHEET 1	OF 2

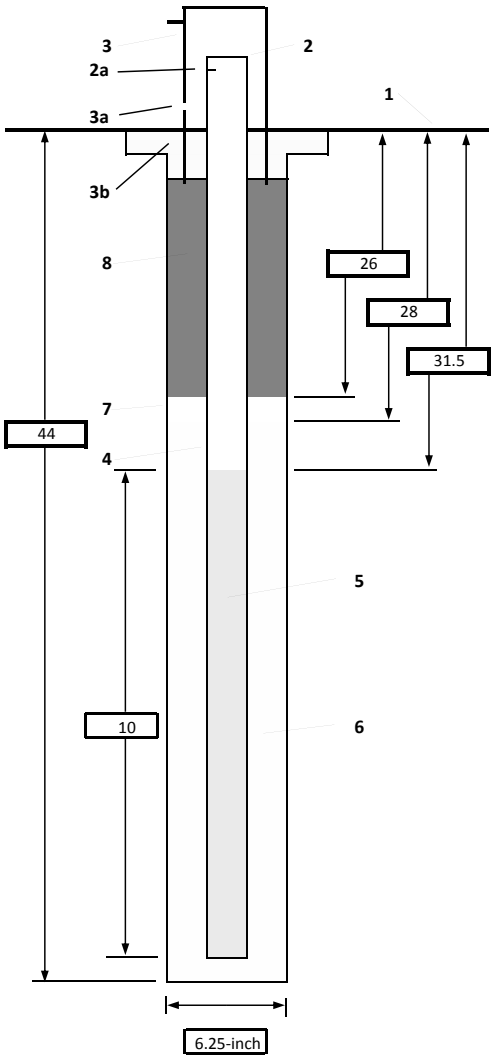
WELL COMPLETION DIAGRAM

PROJECT : PI-4 (SWMU-20) Supplemental expanded Site Inspection. LOCATION : East Vieques, PR

DRILLING CONTRACTOR : Pedro Panzardi and Associates (PPA)

DRILLING METHOD AND EQUIPMENT USED : Mobile Drill B61-HDX with 2-1/4-inch ID augers and 6.25-inch air hammer, external IR750 compressor.

WATER LEVELS : START : 12/01/11:0845 END : 12/02/11:0900 LOGGER : S. Brand



1- Ground elevation at well	33.78' agl
2- Top of casing elevation	
a) vent hole?	
3- Wellhead protection cover type	5-ft (3 ft above ground) steel square casing
a) weep hole?	Yes
b) concrete pad dimensions	3-ft X3-ft X4-inch
4- Dia./type of well casing	2-inch Schedule 40 PVC
5- Type/slot size of screen	10 slot 2-inch schedule 40 PVC
6- Type screen filter	Standard sand (60/20)
a) Quantity used	9 bags, 50 lbs each
7- Type of seal	Bentonite chips, 3/8-inch hole plug.
a) Quantity used	1.5 bags 50 lbs each
8- Grout	
a) Grout mix used	96 lbs of cement, 5 lbs of bentonite, 6 gals H2O
b) Method of placement	Poured from surface
c) Vol. of well casing grout	45 gallons grout
Development method	surge and pump with hurricane pump
Development time	Approximately 3 hours 30 minutes
Estimated purge volume	Approximately 100 gallons

Comments A little bit of rock material at 18 ft, tough material from 22 to 27 ft bgs.

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	WELL NUMBER **MW-14**	SHEET 2 OF 2
	WELL COMPLETION DIAGRAM		

PROJECT : LOCATION :Vieques, PR SWMU 20 (PI-4) DATE: 12/02/11

NOTES

SOP(s) used (refer to SOP Log)?

Were all requirements of the SAP, PIs and above mentioned SOP(s) met?

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Sampler Signature: Stephen Brand Date: 12/2/2011

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	MW-15	SHEET 1 OF 1

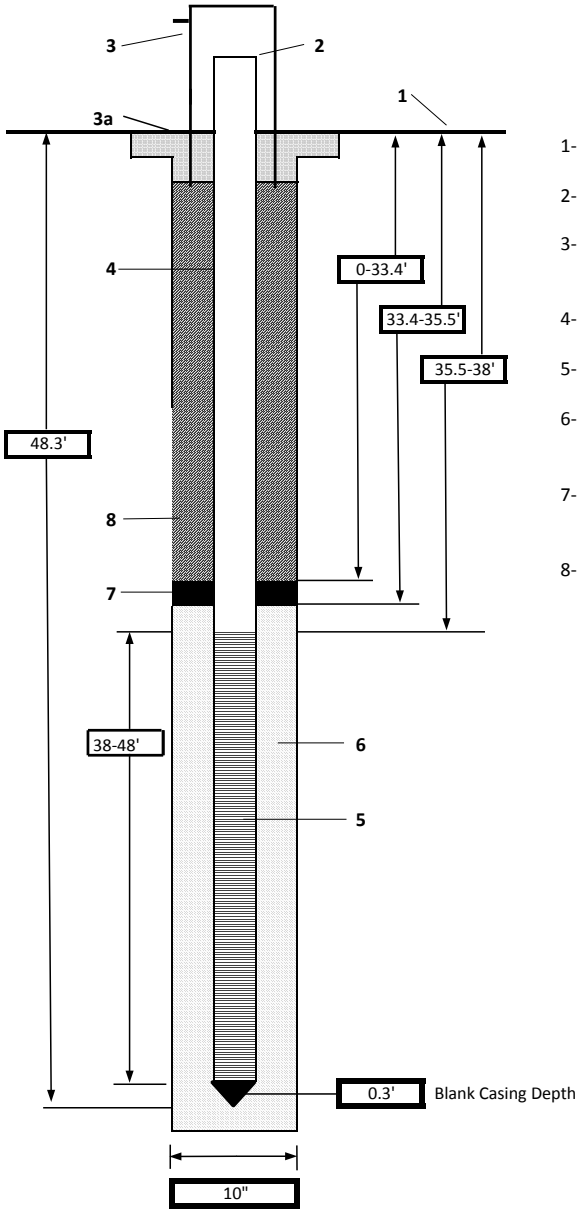
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico Date: 05/21/13

DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Todd Muench

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 with 6 5/8" hollow stemmed augers and 6" air hammer

WATER LEVEL : 38.88 ft bTOC START : 05/21/13 1447 END : 05/23/13 1514 LOGGER : S. Brand



1- Ground elevation at well	TBD
2- Top of casing elevation	38.579 ft above msl
3- Wellhead protection cover type	4" x 4" square top aluminum riser
a) concrete pad dimensions	3' wide x 3' long x 6" deep
4- Dia./type of well casing	2" ID Schedule 40 PVC
5- Screen type/slot size	0.010 slot
6- Type screen filter	#2 Silica Sand
a) Quantity used	13- 50 lb bags
7- Type of seal	3/8" bentonite pellets Haliburton Hole Plug
a) Quantity used	1.5 - 50 lb bags
8- Grout	
a) Grout mix used	Ponce cement/5% bentonite powder/H_2O
b) Method of placement	from surface
c) Vol. of well casing grout	16- 47 lb bags cement/~200 gallons
Development Method	Monsoon Pump/Surge Block
Development Volume	86 gallons
Completed Development	05/29/13 1151

Comments

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	MW-16	SHEET 1 OF 1

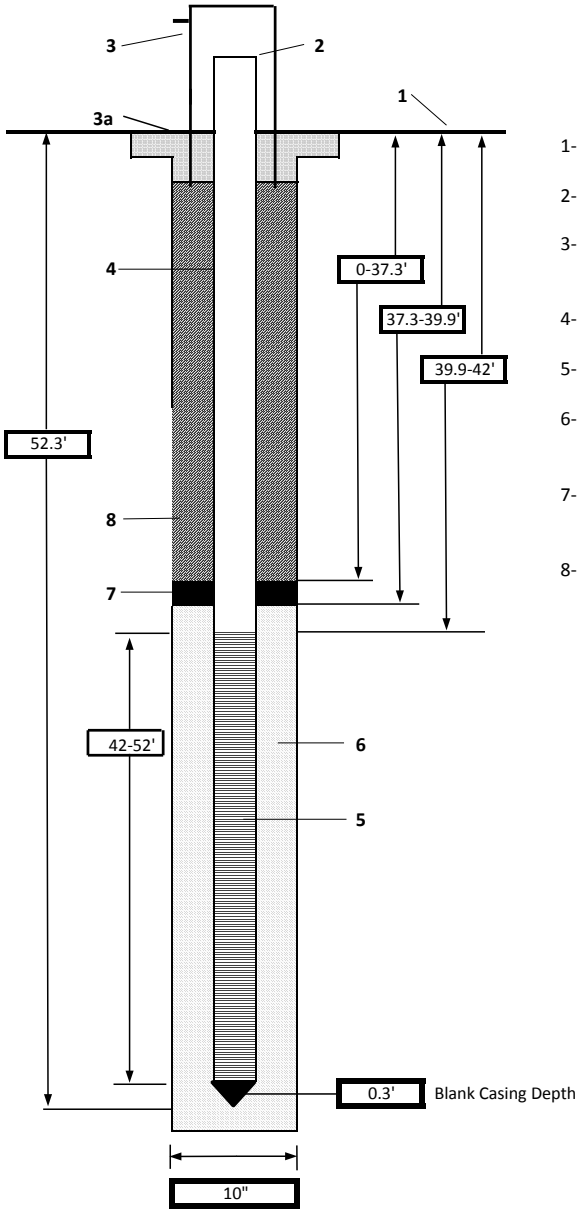
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico Date: 05/15/13

DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Todd Muench

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 with 6 5/8" hollow stemmed augers and 6" air hammer

WATER LEVEL : 36.36 ft bTOC START : 05/15/13 0656 END : 05/17/13 1608 LOGGER : S. Brand



1- Ground elevation at well	TBD
2- Top of casing elevation	35.692 ft above msl
3- Wellhead protection cover type	4" x 4" square top aluminum riser
a) concrete pad dimensions	3' wide x 3' long x 6" deep
4- Dia./type of well casing	2" ID Schedule 40 PVC
5- Screen type/slot size	0.010 slot
6- Type screen filter	#2 Silica Sand
a) Quantity used	14- 50 lb bags
7- Type of seal	3/8" bentonite pellets Haliburton Hole Plug
a) Quantity used	1.5 - 50 lb bags
8- Grout	
a) Grout mix used	Ponce cement/5% bentonite powder/H_2O
b) Method of placement	from surface
c) Vol. of well casing grout	24- 47 lb bags cement
Development Method	Stainless Steel Geosub Pump/Surge Block
Development Volume	133 gallons
Completed Development	05/31/13 1317

Comments

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	MW-17	SHEET 1 OF 1

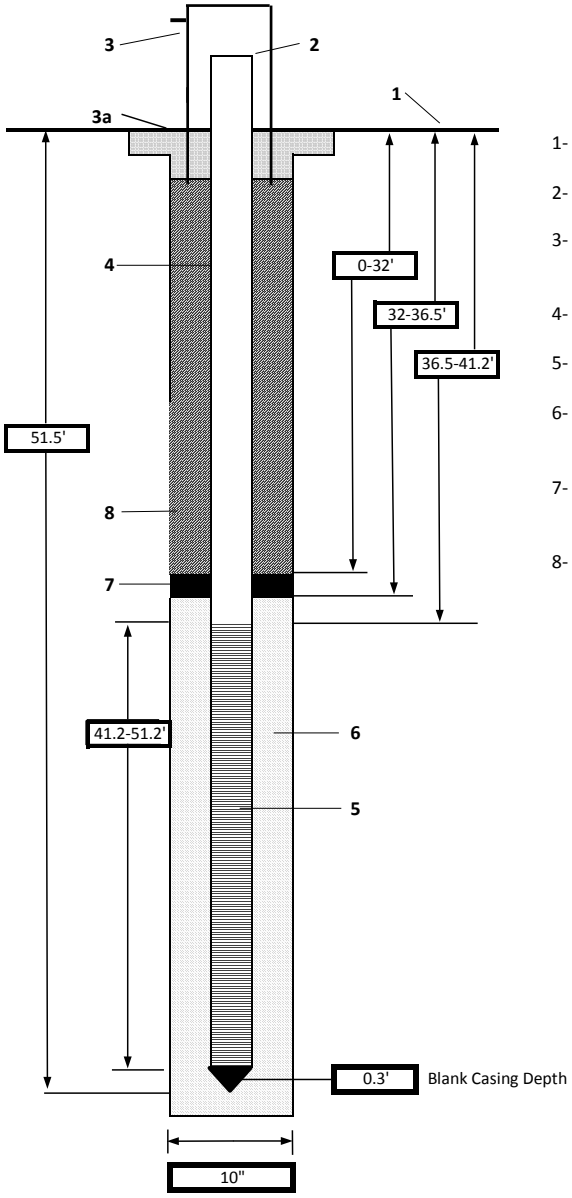
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico Date: 05/28/13

DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Todd Muench

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 with 6 5/8" hollow stemmed augers and 6" air hammer

WATER LEVEL : 33.72 ft bTOC START : 05/28/13 1210 END : 05/29/13 1310 LOGGER : S. Brand



1- Ground elevation at well	TBD
2- Top of casing elevation	32.067 ft above msl
3- Wellhead protection cover type	4" x 4" square top aluminum riser
a) concrete pad dimensions	3' wide x 3' long x 6" deep
4- Dia./type of well casing	2" ID Schedule 40 PVC
5- Screen type/slot size	0.010 slot
6- Type screen filter	#2 Silica Sand and # 1 Silica Sand
a) Quantity used	4- 50 lb bags (#2) / 1- 50 lb bag (#1)
7- Type of seal	3/8" bentonite pellets Haliburton Hole Plug
a) Quantity used	1.5 - 50 lb bags
8- Grout	
a) Grout mix used	Ponce cement/5% bentonite powder/H_2O
b) Method of placement	from surface
c) Vol. of well casing grout	~100 gallons
Development Method	Stainless Steel Geosub Pump/Surge Block
Development Volume	133 gallons
Completed Development	05/31/13 1317

Comments

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	MW-17D	SHEET 1 OF 1

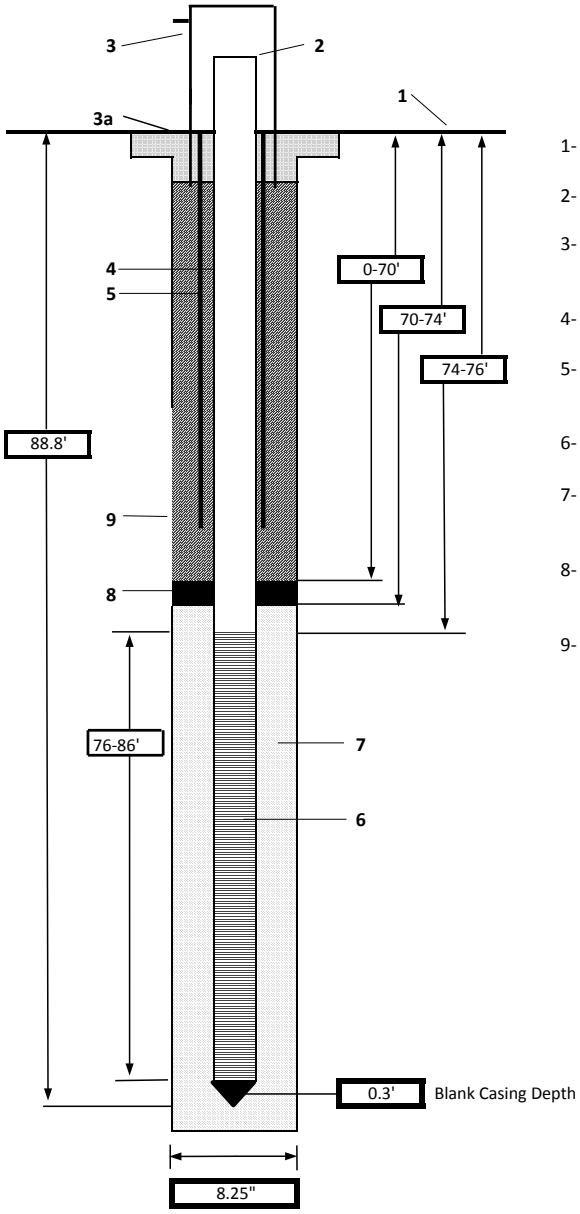
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico Date: 06/24/13

DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller:

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 with 4 1/4" hollow stemmed augers and 6" air hammer

WATER LEVEL : 33.85 ft bTOC START : 06/24/13 0600 END : 06/24/13 0915 LOGGER : T. Horn



1- Ground elevation at well	TBD
2- Top of casing elevation	32.047 ft above msl
3- Wellhead protection cover type	4" x 4" square top aluminum riser
a) concrete pad dimensions	3' wide x 3' long x 6" deep
4- Dia./type of well casing	2" ID Schedule 40 PVC
5- Dia./type of outer casing	3.5" ID PVC casing
Depth of outer casing	0-63 ft bgs
6- Screen slot size	0.010 slot
7- Type screen filter	#2 Silica Sand
a) Quantity used	2.5- 50 lb bags
8- Type of seal	3/8" bentonite pellets Haliburton Hole Plug
a) Quantity used	11 lbs
9- Grout	
a) Grout mix used	Ponce cement/5% bentonite powder/H_2O
b) Method of placement	from surface
c) Vol. of well casing grout	4-47 lb bags cement/5 lb bentonite/ 20 gallons water
Development Method	Hurricane Pump/Surge Block
Development Volume	48.80 gallons
Completed Development	06/27/13 1105

Comments

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	MW-18	SHEET 1 OF 1

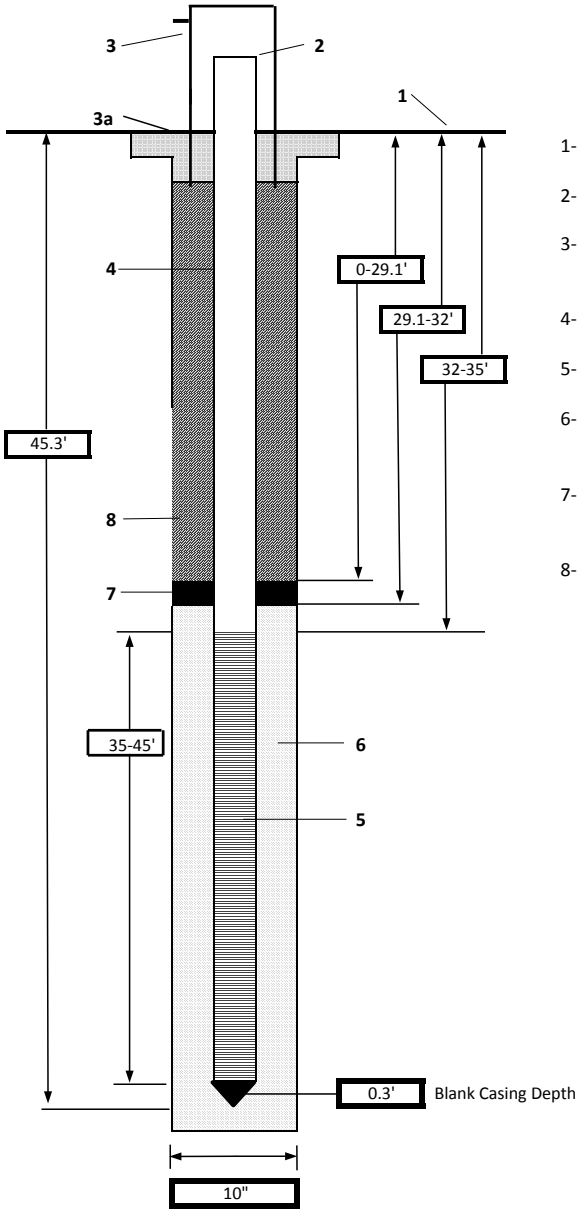
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico Date: 05/17/13

DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Todd Muench

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 with 6 5/8" hollow stemmed augers and 6" air hammer

WATER LEVEL : 30.34 ft bTOC START : 05/17/13 0945 END : 05/21/13 1206 LOGGER : S. Brand



1- Ground elevation at well	TBD
2- Top of casing elevation	28.937 ft above msl
3- Wellhead protection cover type	4" x 4" square top aluminum riser
a) concrete pad dimensions	3' wide x 3' long x 6" deep
4- Dia./type of well casing	2" ID Schedule 40 PVC
5- Screen type/slot size	0.010 slot
6- Type screen filter	#2 Silica Sand
a) Quantity used	13.5- 50 lb bags
7- Type of seal	3/8" bentonite pellets Haliburton Hole Plug
a) Quantity used	1.5 - 50 lb bags
8- Grout	
a) Grout mix used	Ponce cement/5% bentonite powder/H_2O
b) Method of placement	from surface
c) Vol. of well casing grout	~130 gallons
Development Method	Hurricane Pump/Surge Block
Development Volume	129 gallons
Completed Development	05/30/13 1315

Comments

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	MW-19	SHEET 1 OF 1

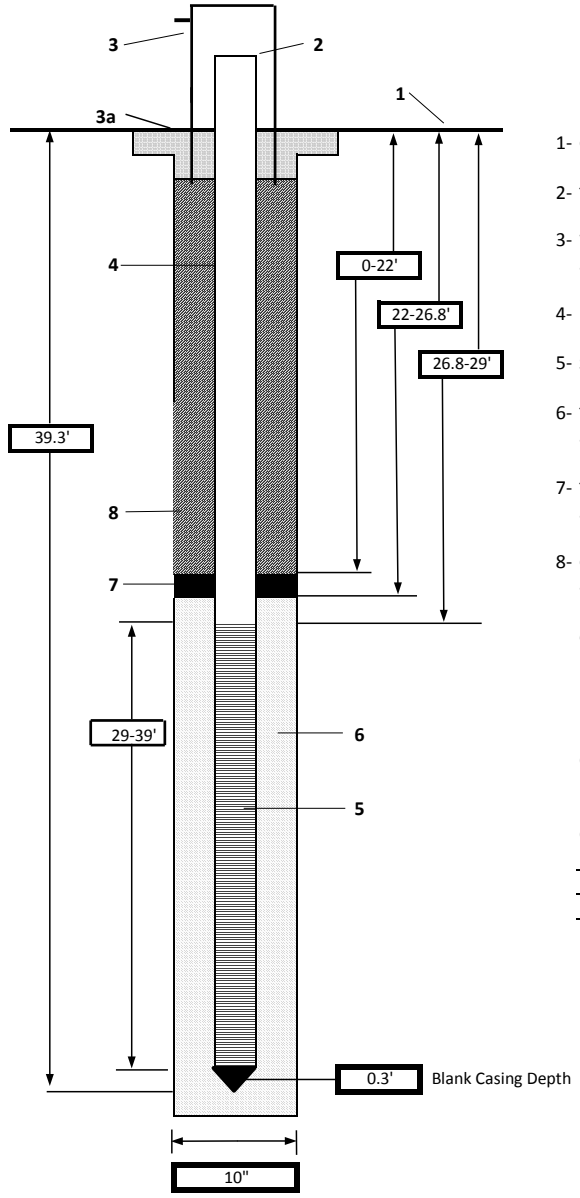
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico Date: 05/14/13

DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Todd Muench

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 with 6 5/8" hollow stemmed augers and 6" air hammer

WATER LEVEL : 27.30 ft bTOC START : 05/13/13 1520 END : 05/17/13 0922 LOGGER : S. Brand



1- Ground elevation at well	TBD
2- Top of casing elevation	28.346 ft above msl
3- Wellhead protection cover type	4" x 4" square top aluminum riser
a) concrete pad dimensions	3' wide x 3' long x 6" deep
4- Dia./type of well casing	2" ID Schedule 40 PVC
5- Screen type/slot size	0.010 slot
6- Type screen filter	#2 Silica Sand
a) Quantity used	12.5- 50 lb bags
7- Type of seal	3/8" bentonite pellets Haliburton Hole Plug
a) Quantity used	5 - 50 lb bags
8- Grout	
a) Grout mix used	Ponce cement/5% bentonite powder/H_2O
b) Method of placement	from surface
c) Vol. of well casing grout	~165 gallons
Development Method	Hurricane Pump/Surge Block
Development Volume	102 gallons
Completed Development	05/28/13 1506

Comments

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	MW-20	SHEET 1 OF 1

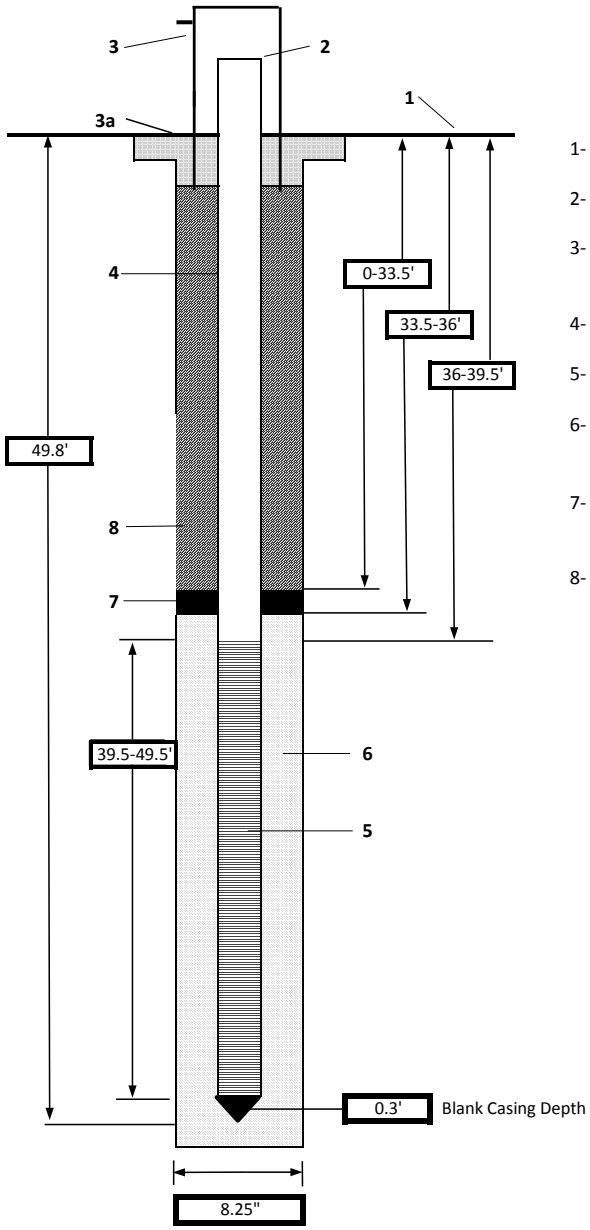
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico Date: 06/10/13

DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Todd Muench

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 with 4 1/4" hollow stemmed augers and 6" air hammer

WATER LEVEL : 34.90 ft bTOC START : 06/10/13 0910 END : 06/10/13 0830 LOGGER : D. Whitaker



1- Ground elevation at well	TBD
2- Top of casing elevation	32.762 ft above msl
3- Wellhead protection cover type	4" x 4" square top aluminum riser
a) concrete pad dimensions	3' wide x 3' long x 6" deep
4- Dia./type of well casing	2" ID Schedule 40 PVC
5- Screen type/slot size	0.010 slot
6- Type screen filter	#2 Silica Sand
a) Quantity used	6.5- 50 lb bags
7- Type of seal	3/8" bentonite pellets Haliburton Hole Plug
a) Quantity used	1 - 50 lb bag
8- Grout	
a) Grout mix used	Ponce cement/5% bentonite powder/H_2O
b) Method of placement	from surface
c) Vol. of well casing grout	12-47 lb bags cement &95 gallons water
Development Method	Monsoon Pump/Surge Block
Development Volume	118 gallons
Completed Development	06/13/13 1120

Comments

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	MW-21	SHEET 1 OF 1

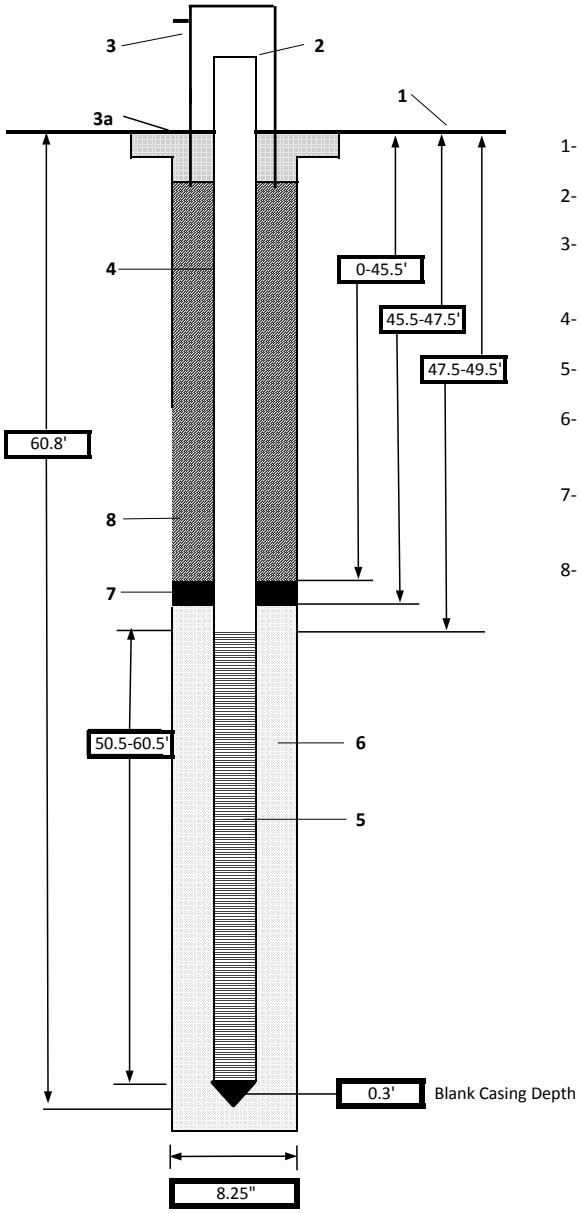
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico Date: 06/21/13

DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Todd Muench

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 with 4 1/4" hollow stemmed augers and 6" air hammer

WATER LEVEL : 50.00 ft bTOC START : 06/21/13 0900 END : 06/21/13 1200 LOGGER : D. Whitaker



1- Ground elevation at well	TBD
2- Top of casing elevation	34.081 ft above msl
3- Wellhead protection cover type	4" x 4" square top aluminum riser
a) concrete pad dimensions	3' wide x 3' long x 6" deep
4- Dia./type of well casing	2" ID Schedule 40 PVC
5- Screen type/slot size	0.010 slot
6- Type screen filter	#2 Silica Sand
a) Quantity used	6- 50 lb bags
7- Type of seal	3/8" bentonite pellets Haliburton Hole Plug
a) Quantity used	1- 50 lb bag
8- Grout	
a) Grout mix used	Ponce cement/5% bentonite powder/H_2O
b) Method of placement	from surface
c) Vol. of well casing grout	15-47 lb bags cement/12 lb bentonite/ 80 gallons water
Development Method	Hurricane Pump/Surge Block
Development Volume	216.5 gallons
Completed Development	06/27/13 0835

Comments

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	MW-22	SHEET 1 OF 1

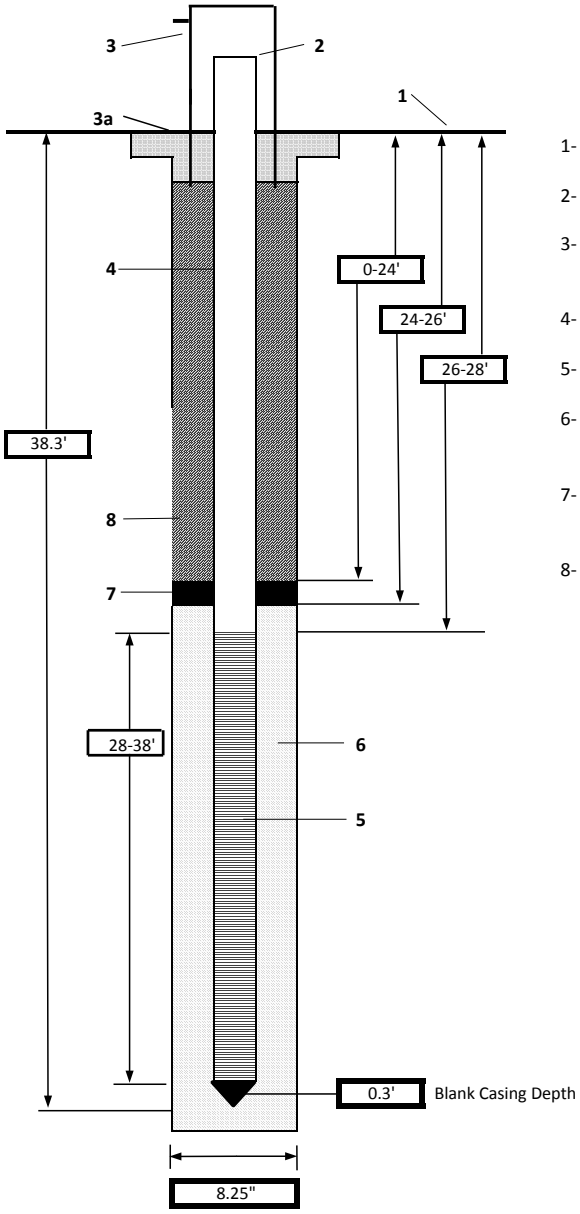
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico Date: 06/18/13

DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Todd Muench

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 with 4 1/4" hollow stemmed augers and 6" air hammer

WATER LEVEL : 28.00 ft bTOC START : 06/18/13 0815 END : 06/19/13 1130 LOGGER : D. Whitaker



1- Ground elevation at well	TBD
2- Top of casing elevation	29.167 ft above msl
3- Wellhead protection cover type	4" x 4" square top aluminum riser
a) concrete pad dimensions	3' wide x 3' long x 6" deep
4- Dia./type of well casing	2" ID Schedule 40 PVC
5- Screen type/slot size	0.010 slot
6- Type screen filter	#2 Silica Sand
a) Quantity used	5- 50 lb bags
7- Type of seal	3/8" bentonite pellets Haliburton Hole Plug
a) Quantity used	1- 50 lb bag
8- Grout	
a) Grout mix used	Ponce cement/5% bentonite powder/H_2O
b) Method of placement	from surface
c) Vol. of well casing grout	8-47 lb bags cement/5 lb bentonite/ 45 gallons water
Development Method	Monsoon Pump/Surge Block
Development Volume	150 gallons
Completed Development	06/21/13 1145

Comments

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	MW-23	SHEET 1 OF 1

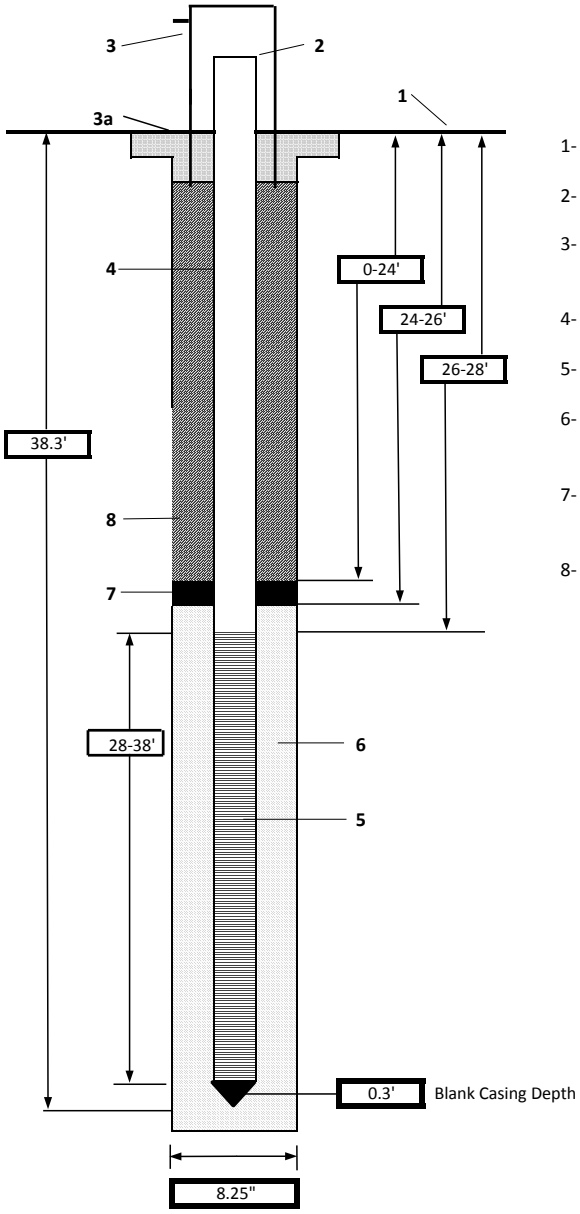
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico Date: 06/19/13

DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Todd Muench

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 with 4 1/4" hollow stemmed augers and 6" air hammer

WATER LEVEL : 28.00 ft bTOC START : 06/19/13 0630 END : 06/19/13 1220 LOGGER : D. Whitaker



1- Ground elevation at well	TBD
2- Top of casing elevation	27.91 ft above msl
3- Wellhead protection cover type	4" x 4" square top aluminum riser
a) concrete pad dimensions	3' wide x 3' long x 6" deep
4- Dia./type of well casing	2" ID Schedule 40 PVC
5- Screen type/slot size	0.010 slot
6- Type screen filter	#2 Silica Sand
a) Quantity used	6- 50 lb bags
7- Type of seal	3/8" bentonite pellets Haliburton Hole Plug
a) Quantity used	1- 50 lb bag
8- Grout	
a) Grout mix used	Ponce cement/5% bentonite powder/H_2O
b) Method of placement	from surface
c) Vol. of well casing grout	8-47 lb bags cement/5 lb bentonite/ 45 gallons water
Development Method	Monsoon Pump/Surge Block
Development Volume	110 gallons
Completed Development	07/19/13 1320

Comments

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	MW-24	SHEET 1 OF 1

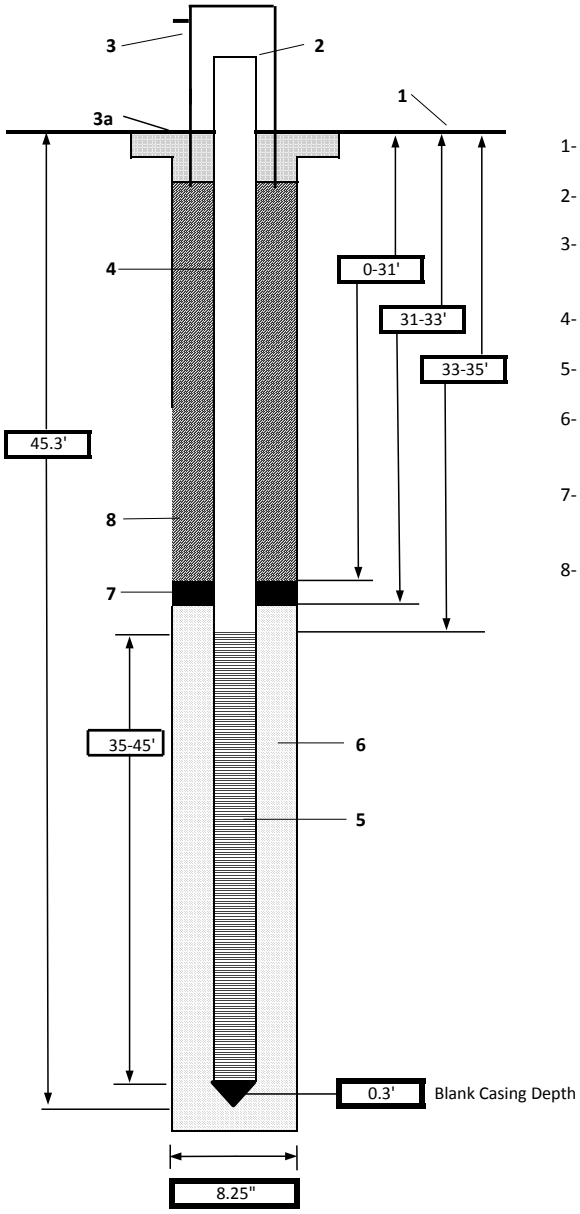
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico Date: 06/20/13

DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Todd Muench

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 with 4 1/4" hollow stemmed augers and 6" air hammer

WATER LEVEL : 32.00 ft bTOC START : 06/20/13 0940 END : 06/20/13 1450 LOGGER : D. Whitaker



1- Ground elevation at well	TBD
2- Top of casing elevation	27.858 ft above msl
3- Wellhead protection cover type	4" x 4" square top aluminum riser
a) concrete pad dimensions	3' wide x 3' long x 6" deep
4- Dia./type of well casing	2" ID Schedule 40 PVC
5- Screen type/slot size	0.010 slot
6- Type screen filter	#2 Silica Sand
a) Quantity used	2- 50 lb bags
7- Type of seal	3/8" bentonite pellets Haliburton Hole Plug
a) Quantity used	1- 50 lb bag
8- Grout	
a) Grout mix used	Ponce cement/5% bentonite powder/H_2O
b) Method of placement	from surface
c) Vol. of well casing grout	~75 gallons
Development Method	Hurricane Pump/Surge Block
Development Volume	190 gallons
Completed Development	07/22/13 1345

Comments

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	MW-24D	SHEET 1 OF 1

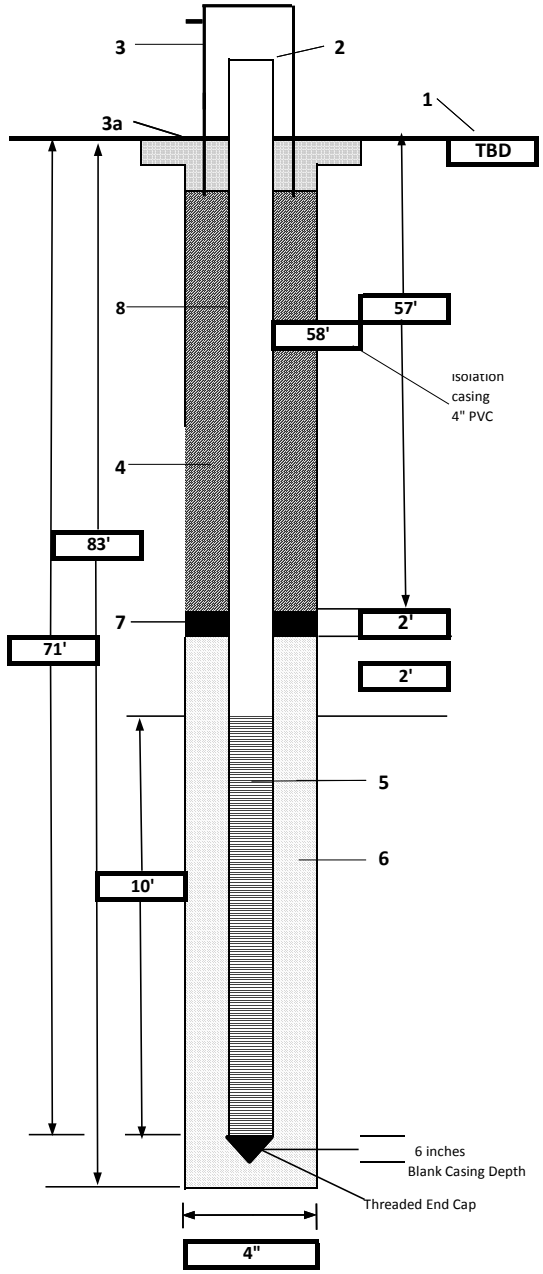
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | Date: 09/12/2014

DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 with 6 5/8" hollow stemmed augers and 3 7/8" roller cone set (air rotary)

WATER LEVEL : | START : 1100 8/19/2014 | END : 9/12/2014 | LOGGER : R. Fields



1-	Ground elevation at well	TBD
2-	Top of casing elevation	28.31 ft
	a) vent hole?	yes
3-	Wellhead protection cover type	Stick-up Aluminum Box
	a) weep hole?	
	b) concrete pad dimensions	3'X3'X6"
4-	Dia./type of well casing	2" dia sch 40 PVC
5-	Screen type/slot size	0.010" PVC
6-	Type screen filter	#2 sand
	a) Quantity used	1.5 - 50 lb bag
7-	Type of seal	3/8" bentonite quick 6 oz
	a) Quantity used	1/3-50 lb bag
8-	Grout	
	a) Grout mix used	7 gal H2O to 94 lb portland (5% Bentonite)
	b) Method of placement	3/4" tremie pipe
	c) Vol. of well casing grout	6 gal
	Development Method	surge block and submersible pump
	Development Volume	49 gal
	Completed Development	

Comments: Deep well: isolation casing @ 58' bgs (6" PVC), borehole was taken down to about 83' bgs drilling 3 3/8' tremie roller set (air rotary) performed caliper (geophysical) exercise to determine optimum screen interval (61-71' bgs) backfilled borehole to 75' bgs with Bentonite (3/4 - 50 lb bag) backfilled to 71 bgs with sand 3/4 - 50 lb bag

*Note: isolation casing (4" PVC) from 0-58' bgs

Sampler Signature: R. Fields | Date: 09/12/14

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	MW-25	SHEET 1 OF 1

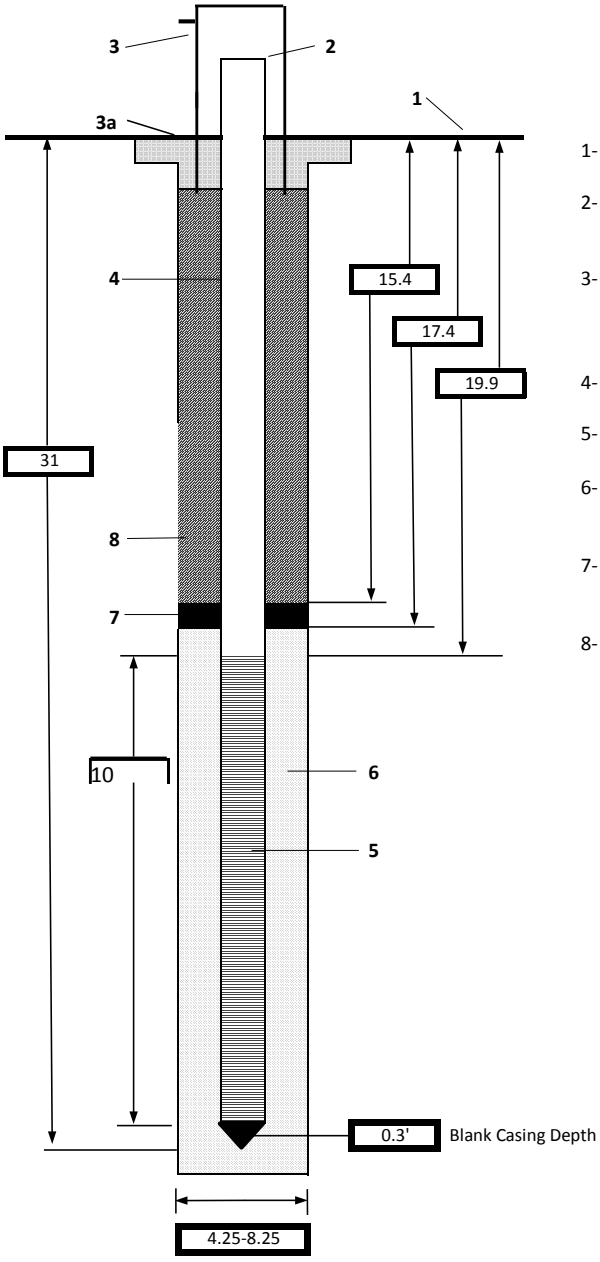
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico Date: 8/27/2013

DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 with 6 5/8" hollow stemmed augers and 6" air hammer

WATER LEVEL : START : 1500 8/26/2013 END : 1138 08/27/2013 LOGGER : S. Brand



1- Ground elevation at well	TBD
2- Top of casing elevation	19.00 ft
a) vent hole?	Yes
3- Wellhead protection cover type	Stick-up Aluminum Box
a) weep hole?	Yes
a) concrete pad dimensions	3' wide x 3' long x 6" deep sloped from well
4- Dia./type of well casing	1" Sched 40 PVC Flush joint with "O" ring
5- Screen type/slot size	0.010 slot
6- Type screen filter	#2 Silica Sand
a) Quantity used	6.66-50lb bags
7- Type of seal	3/8" bentonite pellets Haliburton Hole Plug
a) Quantity used	1-50 lb bag
8- Grout	
a) Grout mix used	5 bags, ~25 gall H2O, w/5/6 bent
b) Method of placement	Poured from surface
c) Vol. of well casing grout	
Development Method	Surge block on PVC and Pump
Development Volume	
Completed Development	

Comments Bottom Car screv on 19.9-30.2

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	MW-25D	SHEET 1 OF 1

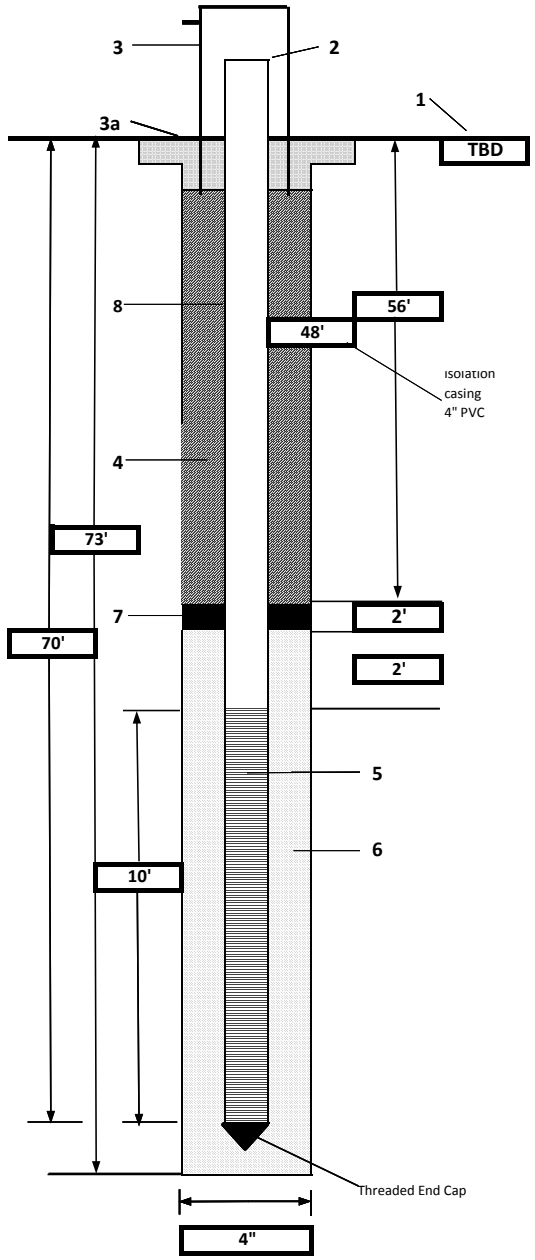
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | Date: 09/12/2014

DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 with 6 5/8" hollow stemmed augers and 3 7/8" roller cone set (air rotary)

WATER LEVEL : | START : 0900 8/15/2014 | END : 9/12/2014 | LOGGER : R. Fields



1-	Ground elevation at well	TBD
2-	Top of casing elevation	18.82 ft
	a) vent hole?	
3-	Wellhead protection cover type	Stick-up Aluminum Box
	a) weep hole?	
	b) concrete pad dimensions	3'X3'X6"
4-	Dia./type of well casing	2" dia sch 40 PVC
5-	Screen type/slot size	0.010" PVC
6-	Type screen filter	#2 sand
	a) Quantity used	1.5 - 50 lb bag
7-	Type of seal	3/8" bentonite quickgel
	a) Quantity used	1/5-50 lb bag
8-	Grout	
	a) Grout mix used	7 gal H2O to 94 lb portland (5% Bentonite)
	b) Method of placement	3/4" tremie pipe
	c) Vol. of well casing grout	6 gal
	Development Method	surge block and submersible pump
	Development Volume	82 gal
	Completed Development	

Comments: Deep well: isolation casing set @ 48 bgs (6" PVC), borehole was taken down to 73' bgs (TD). Performed caliper (geophysical) logging to determine optimum screen interval (60-70 bgs). Backfilled borehole to 70' bgs with sand (3/4 - 50 lb bag).

*Note: isolation casing (4" PVC) from 0-48' bgs

Sampler Signature: R. Fields | Date: 09/12/14

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	MW-26	SHEET 1 OF 1

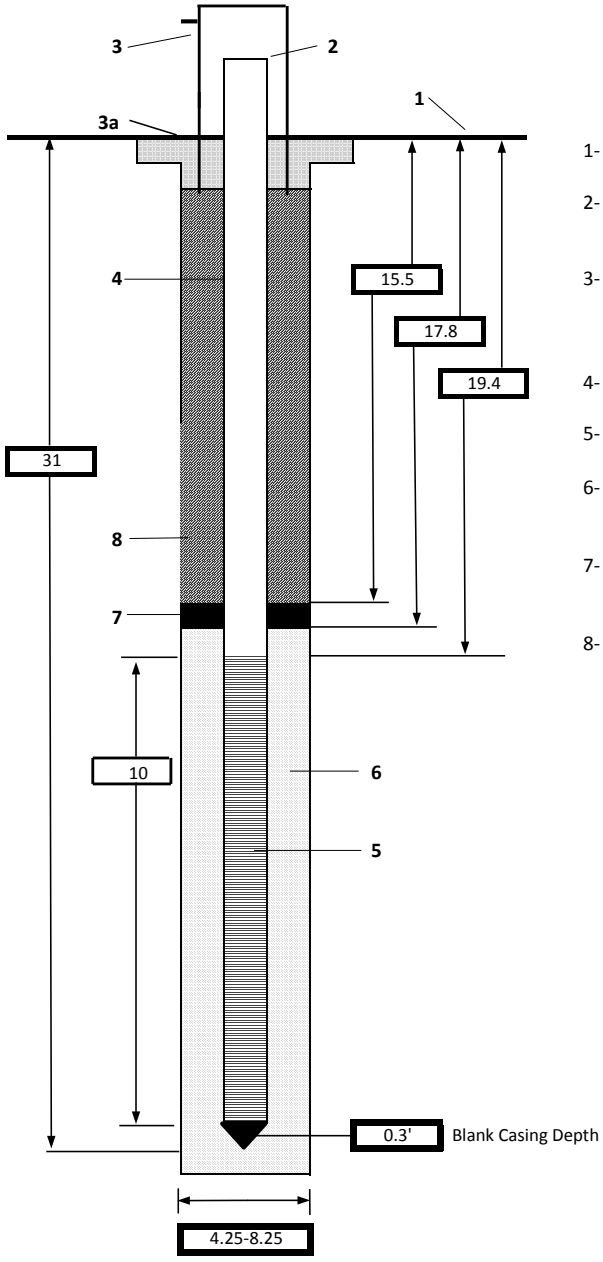
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico Date: 8/20/2013

DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 with 6 5/8" hollow stemmed augers and 6" air hammer

WATER LEVEL : START : 8/20/20013 0820 END : 8/20/13 1359 LOGGER : S. Brand



1- Ground elevation at well	TBD
2- Top of casing elevation	19.95 ft
a) vent hole?	Yes
3- Wellhead protection cover type	Stick-up Aluminum Box
a) weep hole?	Yes
a) concrete pad dimensions	3' wide x 3' long x 6" deep sloped from well
4- Dia./type of well casing	1" Sched 40 PVC Flush joint with "O" ring
5- Screen type/slot size	0.010 slot
6- Type screen filter	#2 Silica Sand
a) Quantity used	
7- Type of seal	3/8" bentonite pellets Haliburton Hole Plug
a) Quantity used	1-50 lbs. bag
8- Grout	
a) Grout mix used	5 Sacks Ponce cement with 35 gall H2O
b) Method of placement	Poured from surface
c) Vol. of well casing grout	~45 gallons with need slurry oft
Development Method	Surge block on PVC and Pump
Development Volume	
Completed Development	

Comments

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	MW-27	SHEET 1 OF 1

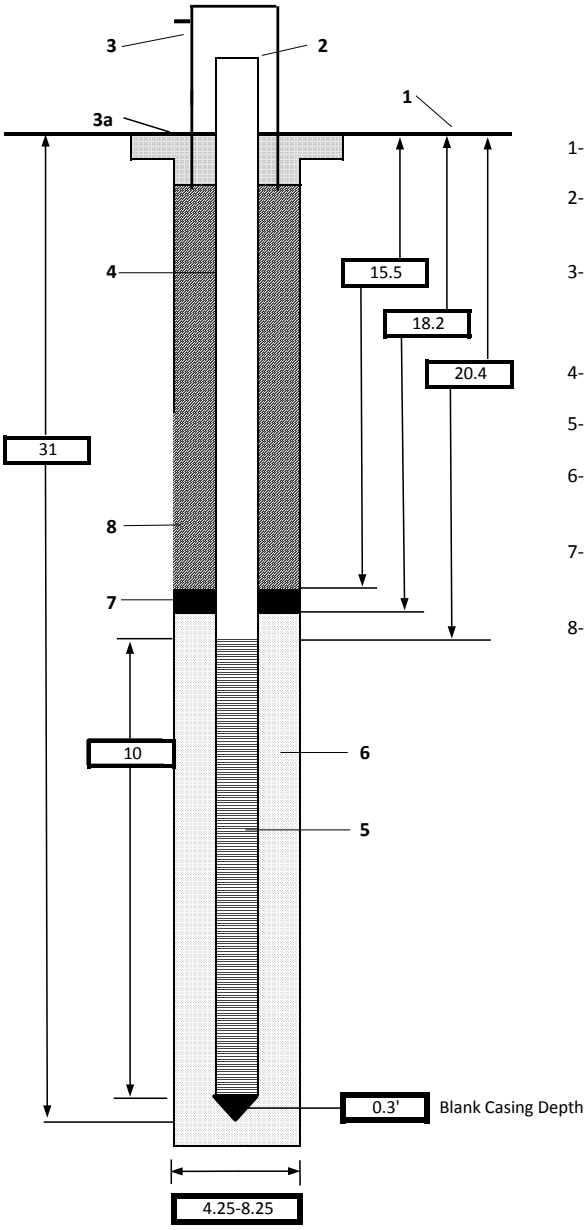
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico Date: 8/28/2013

DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Todd Muench

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 with 6 5/8" hollow stemmed augers and 6" air hammer

WATER LEVEL : START : 1319 8/27/2013 END : 8/28/2013 0733 LOGGER : S. Brand



1- Ground elevation at well	TBD
2- Top of casing elevation	9.42 ft
a) vent hole?	Yes
3- Wellhead protection cover type	Stick-up Aluminum Box
a) weep hole?	Yes
a) concrete pad dimensions	3' wide x 3' long x 6" deep sloped from well
4- Dia./type of well casing	2" Sched 40 PVC Flush joint with "O" ring
5- Screen type/slot size	0.010 slot
6- Type screen filter	#2 Silica Sand and # 1 Silica Sand
a) Quantity used	
7- Type of seal	3/8" bentonite pellets Haliburton Hole Plug
a) Quantity used	Pour from surface
8- Grout	
a) Grout mix used	3 bags ponce to `15 gal H2O to 5 lbs bent
b) Method of placement	Pour from surface
c) Vol. of well casing grout	
Development Method	Surge block on PVC and Pump
Development Volume	
Completed Development	

Comments 0.3' screen bottom cup, 18.2 to 17.5 collapse overnight

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	MW-28	SHEET 1 OF 1

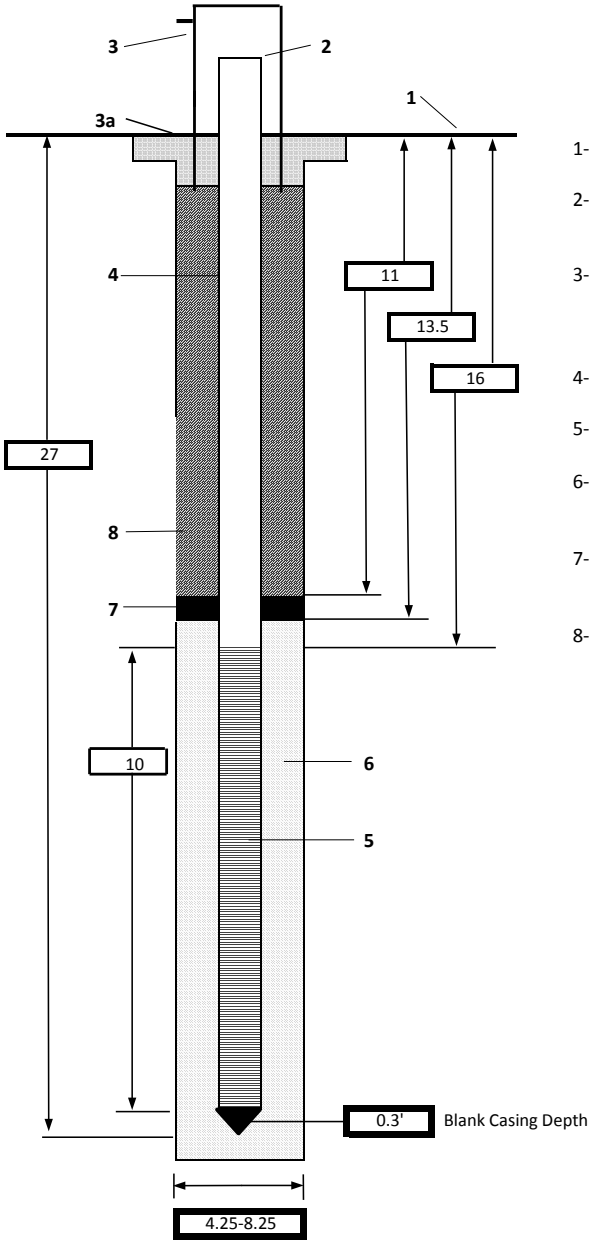
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico Date: 8/29/2013

DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 with 6 5/8" hollow stemmed augers and 6" air hammer

WATER LEVEL : START : 08/29/2013 0710 END : 08/29/2013 1045 LOGGER : S. Brand



1- Ground elevation at well	TBD
2- Top of casing elevation	8.01 ft
a) vent hole?	Yes
3- Wellhead protection cover type	Stick-up Aluminum Box
a) weep hole?	Yes
a) concrete pad dimensions	3' wide x 3' long x 6" deep sloped from well
4- Dia./type of well casing	2" Sched 40 PVC Flush joint with "O" ring
5- Screen type/slot size	0.010 slot
6- Type screen filter	#2 Silica Sand
a) Quantity used	6.5 b ags
7- Type of seal	3/8" bentonite pellets Haliburton Hole Plug
a) Quantity used	1-50 lb bags
8- Grout	
a) Grout mix used	2 bags cement to 10 Gal H2O, w/ 5% bent
b) Method of placement	Poured from surface
c) Vol. of well casing grout	
Development Method	Surge block on PVC and Pump
Development Volume	
Completed Development	

Comments 0.3' bottom cap on bottom of well, Bent nail in road edge is marker for well

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	MW-28D	SHEET 1 OF 1

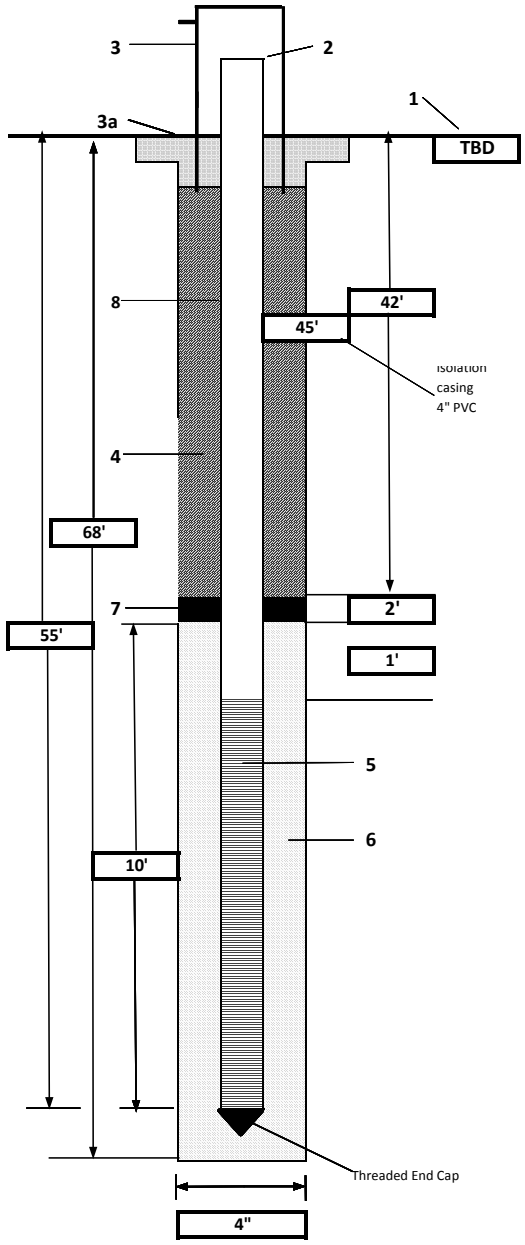
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | Date: 09/12/2014

DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 with 6 5/8" hollow stemmed augers and 3 7/8" roller cone set (air rotary)

WATER LEVEL : | START : 8/20/2014 | END : 9/12/2014 | LOGGER : R. Fields



1-	Ground elevation at well	TBD
2-	Top of casing elevation	7.11 ft
	a) vent hole?	
3-	Wellhead protection cover type	Flush Mount
	a) weep hole?	
	b) concrete pad dimensions	3'X3'X6"
4-	Dia./type of well casing	2" dia sch 40 PVC
5-	Screen type/slot size	0.010" PVC
6-	Type screen filter	#2 sand
	a) Quantity used	6 x 50 lb bag (4.5 bags filter pack, 1.5 bags backfill)
7-	Type of seal	3/8" bentonite quickgel
	a) Quantity used	1/5-50 lb bag
8-	Grout	
	a) Grout mix used	7 gal H2O to 94 lb portland (5% Bentonite)
	b) Method of placement	3/4" tremie pipe
	c) Vol. of well casing grout	5 gal
	Development Method	surge block and submersible pump
	Development Volume	120 gal
	Completed Development	

Comments: Deep well: isolation casing set @ 43 bgs (6" PVC), borehole was taken down to 68' using 3 7/8" tri cone bit/air rotary. Performed caliper (geophysical) and to determine optimum screen interval (45-55' bgs), backfilled borehole to 60' bgs with Bentonite (1.25 bgs), backfilled borehole to 55' with sand (1.25 bag - 50 lbs) bgs). Backfilled borehole to 70' bgs with sand (3/4 - 50 lb bag).

*Note: isolation casing (4" PVC) from 0-43' bgs

Sampler Signature: R. Fields | Date: 09/12/14

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	MW-29	SHEET 1 OF 1

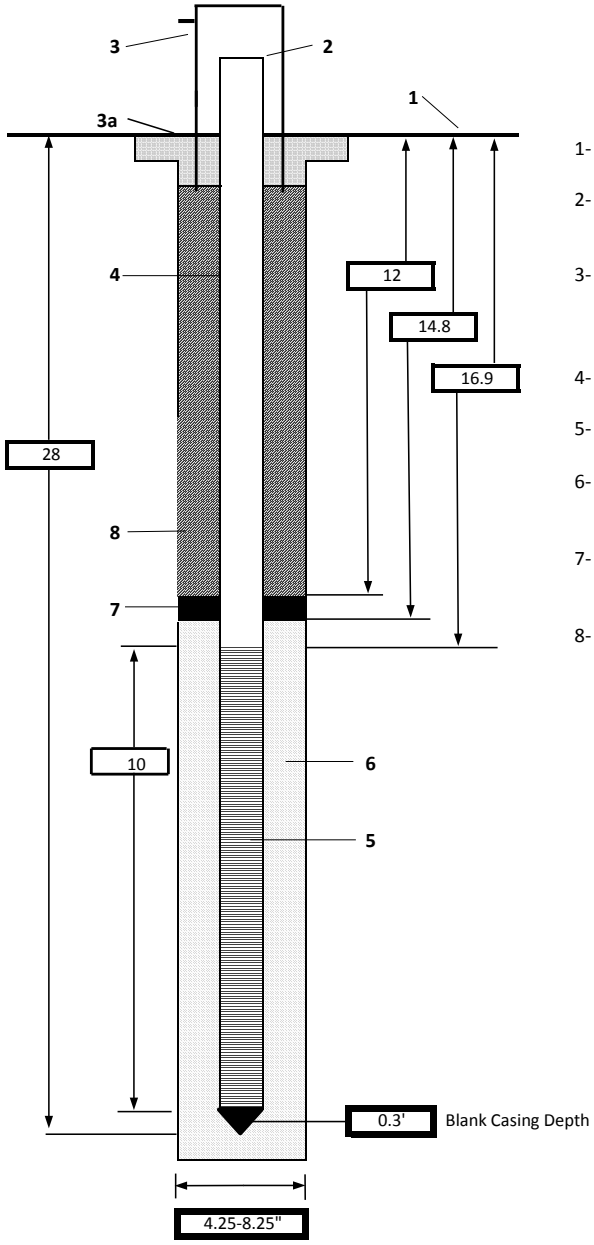
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | Date: 08/28/2013

DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Todd Muench

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 with 6 5/8" hollow stemmed augers and 6" air hammer

WATER LEVEL : | START : 8/28/2013 0935 | END : 8/28/2013 1345 | LOGGER : S. Brand



1- Ground elevation at well	TBD
2- Top of casing elevation	15.35 ft
a) vent hole?	Yes
3- Wellhead protection cover type	Stick-up Aluminum Box
a) weep hole?	Yes
a) concrete pad dimensions	3' wide x 3' long x 6" deep sloped from well
4- Dia./type of well casing	2" Sched 40 PVC Flush joint with "O" ring
5- Screen type/slot size	0.010 slot
6- Type screen filter	#2 Silica Sand
a) Quantity used	6-0.5 CF Sacks
7- Type of seal	3/8" bentonite pellets Haliburton Hole Plug
a) Quantity used	1-50 lb bag
8- Grout	
a) Grout mix used	3 bags ponce cement to 15 gal H2O 5% bent
b) Method of placement	Pour from surface
c) Vol. of well casing grout	
Development Method	Surge block on PVC and Pump
Development Volume	
Completed Development	

Comments Bottom Cup 26.87-27.17

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	MW-30	SHEET 1 OF 1

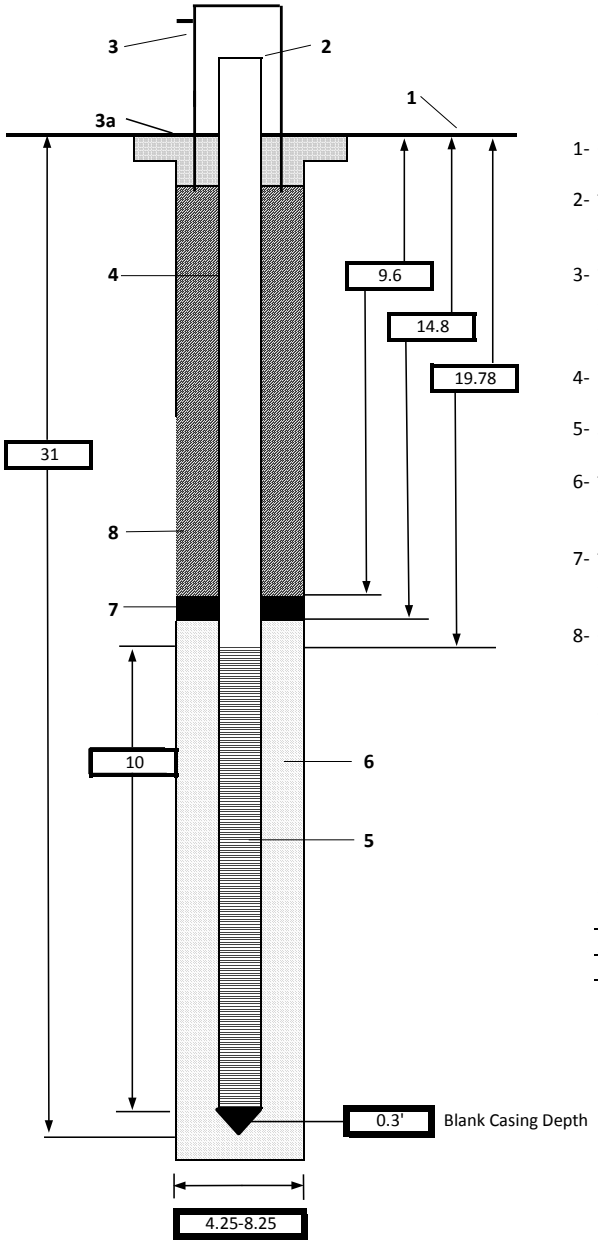
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico Date: 8/30/2013

DRILLING CONTRACTOR : Parratt-Wolff Inc.; Driller: Todd Muench

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 with 4 1/4" hollow stemmed augers and 6" air hammer

WATER LEVEL : START : 8/29/2013 1315 END : 08/30/2013 1004 LOGGER : S. Brand



1- Ground elevation at well	TBD
2- Top of casing elevation	20.90 ft
a) vent hole?	Yes
3- Wellhead protection cover type	Stick-up steel Box
a) weep hole?	Yes
a) concrete pad dimensions	3' wide x 3' long x 6" deep sloped from well
4- Dia./type of well casing	2" Sched 40 PVC Flush joint with "O" ring
5- Screen type/slot size	0.010 slot
6- Type screen filter	#2 Silica Sand
a) Quantity used	5-0.5 CF sacks
7- Type of seal	3/8" bentonite pellets Haliburton Hole Plug
a) Quantity used	1-50 Lb Sacks
8- Grout	
a) Grout mix used	2 bags cement to 10 gal H2O water, 5% bent
b) Method of placement	Pour from surface
c) Vol. of well casing grout	
Development Method	Surge block on PVC and Pump
Development Volume	
Completed Development	

Comments Had to run ~5 gall water in hole when sand bridged, Run extra sand because had to pull augers to run bentonite

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	MW-31	SHEET 1 OF 1

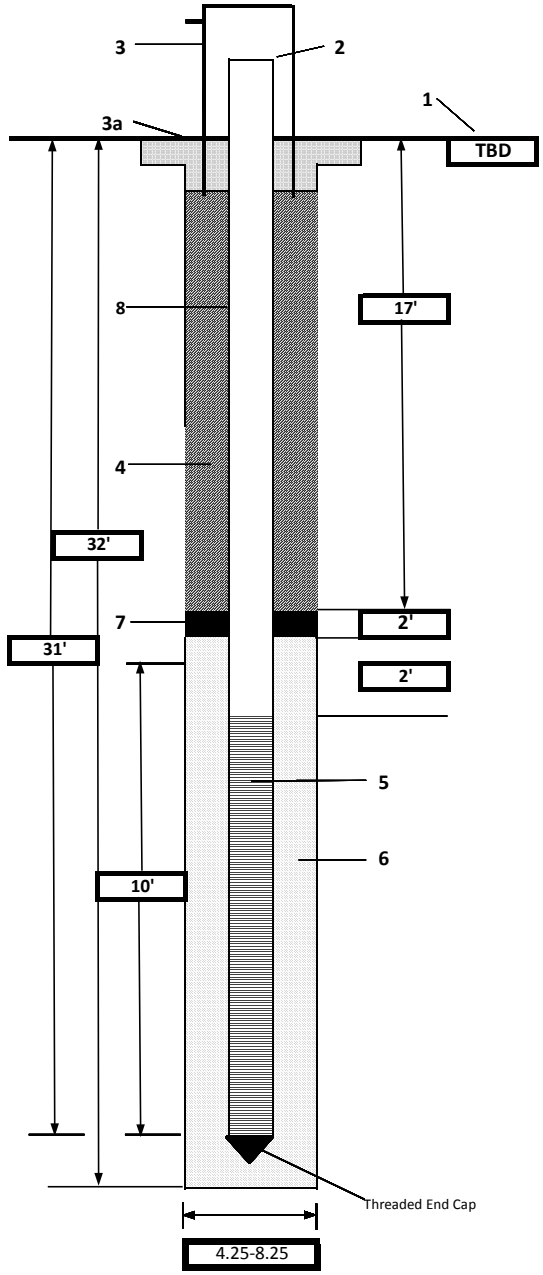
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | Date: 09/2/2014

DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 with 6 5/8" hollow stemmed augers and 3 7/8" roller cone set (air rotary)

WATER LEVEL : | START : 0900 9/2/2014 | END : 1200 9/2/2014 | LOGGER : R. Fields



1- Ground elevation at well	TBD
2- Top of casing elevation	10.80 ft
a) vent hole?	
3- Wellhead protection cover type	Flush Mount
a) weep hole?	
b) concrete pad dimensions	2'X2'X4"
4- Dia./type of well casing	2" dia sch 40 PVC
5- Screen type/slot size	0.010" PVC
6- Type screen filter	#2 sand
a) Quantity used	9.5 x 50 lb bags
7- Type of seal	3/8" bentonite quickgel
a) Quantity used	1-50 lb bag
8- Grout	
a) Grout mix used	7 gal H2O to 94 lb portland (5% Bentonite)
b) Method of placement	3/4" tremie pipe
c) Vol. of well casing grout	51 gal
Development Method	surge block and submersible pump
Development Volume	90 gal
Completed Development	

Comments: Borehole began on 8/29/2014, halted at 25' bgs due to weather, let set to make water (moist soil, but H2O not evident). Resume drilling on 9/2/2014. DTW = 11.64 bgs, take borehole to target depth of 32' bgs, set well @ 31' bgs.

Sampler Signature: R. Fields | Date: 09/02/14

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	MW-32	SHEET 1 OF 1

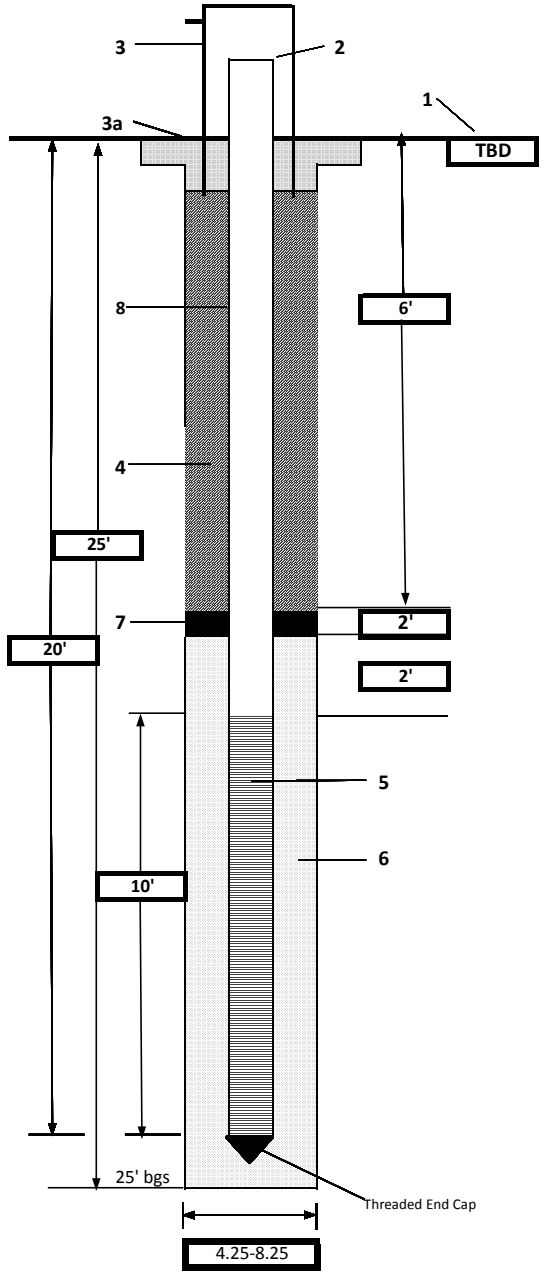
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | Date: 09/10/2014

DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 with 6 5/8" hollow stem augers

WATER LEVEL : | START : 1335 9/10/2014 | END : 9/11/2014 | LOGGER : R. Fields



1- Ground elevation at well	TBD
2- Top of casing elevation	3.76 ft
a) vent hole?	
3- Wellhead protection cover type	Stick-up/Aluminum
a) weep hole?	
b) concrete pad dimensions	2'x2'x4"
4- Dia./type of well casing	2" dia sch 40 PVC
5- Screen type/slot size	0.010" PVC
6- Type screen filter	#2 sand
a) Quantity used	10.5 x 50 lb bag
7- Type of seal	3/8" bentonite quick gel
a) Quantity used	1-50 lb bag
8- Grout	
a) Grout mix used	7 gal H2O to 94 lb portland (5% Bentonite)
b) Method of placement	3/4" tremie pipe
c) Vol. of well casing grout	18 gal
Development Method	surge block and submersible pump
Development Volume	46 gal
Completed Development	

Comments: Drilled down to = 25' bgs, no clear sign of water, ground (cuttings) very moist from 3-13' bgs. Let auger sit overnight per discussion with J. Swenfurth. Decide to set well @ 20' bgs - screen 10-20' bgs (backfill with sand)

Sampler Signature: R. Fields | Date: 09/10/14

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	MW-33	SHEET 1 OF 1

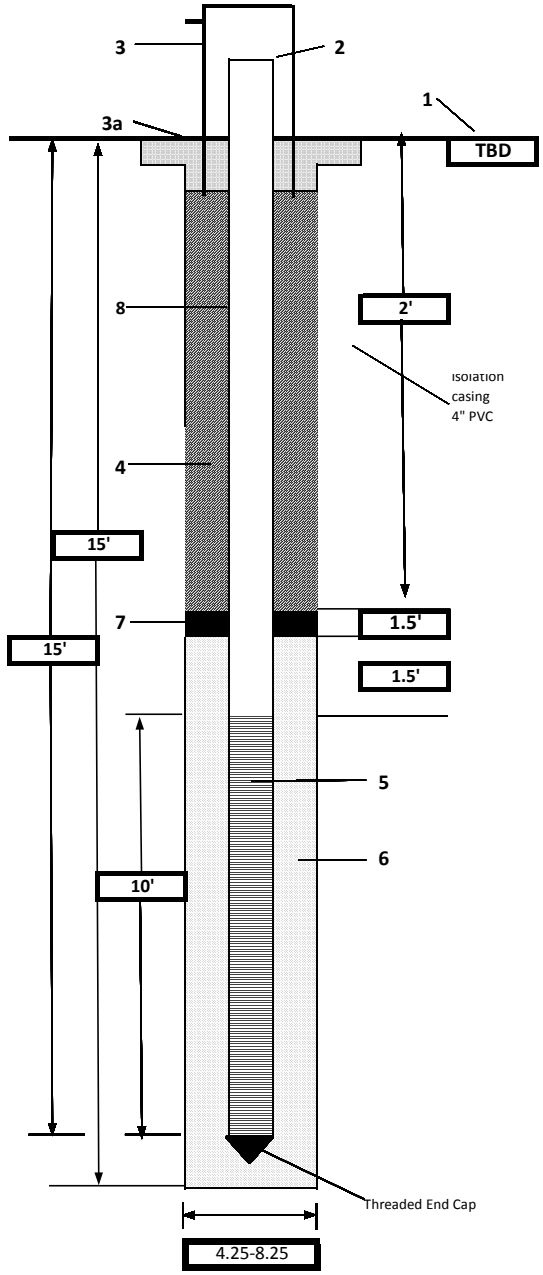
WELL COMPLETION DIAGRAM

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | Date: 09/9/2014

DRILLING CONTRACTOR : Parratt-Wolff Inc.

DRILLING METHOD AND EQUIPMENT USED : Dietrich D-50 with 6 5/8" hollow stem augers

WATER LEVEL : | START : 1445 9/9/2014 | END : 9/9/2014 1650 | LOGGER : R. Fields



1-	Ground elevation at well	TBD
2-	Top of casing elevation	3.31 ft
	a) vent hole?	
3-	Wellhead protection cover type	Stick-up/Aluminum
	a) weep hole?	
	b) concrete pad dimensions	2'x2'x4"
4-	Dia./type of well casing	2" dia sch 40 PVC
5-	Screen type/slot size	0.010" PVC
6-	Type screen filter	#2 sand
	a) Quantity used	9.5 x 50 lb bag
7-	Type of seal	3/8" bentonite quick gel
	a) Quantity used	3/4 x 50 lb bag
8-	Grout	
	a) Grout mix used	7 gal H2O to 94 lb portland (5% Bentonite)
	b) Method of placement	3/4" tremie pipe
	c) Vol. of well casing grout	6 gal
	Development Method	surge block and submersible pump
	Development Volume	104 gal
	Completed Development	

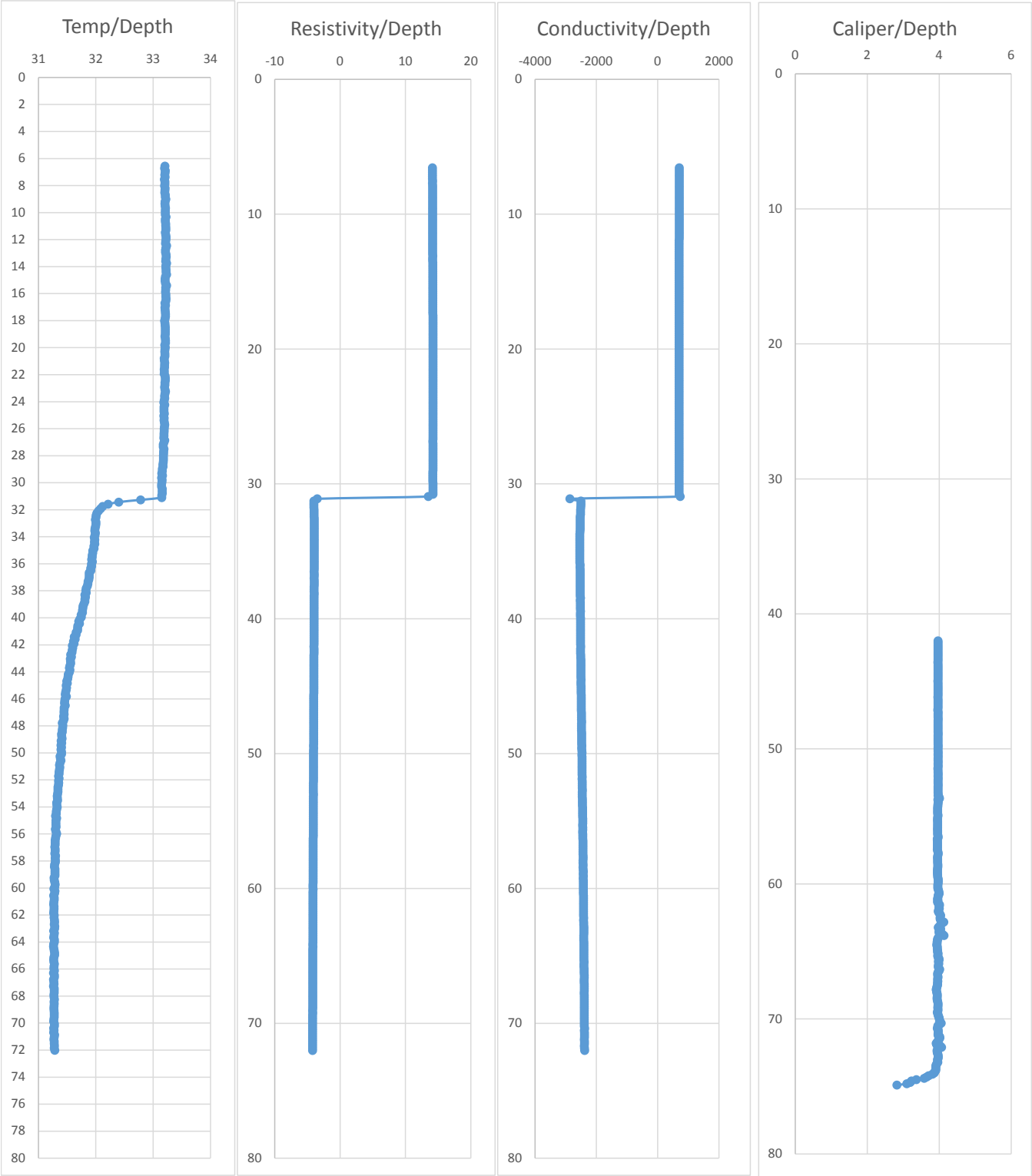
Comments: Water encountered upon initiating drilling - fat clat with sand, 0-5' bgs, 5-15' well-graded sand with silt (SW)

Sampler Signature: R. Fields | Date: 09/09/14

Appendix C
Geophysics Logs and Video Logs

Appendix C – Video Logs are provided electronically on the attached CD-ROM.

MW-13D Temp, Resistivity, Conductivity and Caliper Graphs



```
~VERSION INFORMATION
VERS      .2.0                    :CWLS LOG ASCII STANDARD-VERSION 2.0
WRAP      .NO                     :ONE LINE PER DEPTH STEP
~WELL INFORMATION
STRT      .FT            6.56031  :START DEPTH          WGT5      :WGT5
STOP      .FT              72.01  :STOP DEPTH           CASI      :CASING SIZE5
STEP      .FT           0.163624  :STEP                 CTY       :CTY
NULL      .              -999.25  :NULL VALUE           WGT6      :WGT6
COMP      .                       :COMPANY              CASI      :CASING SIZE6
WELL      .                       :WELL                 MAX.      :MAX. REC. TEMP.
FLD       .                       :FIELD                D.F.      :D.F.
LOC       .                       :LOCATION             CASI      :CASING TO6
PROV      .            N/A        :PROVINCE             OTHE      :OTHER SERVICES
SRVC      .            N/A        :SERVICE COMPANY      BIT1      :BIT1
DATE      .                       :DATE                 DEPT      :DEPTH-DRILLER
UWI       .            N/A        :UNIQUE WELL ID       BIT2      :BIT2
~CURVE INFORMATION                                       RUN       :RUN No
DEPT      .FT                     :DEPTH                RUN1      :RUN1
TEMP      .DEG_C                  :Temp.                BIT3      :BIT3
F-RE      .OHM-M                  :F-Res.               RUN2      :RUN2
COND      .US/CM                  :Cond.                PERM      :PERMANENT DATUM
~PARAMETER INFORMATION                                   TWP       :TWP
ELEV      :ELEVATION                                     BIT4      :BIT4
STE       :STE                                           LOG       :LOG MEAS. FROM
DENS      :DENSITY                                       BIT       :BIT FROM1
CASI      :CASING TO1                                    RUN3      :RUN3
OPER      :OPERATING RIG TIME                            BIT5      :BIT5
WGT1      :WGT1                                          CASI      :CASING FROM1
CASI      :CASING SIZE1                                  TYPE      :TYPE FLUID IN HOLE
CASI      :CASING TO2                                    RUN4      :RUN4
WGT2      :WGT2                                          FLD       :FLD
CASI      :CASING SIZE2                                  BIT6      :BIT6
WELL      :WELL ID                                       BIT       :BIT TO1
CASI      :CASING TO3                                    CASI      :CASING FROM2
K.B.      :K.B.                                          BIT       :BIT FROM2
WGT3      :WGT3                                          CO        :CO
TYPE      :TYPE LOG                                      RGE       :RGE
CASI      :CASING SIZE3                                  BIT       :BIT TO2
CASI      :CASING TO4                                    DEPT      :DEPTH-LOGGER
SALI      :SALINITY                                      CASI      :CASING FROM3
TITL      :TITLE                                         BIT       :BIT FROM3
WGT4      :WGT4                                          RUN5      :RUN5
TOP       :TOP LOGGED INTERVAL                           SEC       :SEC
CASI      :CASING SIZE4                                  BIT       :BIT TO3
WITN      :WITNESSED BY                                  G.L.      :G.L.
CASI      :CASING TO5                                    CASI      :CASING FROM4
DRIL      :DRILLING MEAS. FROM                           BIT       :BIT FROM4
```

RUN6 :RUN6
BIT :BIT TO4
BTM :BTM LOGGED INTERVAL
CASI :CASING FROM5
BIT :BIT FROM5
STAT :STATE
BIT :BIT TO5
LEVE :LEVEL

Depth ft	Temp Deg C	F-Re Ohm-m	Conductivity µS/cm
6.56031	33.2052	14.1352	707.454
6.72394	33.1977	14.1396	707.233
6.88756	33.2127	14.1396	707.233
7.05118	33.2077	14.144	707.012
7.21481	33.2027	14.1484	706.791
7.37843	33.2077	14.1484	706.791
7.54206	33.1952	14.1573	706.35
7.70568	33.2052	14.1484	706.791
7.86931	33.2052	14.1573	706.35
8.03293	33.1977	14.1573	706.35
8.19655	33.2077	14.1617	706.129
8.36018	33.2052	14.1573	706.35
8.5238	33.2027	14.1617	706.129
8.68743	33.2127	14.1573	706.35
8.85105	33.2127	14.1617	706.129
9.01468	33.2227	14.1617	706.129
9.1783	33.2077	14.1617	706.129
9.34192	33.2052	14.1617	706.129
9.50555	33.2077	14.1617	706.129
9.66917	33.2152	14.1617	706.129
9.8328	33.2127	14.175	705.469
9.99642	33.2127	14.1661	705.909
10.16	33.2127	14.1617	706.129
10.3237	33.2252	14.1661	705.909
10.4873	33.2127	14.1661	705.909
10.6509	33.2127	14.1661	705.909
10.8145	33.2177	14.1661	705.909
10.9782	33.2177	14.1661	705.909
11.1418	33.2227	14.175	705.469
11.3054	33.2227	14.175	705.469
11.469	33.2127	14.175	705.469
11.6327	33.2177	14.175	705.469
11.7963	33.2252	14.175	705.469
11.9599	33.2252	14.1794	705.249
12.1235	33.2177	14.1794	705.249
12.2872	33.2152	14.1794	705.249
12.4508	33.2327	14.1794	705.249

CASI :CASING FROM6
BIT :BIT FROM6
COUN :COUNTRY
RECO :RECORDED BY
FILI :FILING No
BIT :BIT TO6
~OTHER
~A

Depth ft	Temp Deg C	F-Re Ohm-m	Conductivity µS/cm
42.5577	31.5834	-3.98342	-2510.41
42.7213	31.5609	-3.99226	-2504.85
42.8849	31.5759	-3.99226	-2504.85
43.0485	31.5559	-3.99668	-2502.08
43.2122	31.5584	-3.99668	-2502.08
43.3758	31.5609	-3.99668	-2502.08
43.5394	31.5484	-3.99668	-2502.08
43.703	31.5384	-3.99668	-2502.08
43.8666	31.5484	-3.99668	-2502.08
44.0303	31.5384	-4.0011	-2499.31
44.1939	31.5184	-4.0011	-2499.31
44.3575	31.5159	-4.0011	-2499.31
44.5211	31.5084	-4.00994	-2493.8
44.6848	31.4934	-3.99668	-2502.08
44.8484	31.5034	-4.0011	-2499.31
45.012	31.4834	-4.00994	-2493.8
45.1756	31.4884	-4.00994	-2493.8
45.3393	31.4834	-4.00994	-2493.8
45.5029	31.4734	-4.00994	-2493.8
45.6665	31.4684	-4.01436	-2491.06
45.8301	31.4859	-4.01878	-2488.32
45.9938	31.4634	-4.01878	-2488.32
46.1574	31.4584	-4.01878	-2488.32
46.321	31.4534	-4.01436	-2491.06
46.4846	31.4659	-4.01878	-2488.32
46.6483	31.4484	-4.01878	-2488.32
46.8119	31.4459	-4.01878	-2488.32
46.9755	31.4434	-4.02762	-2482.86
47.1391	31.4484	-4.02762	-2482.86
47.3028	31.4385	-4.02762	-2482.86
47.4664	31.4484	-4.03204	-2480.13
47.63	31.436	-4.03646	-2477.42
47.7936	31.4135	-4.03204	-2480.13
47.9573	31.426	-4.03204	-2480.13
48.1209	31.421	-4.03204	-2480.13
48.2845	31.4135	-4.03204	-2480.13
48.4481	31.416	-4.03646	-2477.42

Depth ft	Temp Deg C	F-Re Ohm-m	Conductivity µS/cm
12.6144	33.2227	14.1794	705.249
12.778	33.2152	14.1794	705.249
12.9417	33.2152	14.1794	705.249
13.1053	33.2252	14.1838	705.029
13.2689	33.2277	14.1794	705.249
13.4325	33.2227	14.1794	705.249
13.5962	33.2177	14.1838	705.029
13.7598	33.2327	14.1838	705.029
13.9234	33.2227	14.1838	705.029
14.087	33.2227	14.1838	705.029
14.2507	33.2252	14.1838	705.029
14.4143	33.2252	14.1927	704.59
14.5779	33.2327	14.1838	705.029
14.7415	33.2152	14.1838	705.029
14.9051	33.2077	14.1927	704.59
15.0688	33.2077	14.1927	704.59
15.2324	33.2152	14.1927	704.59
15.396	33.2327	14.1927	704.59
15.5596	33.2177	14.1927	704.59
15.7233	33.2177	14.1927	704.59
15.8869	33.2152	14.1927	704.59
16.0505	33.2227	14.1971	704.371
16.2141	33.2227	14.1971	704.371
16.3778	33.2252	14.2015	704.151
16.5414	33.2227	14.2015	704.151
16.705	33.2052	14.2015	704.151
16.8686	33.2152	14.2015	704.151
17.0323	33.2052	14.2015	704.151
17.1959	33.2077	14.2015	704.151
17.3595	33.2127	14.2015	704.151
17.5231	33.2152	14.2103	703.713
17.6868	33.2152	14.2148	703.494
17.8504	33.2077	14.2192	703.276
18.014	33.1977	14.2192	703.276
18.1776	33.2052	14.228	702.839
18.3413	33.2077	14.2192	703.276
18.5049	33.2127	14.2192	703.276
18.6685	33.2127	14.228	702.839
18.8321	33.2127	14.2192	703.276
18.9958	33.2127	14.2192	703.276
19.1594	33.2052	14.2192	703.276
19.323	33.2127	14.228	702.839
19.4866	33.2152	14.228	702.839
19.6503	33.2152	14.2192	703.276
19.8139	33.2027	14.2192	703.276

Depth ft	Temp Deg C	F-Re Ohm-m	Conductivity µS/cm
48.6118	31.4035	-4.03646	-2477.42
48.7754	31.406	-4.03646	-2477.42
48.939	31.411	-4.04088	-2474.71
49.1026	31.396	-4.04088	-2474.71
49.2662	31.406	-4.04088	-2474.71
49.4299	31.3935	-4.04972	-2469.31
49.5935	31.401	-4.04088	-2474.71
49.7571	31.3935	-4.04972	-2469.31
49.9207	31.401	-4.05414	-2466.61
50.0844	31.401	-4.04972	-2469.31
50.248	31.376	-4.05414	-2466.61
50.4116	31.381	-4.05414	-2466.61
50.5752	31.391	-4.05414	-2466.61
50.7389	31.376	-4.05414	-2466.61
50.9025	31.366	-4.05856	-2463.93
51.0661	31.371	-4.05856	-2463.93
51.2297	31.366	-4.05856	-2463.93
51.3934	31.361	-4.05856	-2463.93
51.557	31.3585	-4.05856	-2463.93
51.7206	31.3485	-4.0674	-2458.57
51.8842	31.3585	-4.05856	-2463.93
52.0479	31.3485	-4.0674	-2458.57
52.2115	31.3535	-4.07182	-2455.9
52.3751	31.3485	-4.07182	-2455.9
52.5387	31.3385	-4.07182	-2455.9
52.7024	31.3385	-4.07624	-2453.24
52.866	31.3385	-4.07182	-2455.9
53.0296	31.3335	-4.0674	-2458.57
53.1932	31.3285	-4.07182	-2455.9
53.3569	31.331	-4.07624	-2453.24
53.5205	31.3335	-4.07624	-2453.24
53.6841	31.3185	-4.07624	-2453.24
53.8477	31.321	-4.07624	-2453.24
54.0114	31.3285	-4.08508	-2447.93
54.175	31.3185	-4.08508	-2447.93
54.3386	31.311	-4.0895	-2445.29
54.5022	31.311	-4.08508	-2447.93
54.6659	31.2985	-4.08508	-2447.93
54.8295	31.3185	-4.09392	-2442.65
54.9931	31.3035	-4.09392	-2442.65
55.1567	31.3035	-4.09392	-2442.65
55.3203	31.3035	-4.0895	-2445.29
55.484	31.3085	-4.09392	-2442.65
55.6476	31.2935	-4.09392	-2442.65
55.8112	31.3035	-4.0895	-2445.29

Depth ft	Temp Deg C	F-Re Ohm-m	Conductivity µS/cm
19.9775	33.2127	14.228	702.839
20.1411	33.2052	14.2192	703.276
20.3048	33.2027	14.2192	703.276
20.4684	33.2052	14.2192	703.276
20.632	33.2052	14.2148	703.494
20.7956	33.1927	14.2192	703.276
20.9592	33.1952	14.2103	703.713
21.1229	33.2027	14.2148	703.494
21.2865	33.1977	14.2148	703.494
21.4501	33.1977	14.2148	703.494
21.6137	33.1927	14.2103	703.713
21.7774	33.1952	14.2148	703.494
21.941	33.1927	14.2148	703.494
22.1046	33.2077	14.2148	703.494
22.2682	33.2127	14.2103	703.713
22.4319	33.2127	14.2103	703.713
22.5955	33.2052	14.2148	703.494
22.7591	33.2052	14.2148	703.494
22.9227	33.1977	14.2148	703.494
23.0864	33.2052	14.2148	703.494
23.25	33.2152	14.2192	703.276
23.4136	33.2052	14.2192	703.276
23.5772	33.1977	14.2148	703.494
23.7409	33.2027	14.2148	703.494
23.9045	33.1927	14.2148	703.494
24.0681	33.1852	14.2148	703.494
24.2317	33.2027	14.2148	703.494
24.3954	33.1902	14.2148	703.494
24.559	33.1902	14.2192	703.276
24.7226	33.1902	14.2192	703.276
24.8862	33.1952	14.228	702.839
25.0499	33.1852	14.2192	703.276
25.2135	33.1927	14.2192	703.276
25.3771	33.1902	14.228	702.839
25.5407	33.1952	14.228	702.839
25.7044	33.2027	14.228	702.839
25.868	33.1952	14.228	702.839
26.0316	33.1927	14.2192	703.276
26.1952	33.1927	14.2148	703.494
26.3588	33.1902	14.2103	703.713
26.5225	33.1902	14.2103	703.713
26.6861	33.1852	14.2148	703.494
26.8497	33.2027	14.2015	704.151
27.0133	33.1902	14.2103	703.713
27.177	33.1752	14.2148	703.494

Depth ft	Temp Deg C	F-Re Ohm-m	Conductivity µS/cm
55.9748	31.3185	-4.09392	-2442.65
56.1385	31.3035	-4.09392	-2442.65
56.3021	31.2985	-4.10276	-2437.38
56.4657	31.291	-4.10718	-2434.76
56.6293	31.291	-4.10718	-2434.76
56.793	31.291	-4.10718	-2434.76
56.9566	31.286	-4.10718	-2434.76
57.1202	31.291	-4.10718	-2434.76
57.2838	31.291	-4.1116	-2432.14
57.4475	31.286	-4.10718	-2434.76
57.6111	31.2985	-4.12044	-2426.92
57.7747	31.291	-4.12044	-2426.92
57.9383	31.2935	-4.1116	-2432.14
58.102	31.2935	-4.1116	-2432.14
58.2656	31.281	-4.12044	-2426.92
58.4292	31.2785	-4.1116	-2432.14
58.5928	31.2885	-4.12044	-2426.92
58.7565	31.2885	-4.12486	-2424.32
58.9201	31.2885	-4.12044	-2426.92
59.0837	31.2885	-4.12486	-2424.32
59.2473	31.271	-4.12044	-2426.92
59.411	31.276	-4.12486	-2424.32
59.5746	31.286	-4.12486	-2424.32
59.7382	31.291	-4.12928	-2421.73
59.9018	31.286	-4.12928	-2421.73
60.0655	31.2685	-4.12486	-2424.32
60.2291	31.2885	-4.12928	-2421.73
60.3927	31.281	-4.12928	-2421.73
60.5563	31.266	-4.13812	-2416.55
60.7199	31.276	-4.13812	-2416.55
60.8836	31.276	-4.14254	-2413.97
61.0472	31.2685	-4.13812	-2416.55
61.2108	31.266	-4.13812	-2416.55
61.3744	31.271	-4.13812	-2416.55
61.5381	31.271	-4.14254	-2413.97
61.7017	31.2685	-4.14254	-2413.97
61.8653	31.266	-4.14254	-2413.97
62.0289	31.276	-4.14254	-2413.97
62.1926	31.271	-4.14697	-2411.4
62.3562	31.2785	-4.14254	-2413.97
62.5198	31.281	-4.14697	-2411.4
62.6834	31.276	-4.14697	-2411.4
62.8471	31.286	-4.15581	-2406.27
63.0107	31.281	-4.15581	-2406.27
63.1743	31.266	-4.15581	-2406.27

MW 13D - Temp, Condition

Depth ft	Temp Deg C	F-Re Ohm-m	Conductivity µS/cm
27.3406	33.1752	14.2192	703.276
27.5042	33.1902	14.2192	703.276
27.6678	33.1827	14.2192	703.276
27.8315	33.1827	14.228	702.839
27.9951	33.1802	14.2192	703.276
28.1587	33.1802	14.2192	703.276
28.3223	33.1802	14.2148	703.494
28.486	33.1752	14.2148	703.494
28.6496	33.1702	14.2148	703.494
28.8132	33.1727	14.2103	703.713
28.9768	33.1602	14.2148	703.494
29.1405	33.1602	14.2015	704.151
29.3041	33.1502	14.1971	704.371
29.4677	33.1627	14.1971	704.371
29.6313	33.1452	14.2015	704.151
29.795	33.1552	14.2015	704.151
29.9586	33.1527	14.2103	703.713
30.1222	33.1452	14.2148	703.494
30.2858	33.1452	14.2148	703.494
30.4495	33.1602	14.2148	703.494
30.6131	33.1552	14.2103	703.713
30.7767	33.1602	14.2103	703.713
30.9403	33.1502	13.4987	740.814
31.104	33.1502	-3.49719	-2859.44
31.2676	32.7804	-4.0011	-2499.31
31.4312	32.398	-3.99668	-2502.08
31.5948	32.2131	-3.99668	-2502.08
31.7585	32.1206	-3.99226	-2504.85
31.9221	32.0832	-3.98342	-2510.41
32.0857	32.0482	-3.97458	-2515.99
32.2493	32.0182	-3.979	-2513.2
32.4129	32.0057	-3.96131	-2524.41
32.5766	32.0032	-3.95689	-2527.23
32.7402	31.9932	-3.95689	-2527.23
32.9038	32.0007	-3.95689	-2527.23
33.0674	32.0007	-3.95689	-2527.23
33.2311	31.9957	-3.95689	-2527.23
33.3947	31.9857	-3.95689	-2527.23
33.5583	31.9832	-3.94805	-2532.89
33.7219	31.9932	-3.94363	-2535.73
33.8856	31.9857	-3.93921	-2538.58
34.0492	31.9732	-3.94363	-2535.73
34.2128	31.9832	-3.93921	-2538.58
34.3764	31.9757	-3.94363	-2535.73
34.5401	31.9832	-3.93921	-2538.58

Depth ft	Temp Deg C	F-Re Ohm-m	Conductivity µS/cm
63.3379	31.2785	-4.15581	-2406.27
63.5016	31.271	-4.14697	-2411.4
63.6652	31.266	-4.14697	-2411.4
63.8288	31.2785	-4.14697	-2411.4
63.9924	31.2785	-4.15581	-2406.27
64.1561	31.266	-4.16023	-2403.72
64.3197	31.261	-4.15581	-2406.27
64.4833	31.2685	-4.16023	-2403.72
64.6469	31.276	-4.16465	-2401.16
64.8106	31.281	-4.16465	-2401.16
64.9742	31.281	-4.16023	-2403.72
65.1378	31.2685	-4.16465	-2401.16
65.3014	31.266	-4.16465	-2401.16
65.4651	31.2685	-4.16907	-2398.62
65.6287	31.2785	-4.16023	-2403.72
65.7923	31.271	-4.16465	-2401.16
65.9559	31.2685	-4.16907	-2398.62
66.1195	31.2785	-4.16907	-2398.62
66.2832	31.261	-4.16907	-2398.62
66.4468	31.2785	-4.17791	-2393.54
66.6104	31.2785	-4.17791	-2393.54
66.774	31.261	-4.16907	-2398.62
66.9377	31.2685	-4.16907	-2398.62
67.1013	31.271	-4.17791	-2393.54
67.2649	31.261	-4.17791	-2393.54
67.4285	31.276	-4.17791	-2393.54
67.5922	31.276	-4.17791	-2393.54
67.7558	31.276	-4.16907	-2398.62
67.9194	31.2685	-4.17791	-2393.54
68.083	31.271	-4.17791	-2393.54
68.2467	31.2785	-4.17791	-2393.54
68.4103	31.271	-4.18233	-2391.01
68.5739	31.276	-4.18233	-2391.01
68.7375	31.271	-4.17791	-2393.54
68.9012	31.2685	-4.18233	-2391.01
69.0648	31.271	-4.18675	-2388.49
69.2284	31.276	-4.18233	-2391.01
69.392	31.276	-4.18675	-2388.49
69.5557	31.276	-4.18675	-2388.49
69.7193	31.2685	-4.18675	-2388.49
69.8829	31.266	-4.18675	-2388.49
70.0465	31.2785	-4.18675	-2388.49
70.2102	31.2785	-4.18675	-2388.49
70.3738	31.266	-4.20001	-2380.95
70.5374	31.271	-4.18675	-2388.49

MW 13D - Temp, Condition

Depth ft	Temp Deg C	F-Re Ohm-m	Conductivity µS/cm
34.7037	31.9657	-3.93921	-2538.58
34.8673	31.9707	-3.93921	-2538.58
35.0309	31.9457	-3.93921	-2538.58
35.1946	31.9457	-3.93921	-2538.58
35.3582	31.9382	-3.94363	-2535.73
35.5218	31.9382	-3.94363	-2535.73
35.6854	31.9282	-3.94363	-2535.73
35.8491	31.9407	-3.94363	-2535.73
36.0127	31.9232	-3.95689	-2527.23
36.1763	31.9282	-3.94805	-2532.89
36.3399	31.9107	-3.95689	-2527.23
36.5036	31.9132	-3.96131	-2524.41
36.6672	31.8833	-3.95689	-2527.23
36.8308	31.8833	-3.95689	-2527.23
36.9944	31.8833	-3.96131	-2524.41
37.1581	31.8783	-3.95689	-2527.23
37.3217	31.8658	-3.95689	-2527.23
37.4853	31.8608	-3.95689	-2527.23
37.6489	31.8508	-3.96131	-2524.41
37.8125	31.8308	-3.96131	-2524.41
37.9762	31.8258	-3.96131	-2524.41
38.1398	31.8308	-3.95689	-2527.23
38.3034	31.8108	-3.96131	-2524.41
38.467	31.8208	-3.97458	-2515.99
38.6307	31.8108	-3.96131	-2524.41
38.7943	31.8083	-3.96573	-2521.6
38.9579	31.7933	-3.96573	-2521.6
39.1215	31.7783	-3.96573	-2521.6
39.2852	31.7733	-3.96573	-2521.6
39.4488	31.7683	-3.97458	-2515.99
39.6124	31.7658	-3.96573	-2521.6
39.776	31.7458	-3.96573	-2521.6
39.9397	31.7483	-3.97458	-2515.99
40.1033	31.7208	-3.97458	-2515.99
40.2669	31.7033	-3.97458	-2515.99
40.4305	31.7133	-3.979	-2513.2
40.5942	31.6858	-3.979	-2513.2
40.7578	31.6808	-3.979	-2513.2
40.9214	31.6833	-3.979	-2513.2
41.085	31.6559	-3.98342	-2510.41
41.2487	31.6559	-3.98342	-2510.41
41.4123	31.6234	-3.98342	-2510.41
41.5759	31.6409	-3.979	-2513.2
41.7395	31.6109	-3.98342	-2510.41
41.9032	31.6209	-3.98342	-2510.41

Depth ft	Temp Deg C	F-Re Ohm-m	Conductivity µS/cm
42.0668	31.5909	-3.99226	-2504.85
42.2304	31.5984	-3.98342	-2510.41
42.394	31.5884	-3.98342	-2510.41
72.01	31.286	-4.20001	-2380.95
70.701	31.266	-4.19559	-2383.46
70.8647	31.281	-4.19559	-2383.46
71.0283	31.276	-4.19559	-2383.46
71.1919	31.2685	-4.18675	-2388.49
71.3555	31.276	-4.19559	-2383.46
71.5192	31.276	-4.19559	-2383.46
71.6828	31.2785	-4.18675	-2388.49
71.8464	31.276	-4.19559	-2383.46

```
~VERSION INFORMATION
VERS      .2.0                    :CWLS LOG ASCII STANDARD-VERSION 2.0
WRAP      .NO                     :ONE LINE PER DEPTH STEP
~WELL INFORMATION
STRT      .FT            74.8952  :START DEPTH                    CTY      :CTY
STOP      .FT            41.9914  :STOP DEPTH                    WGT6     :WGT6
STEP      .FT           -0.09971  :STEP                           CASI     :CASING SIZE6
NULL      .              -999.25  :NULL VALUE                    MAX.     :MAX. REC. TEMP.
COMP      .                       :COMPANY                      D.F.     :D.F.
WELL      .                       :WELL                         CASI     :CASING TO6
FLD       .                       :FIELD                        OTHE     :OTHER SERVICES
LOC       .                       :LOCATION                     BIT1     :BIT1
PROV      .             N/A       :PROVINCE                     DEPT     :DEPTH-DRILLER
SRVC      .             N/A       :SERVICE COMPANY              BIT2     :BIT2
DATE      .                       :DATE                         RUN      :RUN No
UWI       .             N/A       :UNIQUE WELL ID               RUN1     :RUN1
~CURVE INFORMATION                                              BIT3     :BIT3
DEPT      .FT                     :DEPTH                        RUN2     :RUN2
CALI      .                       :Caliper (inches)             PERM     :PERMANENT DATUM
~PARAMETER INFORMATION                                          TWP      :TWP
ELEV      :ELEVATION                                            BIT4     :BIT4
STE       :STE                                                  LOG      :LOG MEAS. FROM
DENS      :DENSITY                                              BIT      :BIT FROM1
CASI      :CASING TO1                                           RUN3     :RUN3
OPER      :OPERATING RIG TIME                                   BIT5     :BIT5
WGT1      :WGT1                                                 CASI     :CASING FROM1
CASI      :CASING SIZE1                                         TYPE     :TYPE FLUID IN HOLE
CASI      :CASING TO2                                           RUN4     :RUN4
WGT2      :WGT2                                                 FLD      :FLD
CASI      :CASING SIZE2                                         BIT6     :BIT6
WELL      :WELL ID                                              BIT      :BIT TO1
CASI      :CASING TO3                                           CASI     :CASING FROM2
K.B.      :K.B.                                                 BIT      :BIT FROM2
WGT3      :WGT3                                                 CO       :CO
TYPE      :TYPE LOG                                             RGE      :RGE
CASI      :CASING SIZE3                                         BIT      :BIT TO2
CASI      :CASING TO4                                           DEPT     :DEPTH-LOGGER
SALI      :SALINITY                                             CASI     :CASING FROM3
TITL      :TITLE                                                BIT      :BIT FROM3
WGT4      :WGT4                                                 RUN5     :RUN5
TOP       :TOP LOGGED INTERVAL                                  SEC      :SEC
CASI      :CASING SIZE4                                         BIT      :BIT TO3
WITN      :WITNESSED BY                                         G.L.     :G.L.
CASI      :CASING TO5                                           CASI     :CASING FROM4
DRIL      :DRILLING MEAS. FROM                                  BIT      :BIT FROM4
WGT5      :WGT5                                                 RUN6     :RUN6
CASI      :CASING SIZE5                                         BIT      :BIT TO4
```

BTM	:BTM LOGGED INTERVAL
CASI	:CASING FROM5
BIT	:BIT FROM5
STAT	:STATE
BIT	:BIT TO5
LEVE	:LEVEL
CASI	:CASING FROM6
BIT	:BIT FROM6
COUN	:COUNTRY
RECO	:RECORDED BY
FILI	:FILING No
BIT	:BIT TO6
~OTHER	
~A	

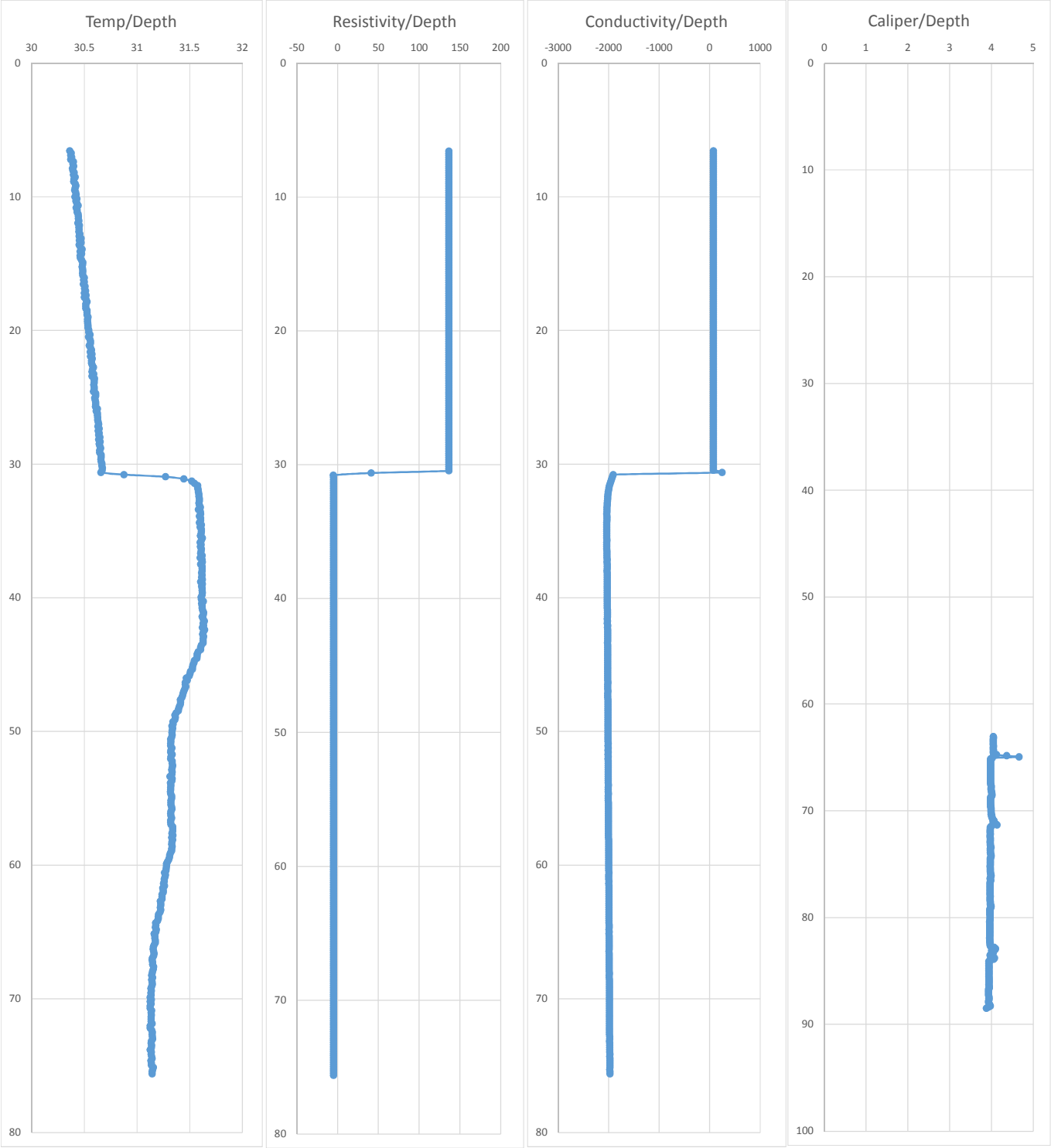
MW 13D - Caliper

Depth (ft)	Caliper (inches)	Depth (ft)	Caliper (inches)	Depth (ft)	Caliper (inches)	Depth (ft)	Caliper (inches)
74.8952	2.82336	70.4083	4.00441	65.9214	3.98469	61.4345	3.96792
74.7955	3.09891	70.3086	4.05138	65.8217	3.98176	61.3348	3.95072
74.6958	3.19118	70.2089	4.00902	65.722	3.97756	61.2351	3.96247
74.5961	3.22893	70.1092	4.00944	65.6223	3.99644	61.1354	3.95072
74.4963	3.36188	70.0095	4.00231	65.5226	3.99182	61.0357	3.95869
74.3966	3.58248	69.9098	3.99811	65.4229	3.96582	60.936	3.96247
74.2969	3.64791	69.81	3.97798	65.3232	3.95324	60.8363	3.96792
74.1972	3.70747	69.7103	3.96414	65.2234	3.96288	60.7366	3.99728
74.0975	3.80645	69.6106	3.95869	65.1237	3.96372	60.6369	3.99182
73.9978	3.85845	69.5109	3.94653	65.024	3.94821	60.5371	3.98679
73.8981	3.87481	69.4112	3.96037	64.9243	3.95659	60.4374	3.97672
73.7984	3.89997	69.3115	3.96247	64.8246	3.94527	60.3377	3.96205
73.6987	3.90123	69.2118	3.95743	64.7249	3.94191	60.238	3.95827
73.599	3.90459	69.1121	3.95827	64.6252	3.94191	60.1383	3.95911
73.4993	3.90333	69.0124	3.96372	64.5255	3.92933	60.0386	3.95869
73.3996	3.91172	68.9127	3.96582	64.4258	3.9394	59.9389	3.96918
73.2998	3.93269	68.813	3.96247	64.3261	3.94108	59.8392	3.97127
73.2001	3.96163	68.7132	3.95366	64.2264	3.94359	59.7395	3.96918
73.1004	3.95408	68.6135	3.94317	64.1267	3.94821	59.6398	3.97211
73.0007	3.95156	68.5138	3.94024	64.0269	3.95827	59.5401	3.96163
72.901	3.96918	68.4141	3.94024	63.9272	3.98763	59.4404	3.95701
72.8013	3.97085	68.3144	3.94611	63.8275	4.12939	59.3406	3.95659
72.7016	3.96876	68.2147	3.94317	63.7278	4.08871	59.2409	3.94862
72.6019	3.95827	68.115	3.9394	63.6281	3.9935	59.1412	3.94821
72.5022	3.94359	68.0153	3.92975	63.5284	3.99182	59.0415	3.94862
72.4025	3.93772	67.9156	3.92388	63.4287	4.02705	58.9418	3.9503
72.3028	3.93856	67.8159	3.91423	63.329	4.03628	58.8421	3.95198
72.203	3.98763	67.7162	3.93101	63.2293	3.9675	58.7424	3.95869
72.1033	4.06312	67.6165	3.93395	63.1296	4.00734	58.6427	3.96037
72.0036	4.02705	67.5167	3.94695	63.0299	4.03041	58.543	3.95827
71.9039	3.93101	67.417	3.95198	62.9302	4.06857	58.4433	3.95534
71.8042	3.91507	67.3173	3.94988	62.8304	4.12561	58.3436	3.95366
71.7045	3.94527	67.2176	3.96079	62.7307	4.05809	58.2439	3.9524
71.6048	3.9784	67.1179	3.95534	62.631	4.02831	58.1441	3.9524
71.5051	3.98511	67.0182	3.95701	62.5313	4.02412	58.0444	3.9503
71.4054	4.01489	66.9185	3.96624	62.4316	4.02873	57.9447	3.95408
71.3057	4.0107	66.8188	3.95995	62.3319	4.03838	57.845	3.96288
71.206	3.96372	66.7191	3.95701	62.2322	4.01489	57.7453	3.97043
71.1063	3.96414	66.6194	3.95659	62.1325	3.99224	57.6456	3.9654
71.0065	3.96876	66.5197	3.97043	62.0328	3.96792	57.5459	3.95575
70.9068	3.97127	66.42	3.99518	61.9331	3.97924	57.4462	3.94653
70.8071	3.97211	66.3202	4.00944	61.8334	3.99979	57.3465	3.94821
70.7074	3.94317	66.2205	3.98302	61.7337	3.99224	57.2468	3.94988
70.6077	3.95911	66.1208	3.96792	61.6339	3.99979	57.1471	3.94779
70.508	3.96079	66.0211	3.97295	61.5342	4.00902	57.0473	3.94779

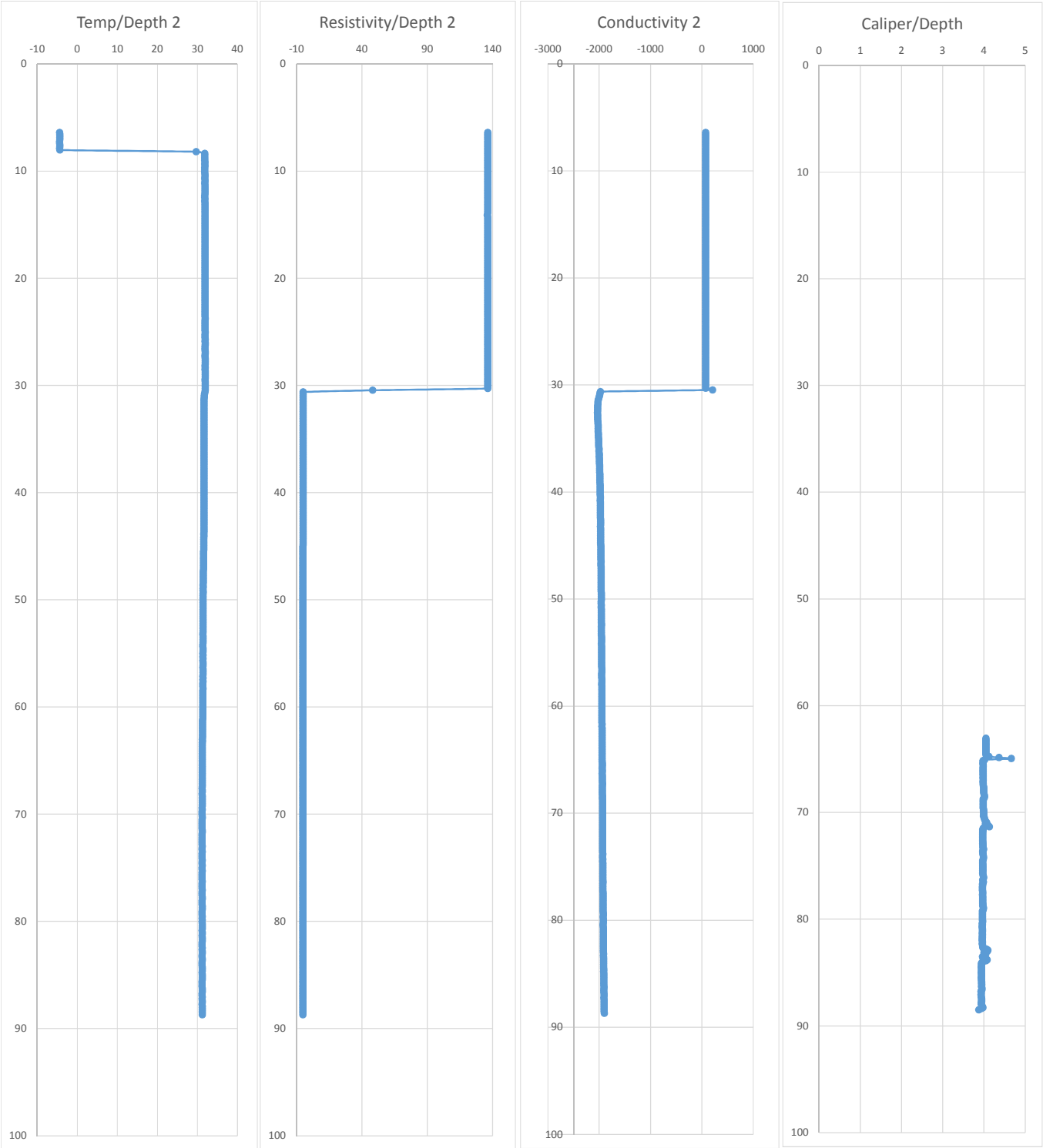
MW 13D - Caliper

Depth (ft)	Caliper (inches)	Depth (ft)	Caliper (inches)	Depth (ft)	Caliper (inches)	Depth (ft)	Caliper (inches)
56.9476	3.9503	52.4608	3.96247	47.9739	3.96372	43.3873	3.96456
56.8479	3.94988	52.361	3.96624	47.8742	3.96582	43.2876	3.96372
56.7482	3.94317	52.2613	3.96708	47.6747	3.96624	43.1879	3.96372
56.6485	3.94275	52.1616	3.96876	47.575	3.96456	43.0882	3.96414
56.5488	3.97127	52.0619	3.96708	47.4753	3.96288	42.9884	3.96624
56.4491	3.96288	51.9622	3.96456	47.3756	3.96456	42.8887	3.96372
56.3494	3.95659	51.8625	3.9675	47.2759	3.9675	42.789	3.96247
56.2497	3.95408	51.7628	3.9654	47.1762	3.96079	42.6893	3.96288
56.15	3.95366	51.6631	3.96624	47.0765	3.95743	42.5896	3.96708
56.0503	3.95366	51.5634	3.96708	46.9768	3.96708	42.4899	3.9654
55.9506	3.95156	51.4637	3.96163	46.8771	3.96288	42.3902	3.96414
55.8508	3.95492	51.364	3.96414	46.7774	3.96372	42.2905	3.96456
55.7511	3.95366	51.2643	3.9675	46.6777	3.96456	42.1908	3.96372
55.6514	3.95534	51.1645	3.9654	46.578	3.96456	42.0911	3.96372
55.5517	3.95492	51.0648	3.96372	46.4782	3.96414	41.9914	3.96414
55.452	3.95659	50.9651	3.96876	46.3785	3.9654		
55.3523	3.95534	50.8654	3.96708	46.2788	3.9654		
55.2526	3.95072	50.7657	3.9654	46.1791	3.96205		
55.1529	3.95575	50.666	3.96414	46.0794	3.96372		
55.0532	3.95659	50.5663	3.96876	45.9797	3.96582		
54.9535	3.96247	50.4666	3.96372	45.88	3.96624		
54.8538	3.95743	50.3669	3.9654	45.7803	3.96372		
54.7541	3.95701	50.2672	3.96792	45.6806	3.96288		
54.6543	3.95575	50.1675	3.96288	45.5809	3.96456		
54.5546	3.95534	50.0678	3.96456	45.4812	3.96288		
54.4549	3.95575	49.968	3.9654	45.3814	3.96456		
54.3552	3.95701	49.8683	3.96414	45.2817	3.96456		
54.2555	3.95743	49.7686	3.9675	45.182	3.96624		
54.1558	3.96163	49.6689	3.9654	45.0823	3.9654		
54.0561	3.96708	49.5692	3.9654	44.9826	3.96205		
53.9564	3.97043	49.4695	3.96582	44.8829	3.9654		
53.8567	3.96792	49.3698	3.96582	44.7832	3.96414		
53.757	3.95743	49.2701	3.96456	44.6835	3.96456		
53.6573	4.00734	49.1704	3.96624	44.5838	3.96456		
53.5575	3.98889	49.0707	3.96372	44.4841	3.96582		
53.4578	3.96247	48.971	3.9654	44.3844	3.96582		
53.3581	3.96792	48.8712	3.96792	44.2847	3.96582		
53.2584	3.96582	48.7715	3.96456	44.1849	3.96414		
53.1587	3.96582	48.6718	3.96582	44.0852	3.96414		
53.059	3.96624	48.5721	3.96582	43.9855	3.96708		
52.9593	3.96624	48.4724	3.96247	43.8858	3.96414		
52.8596	3.96582	48.3727	3.96288	43.7861	3.96456		
52.7599	3.9654	48.273	3.96456	43.6864	3.96414		
52.6602	3.9675	48.1733	3.9654	43.5867	3.96079		
52.5605	3.96624	48.0736	3.96288	43.487	3.96582		

MW-17D Temp, Resistivity, Conductivity and Caliper Graphs (1)



MW-17D temp, Resistivity, Condctivity and Caliper Graphs (2)



```
~VERSION INFORMATION
VERS     .2.0          :CWLS LOG ASCII STANDARD-VERSION 2.0
WRAP     .NO           :ONE LINE PER DEPTH STEP
~WELL INFORMATION
STRT     .FT              6.39669 :START DEPTH
STOP     .FT              88.6997 :STOP DEPTH
STEP     .FT            0.163624 :STEP
NULL     .                -999.25 :NULL VALUE
COMP                   :COMPANY
WELL                   :WELL
FLD                    :FIELD
LOC                    :LOCATION
PROV     N/A           :PROVINCE
SRVC     N/A           :SERVICE COMPANY
DATE                   :DATE
UWI      N/A           :UNIQUE WELL ID
~CURVE INFORMATION
DEPT     .FT           :DEPTH
TEMP     .DEG_C        :Temp.
F-RE     .OHM-M        :F-Res.
COND     .US/CM        :Cond.
~PARAMETER INFORMATION
ELEV     :ELEVATION
STE      :STE
DENS     :DENSITY
CASI     :CASING TO1
OPER     :OPERATING RIG TIME
WGT1     :WGT1
CASI     :CASING SIZE1
CASI     :CASING TO2
WGT2     :WGT2
CASI     :CASING SIZE2
WELL     :WELL ID
CASI     :CASING TO3
K.B.     :K.B.
WGT3     :WGT3
TYPE     :TYPE LOG
CASI     :CASING SIZE3
CASI     :CASING TO4
SALI     :SALINITY
TITL     :TITLE
WGT4     :WGT4
TOP      :TOP LOGGED INTERVAL
CASI     :CASING SIZE4
WITN     :WITNESSED BY
CASI     :CASING TO5
DRIL     :DRILLING MEAS. FROM
WGT5     :WGT5
CASI     :CASING SIZE5
CTY      :CTY
WGT6     :WGT6
CASI     :CASING SIZE6
MAX.     :MAX. REC. TEMP.
D.F.     :D.F.
CASI     :CASING TO6
OTHE     :OTHER SERVICES
BIT1     :BIT1
DEPT     :DEPTH-DRILLER
BIT2     :BIT2
RUN      :RUN No
RUN1     :RUN1
BIT3     :BIT3
RUN2     :RUN2
PERM     :PERMANENT DATUM
TWP      :TWP
BIT4     :BIT4
LOG      :LOG MEAS. FROM
BIT      :BIT FROM1
RUN3     :RUN3
BIT5     :BIT5
CASI     :CASING FROM1
TYPE     :TYPE FLUID IN HOLE
RUN4     :RUN4
FLD      :FLD
BIT6     :BIT6
BIT      :BIT TO1
CASI     :CASING FROM2
BIT      :BIT FROM2
CO       :CO
RGE      :RGE
BIT      :BIT TO2
DEPT     :DEPTH-LOGGER
CASI     :CASING FROM3
BIT      :BIT FROM3
RUN5     :RUN5
SEC      :SEC
BIT      :BIT TO3
G.L.     :G.L.
CASI     :CASING FROM4
BIT      :BIT FROM4
```

RUN6 :RUN6
BIT :BIT TO4
BTM :BTM LOGGED INTERVAL
CASI :CASING FROM5
BIT :BIT FROM5
STAT :STATE
BIT :BIT TO5
LEVE :LEVEL

CASI :CASING FROM6
BIT :BIT FROM6
COUN :COUNTRY
RECO :RECORDED BY
FILI :FILING No
BIT :BIT TO6
~OTHER
~A

Depth ft	Temp Deg C	F-Re Ohm-m	Conductivity µS/cm
6.39669	-4.39247	136.333	73.3498
6.56031	-4.38997	136.333	73.3498
6.72394	-4.38498	136.333	73.3498
6.88756	-4.3831	136.333	73.3498
7.05119	-4.38747	136.333	73.3498
7.21481	-4.39247	136.333	73.3498
7.37843	-4.39622	136.333	73.3498
7.54206	-4.39122	136.333	73.3498
7.70568	-4.3906	136.333	73.3498
7.86931	-4.39809	136.333	73.3498
8.03293	-4.38747	136.333	73.3498
8.19656	29.6942	136.333	73.3498
8.36018	31.8558	136.333	73.3498
8.5238	31.8408	136.333	73.3498
8.68743	31.8483	136.333	73.3498
8.85105	31.8583	136.333	73.3498
9.01468	31.8508	136.333	73.3498
9.1783	31.8683	136.333	73.3498
9.34193	31.8608	136.333	73.3498
9.50555	31.8683	136.333	73.3498
9.66917	31.8558	136.333	73.3498
9.8328	31.8583	136.333	73.3498
9.99642	31.8608	136.333	73.3498
10.16	31.8558	136.333	73.3498
10.3237	31.8708	136.333	73.3498
10.4873	31.8808	136.333	73.3498
10.6509	31.8658	136.333	73.3498
10.8145	31.8783	136.333	73.3498
10.9782	31.8708	136.333	73.3498
11.1418	31.8608	136.333	73.3498
11.3054	31.8708	136.333	73.3498
11.469	31.8708	136.333	73.3498
11.6327	31.8733	136.333	73.3498
11.7963	31.8733	136.333	73.3498
11.9599	31.8783	136.333	73.3498
12.1235	31.8808	136.333	73.3498

Depth ft	Temp Deg C	F-Re Ohm-m	Conductivity µS/cm
12.2872	31.8583	136.333	73.3498
12.4508	31.8658	136.333	73.3498
12.6144	31.8733	136.333	73.3498
12.778	31.8658	136.333	73.3498
12.9417	31.8833	136.333	73.3498
13.1053	31.8808	136.333	73.3498
13.2689	31.8833	136.333	73.3498
13.4325	31.8733	136.333	73.3498
13.5962	31.8808	136.333	73.3498
13.7598	31.8783	136.333	73.3498
13.9234	31.8907	136.271	73.3833
14.087	31.8733	135.912	73.5769
14.2507	31.8808	136.333	73.3498
14.4143	31.8783	136.333	73.3498
14.5779	31.8833	136.333	73.3498
14.7415	31.8907	136.333	73.3498
14.9052	31.8733	136.333	73.3498
15.0688	31.8683	136.333	73.3498
15.2324	31.8683	136.333	73.3498
15.396	31.8808	136.333	73.3498
15.5597	31.8907	136.333	73.3498
15.7233	31.8883	136.333	73.3498
15.8869	31.8833	136.333	73.3498
16.0505	31.8932	136.333	73.3498
16.2141	31.8932	136.333	73.3498
16.3778	31.8808	136.333	73.3498
16.5414	31.8883	136.333	73.3498
16.705	31.8833	136.333	73.3498
16.8686	31.8907	136.333	73.3498
17.0323	31.8907	136.333	73.3498
17.1959	31.8932	136.333	73.3498
17.3595	31.8883	136.333	73.3498
17.5231	31.8907	136.333	73.3498
17.6868	31.8907	136.333	73.3498
17.8504	31.8982	136.333	73.3498
18.014	31.8883	136.333	73.3498

MW-17D Temp, Cond, Res

Depth ft	Temp Deg C	F-Re Ohm-m	Conductivity µS/cm
18.1776	31.8808	136.333	73.3498
18.3413	31.8932	136.333	73.3498
18.5049	31.8982	136.333	73.3498
18.6685	31.9007	136.333	73.3498
18.8321	31.9032	136.333	73.3498
18.9958	31.9107	136.333	73.3498
19.1594	31.8883	136.333	73.3498
19.323	31.9007	136.333	73.3498
19.4866	31.8833	136.333	73.3498
19.6503	31.8907	136.333	73.3498
19.8139	31.9132	136.333	73.3498
19.9775	31.8982	136.333	73.3498
20.1411	31.9082	136.333	73.3498
20.3048	31.9107	136.333	73.3498
20.4684	31.9032	136.333	73.3498
20.632	31.9132	136.333	73.3498
20.7956	31.8982	136.333	73.3498
20.9593	31.9082	136.333	73.3498
21.1229	31.9107	136.333	73.3498
21.2865	31.9107	136.333	73.3498
21.4501	31.9182	136.333	73.3498
21.6138	31.9132	136.333	73.3498
21.7774	31.9032	136.333	73.3498
21.941	31.9107	136.333	73.3498
22.1046	31.9132	136.333	73.3498
22.2682	31.9132	136.333	73.3498
22.4319	31.9282	136.333	73.3498
22.5955	31.9182	136.333	73.3498
22.7591	31.9182	136.333	73.3498
22.9227	31.9132	136.333	73.3498
23.0864	31.9207	136.333	73.3498
23.25	31.9282	136.333	73.3498
23.4136	31.9107	136.333	73.3498
23.5772	31.9082	136.333	73.3498
23.7409	31.9307	136.333	73.3498
23.9045	31.9107	136.333	73.3498
24.0681	31.9232	136.333	73.3498
24.2317	31.9207	136.333	73.3498
24.3954	31.9132	136.333	73.3498
24.559	31.9182	136.333	73.3498
24.7226	31.9282	136.333	73.3498
24.8862	31.9232	136.333	73.3498
25.0499	31.9382	136.333	73.3498
25.2135	31.9182	136.333	73.3498
25.3771	31.9232	136.333	73.3498
25.5407	31.9207	136.333	73.3498
25.7044	31.9332	136.333	73.3498
25.868	31.9282	136.333	73.3498
26.0316	31.9332	136.333	73.3498
26.1952	31.9382	136.333	73.3498
26.3589	31.9232	136.333	73.3498
26.5225	31.9282	136.333	73.3498
26.6861	31.9232	136.333	73.3498
26.8497	31.9382	136.333	73.3498
27.0134	31.9332	136.333	73.3498
27.177	31.9182	136.333	73.3498
27.3406	31.9232	136.333	73.3498
27.5042	31.9457	136.333	73.3498
27.6678	31.9382	136.333	73.3498
27.8315	31.9332	136.333	73.3498
27.9951	31.9307	136.333	73.3498
28.1587	31.9207	136.333	73.3498
28.3223	31.9332	136.333	73.3498
28.486	31.9282	136.333	73.3498
28.6496	31.9382	136.333	73.3498
28.8132	31.9382	136.333	73.3498
28.9768	31.9407	136.333	73.3498
29.1405	31.9307	136.333	73.3498
29.3041	31.9382	136.333	73.3498
29.4677	31.9282	136.333	73.3498
29.6313	31.9407	136.333	73.3498
29.795	31.9307	136.333	73.3498
29.9586	31.9307	136.333	73.3498
30.1222	31.9382	136.333	73.3498
30.2858	31.9457	136.333	73.3498
30.4495	31.9382	48.1888	207.517
30.6131	31.8982	-5.05754	-1977.25
30.7767	31.7758	-5.03544	-1985.93
30.9403	31.7158	-5.01775	-1992.92
31.104	31.6958	-5.00007	-1999.97
31.2676	31.6808	-4.96913	-2012.42
31.4312	31.6634	-4.95145	-2019.61
31.5948	31.6733	-4.93819	-2025.03
31.7585	31.6559	-4.93377	-2026.85
31.9221	31.6733	-4.92935	-2028.67
32.0857	31.6708	-4.92493	-2030.49
32.2493	31.6534	-4.92493	-2030.49
32.413	31.6634	-4.92493	-2030.49
32.5766	31.6708	-4.91609	-2034.14
32.7402	31.6658	-4.92935	-2028.67

MW-17D Temp, Cond, Res

Depth ft	Temp Deg C	F-Re Ohm-m	Conductivity µS/cm
32.9038	31.6634	-4.92935	-2028.67
33.0675	31.6733	-4.92935	-2028.67
33.2311	31.6658	-4.92935	-2028.67
33.3947	31.6634	-4.93819	-2025.03
33.5583	31.6733	-4.93377	-2026.85
33.7219	31.6733	-4.94703	-2021.41
33.8856	31.6634	-4.94703	-2021.41
34.0492	31.6708	-4.94703	-2021.41
34.2128	31.6609	-4.94703	-2021.41
34.3764	31.6733	-4.95145	-2019.61
34.5401	31.6559	-4.95587	-2017.81
34.7037	31.6658	-4.95587	-2017.81
34.8673	31.6559	-4.96471	-2014.22
35.0309	31.6609	-4.96913	-2012.42
35.1946	31.6559	-4.97355	-2010.64
35.3582	31.6634	-4.97355	-2010.64
35.5218	31.6708	-4.97355	-2010.64
35.6854	31.6534	-4.97355	-2010.64
35.8491	31.6609	-4.98239	-2007.07
36.0127	31.6634	-4.99123	-2003.51
36.1763	31.6658	-4.98681	-2005.29
36.3399	31.6509	-5.00007	-1999.97
36.5036	31.6658	-5.00449	-1998.2
36.6672	31.6609	-5.00007	-1999.97
36.8308	31.6758	-5.00449	-1998.2
36.9944	31.6658	-5.00449	-1998.2
37.1581	31.6634	-5.00449	-1998.2
37.3217	31.6559	-5.00891	-1996.44
37.4853	31.6559	-5.01775	-1992.92
37.6489	31.6708	-5.01775	-1992.92
37.8126	31.6733	-5.01775	-1992.92
37.9762	31.6559	-5.01775	-1992.92
38.1398	31.6733	-5.02217	-1991.17
38.3034	31.6559	-5.02659	-1989.42
38.4671	31.6733	-5.02659	-1989.42
38.6307	31.6708	-5.02659	-1989.42
38.7943	31.6534	-5.02659	-1989.42
38.9579	31.6733	-5.03544	-1985.93
39.1216	31.6559	-5.03544	-1985.93
39.2852	31.6658	-5.03986	-1984.18
39.4488	31.6658	-5.03986	-1984.18
39.6124	31.6708	-5.04428	-1982.45
39.776	31.6708	-5.04428	-1982.45
39.9397	31.6733	-5.03986	-1984.18
40.1033	31.6708	-5.04428	-1982.45

Depth ft	Temp Deg C	F-Re Ohm-m	Conductivity µS/cm
40.2669	31.6634	-5.03986	-1984.18
40.4305	31.6634	-5.05312	-1978.98
40.5942	31.6733	-5.05312	-1978.98
40.7578	31.6733	-5.04428	-1982.45
40.9214	31.6559	-5.05312	-1978.98
41.085	31.6758	-5.05312	-1978.98
41.2487	31.6658	-5.05754	-1977.25
41.4123	31.6534	-5.05754	-1977.25
41.5759	31.6559	-5.05754	-1977.25
41.7395	31.6634	-5.05754	-1977.25
41.9032	31.6559	-5.05754	-1977.25
42.0668	31.6658	-5.06196	-1975.52
42.2304	31.6534	-5.05754	-1977.25
42.394	31.6559	-5.06196	-1975.52
42.5577	31.6609	-5.06638	-1973.8
42.7213	31.6434	-5.06638	-1973.8
42.8849	31.6534	-5.06638	-1973.8
43.0485	31.6484	-5.07522	-1970.36
43.2122	31.6484	-5.06196	-1975.52
43.3758	31.6434	-5.06638	-1973.8
43.5394	31.6234	-5.06638	-1973.8
43.703	31.6234	-5.06638	-1973.8
43.8667	31.6184	-5.06638	-1973.8
44.0303	31.6234	-5.06638	-1973.8
44.1939	31.6009	-5.07522	-1970.36
44.3575	31.6109	-5.07522	-1970.36
44.5212	31.6034	-5.07522	-1970.36
44.6848	31.5909	-5.07522	-1970.36
44.8484	31.5759	-5.07522	-1970.36
45.012	31.5884	-5.07964	-1968.64
45.1757	31.5709	-5.07964	-1968.64
45.3393	31.5684	-5.07964	-1968.64
45.5029	31.5559	-5.07964	-1968.64
45.6665	31.5484	-5.07964	-1968.64
45.8301	31.5459	-5.08406	-1966.93
45.9938	31.5259	-5.07964	-1968.64
46.1574	31.5284	-5.08406	-1966.93
46.321	31.5309	-5.08406	-1966.93
46.4846	31.5109	-5.0929	-1963.52
46.6483	31.5184	-5.08406	-1966.93
46.8119	31.5159	-5.08406	-1966.93
46.9755	31.5084	-5.0929	-1963.52
47.1391	31.4984	-5.0929	-1963.52
47.3028	31.4934	-5.0929	-1963.52
47.4664	31.4834	-5.0929	-1963.52

MW-17D Temp, Cond, Res

Depth ft	Temp Deg C	F-Re Ohm-m	Conductivity µS/cm
47.63	31.4884	-5.0929	-1963.52
47.7936	31.4584	-5.0929	-1963.52
47.9573	31.4659	-5.0929	-1963.52
48.1209	31.4534	-5.09732	-1961.82
48.2845	31.4484	-5.0929	-1963.52
48.4481	31.4559	-5.09732	-1961.82
48.6118	31.431	-5.09732	-1961.82
48.7754	31.4434	-5.09732	-1961.82
48.939	31.426	-5.09732	-1961.82
49.1026	31.431	-5.09732	-1961.82
49.2663	31.4385	-5.09732	-1961.82
49.4299	31.431	-5.10174	-1960.12
49.5935	31.4135	-5.10174	-1960.12
49.7571	31.4135	-5.11058	-1956.73
49.9208	31.4135	-5.10174	-1960.12
50.0844	31.4135	-5.10174	-1960.12
50.248	31.411	-5.09732	-1961.82
50.4116	31.411	-5.09732	-1961.82
50.5753	31.396	-5.10174	-1960.12
50.7389	31.401	-5.09732	-1961.82
50.9025	31.3935	-5.10174	-1960.12
51.0661	31.401	-5.11058	-1956.73
51.2298	31.386	-5.10174	-1960.12
51.3934	31.3835	-5.10174	-1960.12
51.557	31.3935	-5.10174	-1960.12
51.7206	31.381	-5.11058	-1956.73
51.8842	31.396	-5.11058	-1956.73
52.0479	31.391	-5.11058	-1956.73
52.2115	31.401	-5.11058	-1956.73
52.3751	31.3835	-5.115	-1955.03
52.5387	31.3835	-5.11058	-1956.73
52.7024	31.386	-5.11058	-1956.73
52.866	31.381	-5.11058	-1956.73
53.0296	31.381	-5.10174	-1960.12
53.1932	31.371	-5.11058	-1956.73
53.3569	31.391	-5.11058	-1956.73
53.5205	31.381	-5.115	-1955.03
53.6841	31.391	-5.115	-1955.03
53.8477	31.386	-5.115	-1955.03
54.0114	31.381	-5.115	-1955.03
54.175	31.371	-5.11058	-1956.73
54.3386	31.3735	-5.115	-1955.03
54.5022	31.3835	-5.115	-1955.03
54.6659	31.381	-5.115	-1955.03
54.8295	31.381	-5.115	-1955.03

Depth ft	Temp Deg C	F-Re Ohm-m	Conductivity µS/cm
54.9931	31.371	-5.115	-1955.03
55.1567	31.3835	-5.115	-1955.03
55.3204	31.371	-5.115	-1955.03
55.484	31.386	-5.115	-1955.03
55.6476	31.366	-5.115	-1955.03
55.8112	31.386	-5.11942	-1953.35
55.9749	31.396	-5.11942	-1953.35
56.1385	31.391	-5.11942	-1953.35
56.3021	31.371	-5.11942	-1953.35
56.4657	31.381	-5.12826	-1949.98
56.6294	31.3835	-5.12826	-1949.98
56.793	31.391	-5.12826	-1949.98
56.9566	31.376	-5.11942	-1953.35
57.1202	31.3635	-5.11942	-1953.35
57.2839	31.376	-5.11942	-1953.35
57.4475	31.3735	-5.12826	-1949.98
57.6111	31.376	-5.12826	-1949.98
57.7747	31.361	-5.12826	-1949.98
57.9383	31.371	-5.11942	-1953.35
58.102	31.3735	-5.12826	-1949.98
58.2656	31.376	-5.13268	-1948.3
58.4292	31.351	-5.12826	-1949.98
58.5928	31.361	-5.12826	-1949.98
58.7565	31.366	-5.13268	-1948.3
58.9201	31.351	-5.13268	-1948.3
59.0837	31.3585	-5.12826	-1949.98
59.2473	31.351	-5.13268	-1948.3
59.411	31.3485	-5.12826	-1949.98
59.5746	31.341	-5.13268	-1948.3
59.7382	31.3335	-5.12826	-1949.98
59.9018	31.331	-5.13268	-1948.3
60.0655	31.3335	-5.1371	-1946.62
60.2291	31.3385	-5.13268	-1948.3
60.3927	31.3235	-5.12826	-1949.98
60.5563	31.3135	-5.13268	-1948.3
60.72	31.3285	-5.1371	-1946.62
60.8836	31.3135	-5.13268	-1948.3
61.0472	31.3135	-5.1371	-1946.62
61.2108	31.301	-5.1371	-1946.62
61.3745	31.2935	-5.1371	-1946.62
61.5381	31.301	-5.1371	-1946.62
61.7017	31.311	-5.14594	-1943.28
61.8653	31.2985	-5.1371	-1946.62
62.029	31.2885	-5.14594	-1943.28
62.1926	31.281	-5.15036	-1941.61

MW-17D Temp, Cond, Res

Depth ft	Temp Deg C	F-Re Ohm-m	Conductivity µS/cm
62.3562	31.276	-5.14594	-1943.28
62.5198	31.2785	-5.14594	-1943.28
62.6835	31.2785	-5.15036	-1941.61
62.8471	31.276	-5.15036	-1941.61
63.0107	31.251	-5.15036	-1941.61
63.1743	31.266	-5.15036	-1941.61
63.338	31.2485	-5.14594	-1943.28
63.5016	31.251	-5.14594	-1943.28
63.6652	31.241	-5.14594	-1943.28
63.8288	31.251	-5.14594	-1943.28
63.9924	31.2285	-5.14594	-1943.28
64.1561	31.231	-5.14594	-1943.28
64.3197	31.2385	-5.15036	-1941.61
64.4833	31.231	-5.14594	-1943.28
64.6469	31.246	-5.14594	-1943.28
64.8106	31.226	-5.14594	-1943.28
64.9742	31.226	-5.15036	-1941.61
65.1378	31.2111	-5.15036	-1941.61
65.3014	31.2161	-5.15478	-1939.95
65.4651	31.2161	-5.15478	-1939.95
65.6287	31.2086	-5.15478	-1939.95
65.7923	31.2111	-5.15036	-1941.61
65.9559	31.2111	-5.15478	-1939.95
66.1196	31.1986	-5.15478	-1939.95
66.2832	31.1936	-5.15036	-1941.61
66.4468	31.2036	-5.15478	-1939.95
66.6104	31.1986	-5.15478	-1939.95
66.7741	31.1936	-5.15478	-1939.95
66.9377	31.1936	-5.15478	-1939.95
67.1013	31.1986	-5.15478	-1939.95
67.2649	31.1936	-5.16362	-1936.62
67.4286	31.1986	-5.15478	-1939.95
67.5922	31.1886	-5.15478	-1939.95
67.7558	31.1986	-5.15478	-1939.95
67.9194	31.1936	-5.15478	-1939.95
68.0831	31.1836	-5.15478	-1939.95
68.2467	31.1961	-5.15478	-1939.95
68.4103	31.1936	-5.16362	-1936.62
68.5739	31.1961	-5.15478	-1939.95
68.7376	31.2061	-5.16362	-1936.62
68.9012	31.1961	-5.16362	-1936.62
69.0648	31.1936	-5.16362	-1936.62
69.2284	31.1936	-5.16362	-1936.62
69.3921	31.1861	-5.16362	-1936.62
69.5557	31.1961	-5.16804	-1934.97
69.7193	31.1836	-5.16804	-1934.97
69.8829	31.1861	-5.16362	-1936.62
70.0465	31.1886	-5.16362	-1936.62
70.2102	31.1961	-5.16362	-1936.62
70.3738	31.1961	-5.16804	-1934.97
70.5374	31.1886	-5.16804	-1934.97
70.701	31.1861	-5.16804	-1934.97
70.8647	31.1836	-5.16362	-1936.62
71.0283	31.1861	-5.16362	-1936.62
71.1919	31.1761	-5.16804	-1934.97
71.3555	31.1861	-5.16804	-1934.97
71.5192	31.1986	-5.16804	-1934.97
71.6828	31.1936	-5.16804	-1934.97
71.8464	31.1861	-5.16362	-1936.62
72.01	31.1836	-5.17246	-1933.31
72.1737	31.1786	-5.16804	-1934.97
72.3373	31.1761	-5.16804	-1934.97
72.5009	31.1761	-5.16804	-1934.97
72.6645	31.1761	-5.16362	-1936.62
72.8282	31.1861	-5.17246	-1933.31
72.9918	31.1936	-5.16804	-1934.97
73.1554	31.1836	-5.16804	-1934.97
73.319	31.1861	-5.16804	-1934.97
73.4827	31.1936	-5.17246	-1933.31
73.6463	31.1861	-5.16804	-1934.97
73.8099	31.1736	-5.1813	-1930.02
73.9735	31.1836	-5.17246	-1933.31
74.1372	31.1836	-5.17246	-1933.31
74.3008	31.1961	-5.1813	-1930.02
74.4644	31.1886	-5.17246	-1933.31
74.628	31.1836	-5.1813	-1930.02
74.7917	31.1961	-5.1813	-1930.02
74.9553	31.1861	-5.1813	-1930.02
75.1189	31.1736	-5.1813	-1930.02
75.2825	31.1936	-5.1813	-1930.02
75.4462	31.1786	-5.1813	-1930.02
75.6098	31.1836	-5.1813	-1930.02
75.7734	31.1786	-5.1813	-1930.02
75.937	31.1786	-5.18572	-1928.37
76.1006	31.1836	-5.18572	-1928.37
76.2643	31.1961	-5.1813	-1930.02
76.4279	31.1861	-5.19014	-1926.73
76.5915	31.1761	-5.18572	-1928.37
76.7551	31.1861	-5.1813	-1930.02
76.9188	31.1836	-5.18572	-1928.37

MW-17D Temp, Cond, Res

Depth ft	Temp Deg C	F-Re Ohm-m	Conductivity µS/cm
77.0824	31.1961	-5.18572	-1928.37
77.246	31.1861	-5.18572	-1928.37
77.4096	31.1786	-5.19014	-1926.73
77.5733	31.1886	-5.19014	-1926.73
77.7369	31.1986	-5.19014	-1926.73
77.9005	31.1936	-5.19014	-1926.73
78.0641	31.1861	-5.19014	-1926.73
78.2278	31.1786	-5.19014	-1926.73
78.3914	31.1786	-5.19456	-1925.09
78.555	31.1936	-5.19456	-1925.09
78.7186	31.1936	-5.19014	-1926.73
78.8823	31.1936	-5.19014	-1926.73
79.0459	31.1836	-5.19014	-1926.73
79.2095	31.1886	-5.19456	-1925.09
79.3731	31.1786	-5.20341	-1921.82
79.5368	31.1986	-5.20341	-1921.82
79.7004	31.1836	-5.19456	-1925.09
79.864	31.1936	-5.20341	-1921.82
80.0276	31.1861	-5.20341	-1921.82
80.1913	31.1961	-5.20341	-1921.82
80.3549	31.1936	-5.19456	-1925.09
80.5185	31.1961	-5.19456	-1925.09
80.6821	31.1936	-5.20341	-1921.82
80.8458	31.1761	-5.20341	-1921.82
81.0094	31.1961	-5.20341	-1921.82
81.173	31.2036	-5.20341	-1921.82
81.3366	31.1861	-5.20783	-1920.19
81.5003	31.1936	-5.20341	-1921.82
81.6639	31.2036	-5.20341	-1921.82
81.8275	31.1986	-5.20341	-1921.82
81.9911	31.1861	-5.20783	-1920.19
82.1547	31.1886	-5.20341	-1921.82
82.3184	31.1886	-5.20783	-1920.19
82.482	31.1961	-5.21225	-1918.56
82.6456	31.1886	-5.21225	-1918.56
82.8092	31.1986	-5.21225	-1918.56
82.9729	31.1961	-5.21225	-1918.56
83.1365	31.1836	-5.22109	-1915.31
83.3001	31.1836	-5.21225	-1918.56
83.4637	31.1961	-5.22109	-1915.31
83.6274	31.2036	-5.22109	-1915.31
83.791	31.1886	-5.22109	-1915.31
83.9546	31.1861	-5.22551	-1913.69
84.1182	31.1861	-5.22109	-1915.31
84.2819	31.1961	-5.22551	-1913.69
84.4455	31.2061	-5.22551	-1913.69
84.6091	31.1986	-5.23877	-1908.85
84.7727	31.1861	-5.22551	-1913.69
84.9364	31.1961	-5.22993	-1912.07
85.1	31.2036	-5.22993	-1912.07
85.2636	31.1961	-5.22993	-1912.07
85.4272	31.1936	-5.23877	-1908.85
85.5909	31.1861	-5.23877	-1908.85
85.7545	31.1861	-5.23877	-1908.85
85.9181	31.1886	-5.23877	-1908.85
86.0817	31.1886	-5.23877	-1908.85
86.2454	31.1936	-5.24319	-1907.24
86.409	31.1986	-5.23877	-1908.85
86.5726	31.1961	-5.23877	-1908.85
86.7362	31.1886	-5.23877	-1908.85
86.8999	31.1886	-5.24319	-1907.24
87.0635	31.1936	-5.24319	-1907.24
87.2271	31.1836	-5.23877	-1908.85
87.3907	31.1986	-5.24761	-1905.63
87.5544	31.1961	-5.24319	-1907.24
87.718	31.1886	-5.24319	-1907.24
87.8816	31.1936	-5.24319	-1907.24
88.0452	31.2086	-5.24319	-1907.24
88.2088	31.2061	-5.24319	-1907.24
88.3725	31.1961	-5.24761	-1905.63
88.5361	31.2111	-5.24319	-1907.24
88.6997	31.2111	-5.25645	-1902.43

```
~VERSION INFORMATION
VERS      .2.0                    :CWLS LOG ASCII STANDARD-VERSION 2.0
WRAP      .NO                     :ONE LINE PER DEPTH STEP
~WELL INFORMATION
STRT      .FT            6.56031  :START DEPTH
STOP      .FT            75.6098  :STOP DEPTH
STEP      .FT           0.163624  :STEP
NULL          -999.25            :NULL VALUE
COMP                             :COMPANY
WELL                             :WELL
FLD                              :FIELD
LOC                              :LOCATION
PROV      N/A                    :PROVINCE
SRVC      N/A                    :SERVICE COMPANY
DATE                             :DATE
UWI       N/A                    :UNIQUE WELL ID
~CURVE INFORMATION
DEPT      .FT                    :DEPTH
TEMP      .DEG_C                 :Temp.
F-RE      .OHM-M                 :F-Res.
COND      .US/CM                 :Cond.
~PARAMETER INFORMATION
ELEV      :ELEVATION
STE       :STE
DENS      :DENSITY
CASI      :CASING TO1
OPER      :OPERATING RIG TIME
WGT1      :WGT1
CASI      :CASING SIZE1
CASI      :CASING TO2
WGT2      :WGT2
CASI      :CASING SIZE2
WELL      :WELL ID
CASI      :CASING TO3
K.B.      :K.B.
WGT3      :WGT3
TYPE      :TYPE LOG
CASI      :CASING SIZE3
CASI      :CASING TO4
SALI      :SALINITY
TITL      :TITLE
WGT4      :WGT4
TOP       :TOP LOGGED INTERVAL
CASI      :CASING SIZE4
WITN      :WITNESSED BY
CASI      :CASING TO5
DRIL      :DRILLING MEAS. FROM
WGT5      :WGT5
CASI      :CASING SIZE5
CTY       :CTY
WGT6      :WGT6
CASI      :CASING SIZE6
MAX.      :MAX. REC. TEMP.
D.F.      :D.F.
CASI      :CASING TO6
OTHE      :OTHER SERVICES
BIT1      :BIT1
DEPT      :DEPTH-DRILLER
BIT2      :BIT2
RUN       :RUN No
RUN1      :RUN1
BIT3      :BIT3
RUN2      :RUN2
PERM      :PERMANENT DATUM
TWP       :TWP
BIT4      :BIT4
LOG       :LOG MEAS. FROM
BIT       :BIT FROM1
RUN3      :RUN3
BIT5      :BIT5
CASI      :CASING FROM1
TYPE      :TYPE FLUID IN HOLE
RUN4      :RUN4
FLD       :FLD
BIT6      :BIT6
BIT       :BIT TO1
CASI      :CASING FROM2
BIT       :BIT FROM2
CO        :CO
RGE       :RGE
BIT       :BIT TO2
DEPT      :DEPTH-LOGGER
CASI      :CASING FROM3
BIT       :BIT FROM3
RUN5      :RUN5
SEC       :SEC
BIT       :BIT TO3
G.L.      :G.L.
CASI      :CASING FROM4
BIT       :BIT FROM4
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RUN6	:RUN6
BIT	:BIT TO4
BTM	:BTM LOGGED INTERVAL
CASI	:CASING FROM5
BIT	:BIT FROM5
STAT	:STATE
BIT	:BIT TO5
LEVE	:LEVEL
CASI	:CASING FROM6
BIT	:BIT FROM6
COUN	:COUNTRY
RECO	:RECORDED BY
FILI	:FILING No
BIT	:BIT TO6
~OTHER	
~A	

Depth ft	Temp Deg C	F-Re Ohm-m	Conductivity µS/cm
6.56031	30.3614	136.333	73.3498
6.72394	30.3764	136.333	73.3498
6.88756	30.3714	136.333	73.3498
7.05119	30.3814	136.333	73.3498
7.21481	30.3714	136.333	73.3498
7.37843	30.3964	136.333	73.3498
7.54206	30.3914	136.333	73.3498
7.70568	30.3989	136.333	73.3498
7.86931	30.3889	136.333	73.3498
8.03293	30.3914	136.333	73.3498
8.19656	30.4039	136.333	73.3498
8.36018	30.3964	136.333	73.3498
8.5238	30.4139	136.333	73.3498
8.68743	30.4014	136.333	73.3498
8.85105	30.3989	136.333	73.3498
9.01468	30.4139	136.333	73.3498
9.1783	30.4214	136.333	73.3498
9.34193	30.4139	136.333	73.3498
9.50555	30.4089	136.333	73.3498
9.66917	30.4189	136.333	73.3498
9.8328	30.4239	136.333	73.3498
9.99642	30.4114	136.333	73.3498
10.16	30.4289	136.333	73.3498
10.3237	30.4214	136.333	73.3498
10.4873	30.4289	136.333	73.3498
10.6509	30.4414	136.333	73.3498
10.8145	30.4239	136.333	73.3498
10.9782	30.4314	136.333	73.3498
11.1418	30.4314	136.333	73.3498
11.3054	30.4414	136.333	73.3498
11.469	30.4439	136.333	73.3498
11.6327	30.4439	136.333	73.3498
11.7963	30.4489	136.333	73.3498
11.9599	30.4389	136.333	73.3498
12.1235	30.4539	136.333	73.3498
12.2872	30.4489	136.333	73.3498

Depth ft	Temp Deg C	F-Re Ohm-m	Conductivity µS/cm
12.4508	30.4514	136.333	73.3498
12.6144	30.4489	136.333	73.3498
12.778	30.4589	136.333	73.3498
12.9417	30.4514	136.333	73.3498
13.1053	30.4689	136.333	73.3498
13.2689	30.4539	136.333	73.3498
13.4325	30.4689	136.333	73.3498
13.5962	30.4514	136.333	73.3498
13.7598	30.4639	136.333	73.3498
13.9234	30.4789	136.333	73.3498
14.087	30.4614	136.333	73.3498
14.2507	30.4739	136.333	73.3498
14.4143	30.4614	136.333	73.3498
14.5779	30.4639	136.333	73.3498
14.7415	30.4739	136.333	73.3498
14.9052	30.4864	136.333	73.3498
15.0688	30.4839	136.333	73.3498
15.2324	30.4789	136.333	73.3498
15.396	30.4839	136.333	73.3498
15.5597	30.4864	136.333	73.3498
15.7233	30.4839	136.333	73.3498
15.8869	30.4864	136.333	73.3498
16.0505	30.5014	136.333	73.3498
16.2141	30.4939	136.333	73.3498
16.3778	30.5014	136.333	73.3498
16.5414	30.4914	136.333	73.3498
16.705	30.5064	136.333	73.3498
16.8686	30.5039	136.333	73.3498
17.0323	30.5114	136.333	73.3498
17.1959	30.5014	136.333	73.3498
17.3595	30.5164	136.333	73.3498
17.5231	30.5014	136.333	73.3498
17.6868	30.5164	136.333	73.3498
17.8504	30.5264	136.333	73.3498
18.014	30.5139	136.333	73.3498
18.1776	30.5139	136.333	73.3498

Depth ft	Temp Deg C	F-Re Ohm-m	Conductivity µS/cm
18.3413	30.5139	136.333	73.3498
18.5049	30.5264	136.333	73.3498
18.6685	30.5264	136.333	73.3498
18.8321	30.5264	136.333	73.3498
18.9958	30.5364	136.333	73.3498
19.1594	30.5314	136.333	73.3498
19.323	30.5314	136.333	73.3498
19.4866	30.5339	136.333	73.3498
19.6503	30.5364	136.333	73.3498
19.8139	30.5364	136.333	73.3498
19.9775	30.5438	136.333	73.3498
20.1411	30.5438	136.333	73.3498
20.3048	30.5538	136.333	73.3498
20.4684	30.5414	136.333	73.3498
20.632	30.5513	136.333	73.3498
20.7956	30.5588	136.333	73.3498
20.9593	30.5588	136.333	73.3498
21.1229	30.5463	136.333	73.3498
21.2865	30.5588	136.333	73.3498
21.4501	30.5688	136.333	73.3498
21.6138	30.5563	136.333	73.3498
21.7774	30.5738	136.333	73.3498
21.941	30.5588	136.333	73.3498
22.1046	30.5763	136.333	73.3498
22.2682	30.5688	136.333	73.3498
22.4319	30.5688	136.333	73.3498
22.5955	30.5763	136.333	73.3498
22.7591	30.5863	136.333	73.3498
22.9227	30.5788	136.333	73.3498
23.0864	30.5738	136.333	73.3498
23.25	30.5888	136.333	73.3498
23.4136	30.5738	136.333	73.3498
23.5772	30.5963	136.333	73.3498
23.7409	30.5938	136.333	73.3498
23.9045	30.5938	136.333	73.3498
24.0681	30.5888	136.333	73.3498
24.2317	30.5938	136.333	73.3498
24.3954	30.5938	136.333	73.3498
24.559	30.5863	136.333	73.3498
24.7226	30.6088	136.333	73.3498
24.8862	30.6088	136.333	73.3498
25.0499	30.5988	136.333	73.3498
25.2135	30.6038	136.333	73.3498
25.3771	30.6088	136.333	73.3498
25.5407	30.6088	136.333	73.3498

Depth ft	Temp Deg C	F-Re Ohm-m	Conductivity µS/cm
25.7044	30.6063	136.333	73.3498
25.868	30.6238	136.333	73.3498
26.0316	30.6138	136.333	73.3498
26.1952	30.6238	136.333	73.3498
26.3589	30.6238	136.333	73.3498
26.5225	30.6263	136.333	73.3498
26.6861	30.6263	136.333	73.3498
26.8497	30.6313	136.333	73.3498
27.0134	30.6363	136.333	73.3498
27.177	30.6288	136.333	73.3498
27.3406	30.6413	136.333	73.3498
27.5042	30.6313	136.333	73.3498
27.6679	30.6413	136.333	73.3498
27.8315	30.6363	136.333	73.3498
27.9951	30.6488	136.333	73.3498
28.1587	30.6363	136.333	73.3498
28.3223	30.6513	136.333	73.3498
28.486	30.6413	136.333	73.3498
28.6496	30.6488	136.333	73.3498
28.8132	30.6563	136.333	73.3498
28.9768	30.6463	136.333	73.3498
29.1405	30.6463	136.333	73.3498
29.3041	30.6613	136.333	73.3498
29.4677	30.6613	136.333	73.3498
29.6313	30.6588	136.333	73.3498
29.795	30.6613	136.333	73.3498
29.9586	30.6663	136.333	73.3498
30.1222	30.6663	136.333	73.3498
30.2858	30.6713	136.333	73.3498
30.4495	30.6688	136.333	73.3498
30.6131	30.6588	41.196	242.742
30.7767	30.8762	-5.23877	-1908.85
30.9403	31.271	-5.19456	-1925.09
31.104	31.4434	-5.15478	-1939.95
31.2676	31.5184	-5.115	-1955.03
31.4312	31.5459	-5.07522	-1970.36
31.5948	31.5759	-5.04428	-1982.45
31.7585	31.5759	-5.01775	-1992.92
31.9221	31.5809	-5.00007	-1999.97
32.0857	31.5834	-4.98239	-2007.07
32.2493	31.5884	-4.96471	-2014.22
32.413	31.5884	-4.95145	-2019.61
32.5766	31.5934	-4.94703	-2021.41
32.7402	31.5934	-4.93819	-2025.03
32.9038	31.5884	-4.93377	-2026.85

Depth ft	Temp Deg C	F-Re Ohm-m	Conductivity µS/cm
40.4305	31.6134	-4.92935	-2028.67
40.5942	31.6184	-4.92935	-2028.67
40.7578	31.6184	-4.93377	-2026.85
40.9214	31.6234	-4.93819	-2025.03
41.085	31.6334	-4.93819	-2025.03
41.2487	31.6309	-4.93819	-2025.03
41.4123	31.6184	-4.93819	-2025.03
41.5759	31.6284	-4.93377	-2026.85
41.7395	31.6384	-4.93819	-2025.03
41.9032	31.6284	-4.93377	-2026.85
42.0668	31.6334	-4.94703	-2021.41
42.2304	31.6209	-4.93819	-2025.03
42.394	31.6409	-4.94703	-2021.41
42.5577	31.6309	-4.94703	-2021.41
42.7213	31.6234	-4.94703	-2021.41
42.8849	31.6334	-4.94703	-2021.41
43.0485	31.6284	-4.94703	-2021.41
43.2122	31.6284	-4.95145	-2019.61
43.3758	31.6284	-4.93819	-2025.03
43.5394	31.6109	-4.94703	-2021.41
43.703	31.6034	-4.95145	-2019.61
43.8667	31.6034	-4.94703	-2021.41
44.0303	31.5809	-4.95145	-2019.61
44.1939	31.5709	-4.95145	-2019.61
44.3575	31.5709	-4.95145	-2019.61
44.5212	31.5684	-4.95145	-2019.61
44.6848	31.5459	-4.94703	-2021.41
44.8484	31.5409	-4.95145	-2019.61
45.012	31.5309	-4.95587	-2017.81
45.1757	31.5259	-4.95587	-2017.81
45.3393	31.5259	-4.95145	-2019.61
45.5029	31.5084	-4.95587	-2017.81
45.6665	31.5034	-4.95587	-2017.81
45.8301	31.4959	-4.95145	-2019.61
45.9938	31.4684	-4.95587	-2017.81
46.1574	31.4784	-4.95587	-2017.81
46.321	31.4584	-4.96471	-2014.22
46.4846	31.4584	-4.95587	-2017.81
46.6483	31.4634	-4.95587	-2017.81
46.8119	31.4534	-4.95587	-2017.81
46.9755	31.4434	-4.96471	-2014.22
47.1391	31.4385	-4.95587	-2017.81
47.3028	31.4335	-4.95587	-2017.81
47.4664	31.426	-4.95587	-2017.81
47.63	31.411	-4.96471	-2014.22

Depth ft	Temp Deg C	F-Re Ohm-m	Conductivity µS/cm
47.7936	31.4135	-4.96471	-2014.22
47.9573	31.411	-4.96471	-2014.22
48.1209	31.401	-4.96471	-2014.22
48.2845	31.396	-4.96471	-2014.22
48.4481	31.3935	-4.96471	-2014.22
48.6118	31.371	-4.96471	-2014.22
48.7754	31.361	-4.96913	-2012.42
48.939	31.3635	-4.96471	-2014.22
49.1026	31.361	-4.96471	-2014.22
49.2663	31.341	-4.96913	-2012.42
49.4299	31.3435	-4.96471	-2014.22
49.5935	31.331	-4.96913	-2012.42
49.7571	31.3385	-4.96471	-2014.22
49.9208	31.3335	-4.96913	-2012.42
50.0844	31.331	-4.96913	-2012.42
50.248	31.3335	-4.96913	-2012.42
50.4116	31.3285	-4.96913	-2012.42
50.5753	31.321	-4.96471	-2014.22
50.7389	31.3235	-4.96913	-2012.42
50.9025	31.321	-4.97355	-2010.64
51.0661	31.321	-4.96913	-2012.42
51.2298	31.331	-4.97355	-2010.64
51.3934	31.3235	-4.96913	-2012.42
51.557	31.321	-4.97355	-2010.64
51.7206	31.3335	-4.96913	-2012.42
51.8842	31.3235	-4.97355	-2010.64
52.0479	31.321	-4.96913	-2012.42
52.2115	31.3335	-4.97355	-2010.64
52.3751	31.3335	-4.97355	-2010.64
52.5387	31.3385	-4.97355	-2010.64
52.7024	31.3335	-4.97355	-2010.64
52.866	31.3285	-4.98239	-2007.07
53.0296	31.3335	-4.97355	-2010.64
53.1932	31.331	-4.97355	-2010.64
53.3569	31.3135	-4.98239	-2007.07
53.5205	31.3335	-4.98239	-2007.07
53.6841	31.331	-4.98239	-2007.07
53.8477	31.3185	-4.98239	-2007.07
54.0114	31.3235	-4.98681	-2005.29
54.175	31.321	-4.98239	-2007.07
54.3386	31.321	-4.98239	-2007.07
54.5022	31.3185	-4.98239	-2007.07
54.6659	31.321	-4.98681	-2005.29
54.8295	31.3285	-4.98239	-2007.07
54.9931	31.3285	-4.98239	-2007.07

Depth ft	Temp Deg C	F-Re Ohm-m	Conductivity µS/cm
55.1567	31.3235	-4.98239	-2007.07
55.3204	31.3235	-4.98681	-2005.29
55.484	31.3235	-4.98681	-2005.29
55.6476	31.3285	-4.98681	-2005.29
55.8112	31.331	-4.98681	-2005.29
55.9749	31.3235	-4.98681	-2005.29
56.1385	31.321	-4.99123	-2003.51
56.3021	31.3235	-4.98681	-2005.29
56.4657	31.3285	-4.99123	-2003.51
56.6294	31.321	-4.98681	-2005.29
56.793	31.321	-4.99123	-2003.51
56.9566	31.3235	-4.99123	-2003.51
57.1202	31.3385	-4.99123	-2003.51
57.2839	31.3385	-4.98681	-2005.29
57.4475	31.3385	-4.99123	-2003.51
57.6111	31.331	-4.99123	-2003.51
57.7747	31.341	-4.99123	-2003.51
57.9383	31.3285	-4.99123	-2003.51
58.102	31.3385	-5.00007	-1999.97
58.2656	31.331	-5.00007	-1999.97
58.4292	31.3285	-5.00007	-1999.97
58.5928	31.3335	-5.00007	-1999.97
58.7565	31.3285	-5.00007	-1999.97
58.9201	31.3285	-5.00449	-1998.2
59.0837	31.3185	-5.00007	-1999.97
59.2473	31.311	-5.00449	-1998.2
59.411	31.3085	-5.00449	-1998.2
59.5746	31.301	-5.00449	-1998.2
59.7382	31.2885	-5.00007	-1999.97
59.9018	31.281	-5.00007	-1999.97
60.0655	31.281	-5.00449	-1998.2
60.2291	31.2785	-5.00449	-1998.2
60.3927	31.276	-5.00449	-1998.2
60.5563	31.261	-5.00891	-1996.44
60.72	31.271	-5.00007	-1999.97
60.8836	31.266	-5.00449	-1998.2
61.0472	31.2585	-5.00449	-1998.2
61.2108	31.2585	-5.00891	-1996.44
61.3745	31.251	-5.00449	-1998.2
61.5381	31.261	-5.00891	-1996.44
61.7017	31.246	-5.00891	-1996.44
61.8653	31.2485	-5.00891	-1996.44
62.029	31.2485	-5.00891	-1996.44
62.1926	31.2385	-5.00891	-1996.44
62.3562	31.2385	-5.00891	-1996.44

Depth ft	Temp Deg C	F-Re Ohm-m	Conductivity µS/cm
62.5198	31.2385	-5.00891	-1996.44
62.6835	31.221	-5.00891	-1996.44
62.8471	31.226	-5.01775	-1992.92
63.0107	31.226	-5.01775	-1992.92
63.1743	31.221	-5.01775	-1992.92
63.338	31.226	-5.01775	-1992.92
63.5016	31.2185	-5.01775	-1992.92
63.6652	31.2061	-5.00891	-1996.44
63.8288	31.2036	-5.01775	-1992.92
63.9924	31.2036	-5.00891	-1996.44
64.1561	31.1961	-5.01775	-1992.92
64.3197	31.1761	-5.00891	-1996.44
64.4833	31.1786	-5.02217	-1991.17
64.6469	31.1736	-5.02217	-1991.17
64.8106	31.1836	-5.01775	-1992.92
64.9742	31.1786	-5.02217	-1991.17
65.1378	31.1636	-5.01775	-1992.92
65.3014	31.1686	-5.02217	-1991.17
65.4651	31.1686	-5.02217	-1991.17
65.6287	31.1736	-5.02217	-1991.17
65.7923	31.1736	-5.02217	-1991.17
65.9559	31.1636	-5.02217	-1991.17
66.1196	31.1561	-5.02217	-1991.17
66.2832	31.1536	-5.02217	-1991.17
66.4468	31.1586	-5.01775	-1992.92
66.6104	31.1636	-5.02217	-1991.17
66.7741	31.1586	-5.02659	-1989.42
66.9377	31.1461	-5.02217	-1991.17
67.1013	31.1436	-5.02217	-1991.17
67.2649	31.1486	-5.02217	-1991.17
67.4286	31.1486	-5.02217	-1991.17
67.5922	31.1586	-5.02659	-1989.42
67.7558	31.1561	-5.02659	-1989.42
67.9194	31.1486	-5.02659	-1989.42
68.0831	31.1436	-5.03544	-1985.93
68.2467	31.1386	-5.02659	-1989.42
68.4103	31.1486	-5.02659	-1989.42
68.5739	31.1386	-5.03544	-1985.93
68.7376	31.1436	-5.03544	-1985.93
68.9012	31.1461	-5.03544	-1985.93
69.0648	31.1386	-5.03544	-1985.93
69.2284	31.1311	-5.03544	-1985.93
69.3921	31.1361	-5.03544	-1985.93
69.5557	31.1311	-5.03544	-1985.93
69.7193	31.1336	-5.03986	-1984.18

Depth ft	Temp Deg C	F-Re Ohm-m	Conductivity µS/cm
69.8829	31.1261	-5.03544	-1985.93
70.0465	31.1361	-5.03986	-1984.18
70.2102	31.1261	-5.03544	-1985.93
70.3738	31.1336	-5.03986	-1984.18
70.5374	31.1261	-5.03544	-1985.93
70.701	31.1261	-5.04428	-1982.45
70.8647	31.1386	-5.03986	-1984.18
71.0283	31.1336	-5.03986	-1984.18
71.1919	31.1361	-5.04428	-1982.45
71.3555	31.1336	-5.03986	-1984.18
71.5192	31.1336	-5.04428	-1982.45
71.6828	31.1336	-5.03986	-1984.18
71.8464	31.1436	-5.04428	-1982.45
72.01	31.1261	-5.04428	-1982.45
72.1737	31.1261	-5.04428	-1982.45
72.3373	31.1386	-5.03986	-1984.18
72.5009	31.1461	-5.04428	-1982.45
72.6645	31.1436	-5.04428	-1982.45
72.8282	31.1461	-5.05312	-1978.98
72.9918	31.1486	-5.05312	-1978.98
73.1554	31.1361	-5.04428	-1982.45
73.319	31.1336	-5.05312	-1978.98
73.4827	31.1386	-5.05312	-1978.98
73.6463	31.1361	-5.05312	-1978.98
73.8099	31.1261	-5.05312	-1978.98
73.9735	31.1361	-5.05312	-1978.98
74.1372	31.1336	-5.05754	-1977.25
74.3008	31.1386	-5.05312	-1978.98
74.4644	31.1436	-5.05754	-1977.25
74.628	31.1311	-5.05754	-1977.25
74.7917	31.1361	-5.05754	-1977.25
74.9553	31.1361	-5.06196	-1975.52
75.1189	31.1561	-5.05754	-1977.25
75.2825	31.1486	-5.05312	-1978.98
75.4462	31.1436	-5.05754	-1977.25
75.6098	31.1436	-5.05754	-1977.25

```
~VERSION INFORMATION
VERS      .2.0          :CWLS LOG ASCII STANDARD-VERSION 2.0
WRAP      .NO           :ONE LINE PER DEPTH STEP
~WELL INFORMATION
STRT      .FT              88.4811 :START DEPTH
STOP      .FT              63.0554 :STOP DEPTH
STEP      .FT             -0.09971 :STEP
NULL           -999.25 :NULL VALUE
COMP                     :COMPANY
WELL                     :WELL
FLD                      :FIELD
LOC                      :LOCATION
PROV      N/A            :PROVINCE
SRVC      N/A            :SERVICE COMPANY
DATE                     :DATE
UWI       N/A            :UNIQUE WELL ID
~CURVE INFORMATION
DEPT      .FT            :DEPTH
CALI      .              :Caliper (inches)
~PARAMETER INFORMATION
ELEV      :ELEVATION
STE       :STE
DENS      :DENSITY
CASI      :CASING TO1
OPER      :OPERATING RIG TIME
WGT1      :WGT1
CASI      :CASING SIZE1
CASI      :CASING TO2
WGT2      :WGT2
CASI      :CASING SIZE2
WELL      :WELL ID
CASI      :CASING TO3
K.B.      :K.B.
WGT3      :WGT3
TYPE      :TYPE LOG
CASI      :CASING SIZE3
CASI      :CASING TO4
SALI      :SALINITY
TITL      :TITLE
WGT4      :WGT4
TOP       :TOP LOGGED INTERVAL
CASI      :CASING SIZE4
WITN      :WITNESSED BY
CASI      :CASING TO5
DRIL      :DRILLING MEAS. FROM
WGT5      :WGT5
CASI      :CASING SIZE5
CTY       :CTY
WGT6      :WGT6
CASI      :CASING SIZE6
MAX.      :MAX. REC. TEMP.
D.F.      :D.F.
CASI      :CASING TO6
OTHE      :OTHER SERVICES
BIT1      :BIT1
DEPT      :DEPTH-DRILLER
BIT2      :BIT2
RUN       :RUN No
RUN1      :RUN1
BIT3      :BIT3
RUN2      :RUN2
PERM      :PERMANENT DATUM
TWP       :TWP
BIT4      :BIT4
LOG       :LOG MEAS. FROM
BIT       :BIT FROM1
RUN3      :RUN3
BIT5      :BIT5
CASI      :CASING FROM1
TYPE      :TYPE FLUID IN HOLE
RUN4      :RUN4
FLD       :FLD
BIT6      :BIT6
BIT       :BIT TO1
CASI      :CASING FROM2
BIT       :BIT FROM2
CO        :CO
RGE       :RGE
BIT       :BIT TO2
DEPT      :DEPTH-LOGGER
CASI      :CASING FROM3
BIT       :BIT FROM3
RUN5      :RUN5
SEC       :SEC
BIT       :BIT TO3
G.L.      :G.L.
CASI      :CASING FROM4
BIT       :BIT FROM4
RUN6      :RUN6
BIT       :BIT TO4
BTM       :BTM LOGGED INTERVAL
```

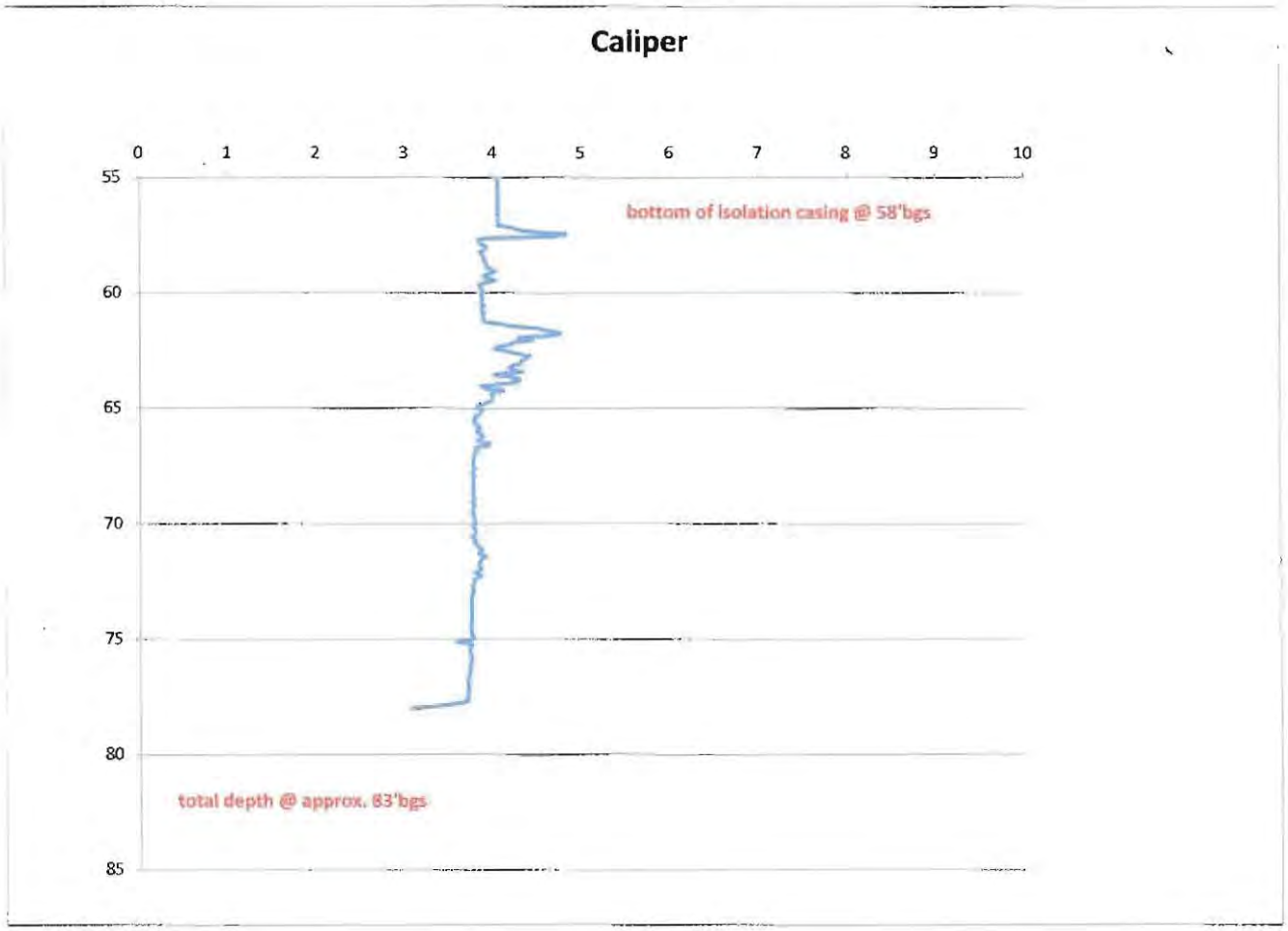
CASI	:CASING FROM5
BIT	:BIT FROM5
STAT	:STATE
BIT	:BIT TO5
LEVE	:LEVEL
CASI	:CASING FROM6
BIT	:BIT FROM6
COUN	:COUNTRY
RECO	:RECORDED BY
FILI	:FILING No
BIT	:BIT TO6
~OTHER	
~A	

Depth (ft)	Caliper (in)	Depth (ft)	Caliper (in)	Depth (ft)	Caliper (in)	Depth (ft)	Caliper (in)
88.4811	3.87565	84.7919	3.93730	81.1027	3.96079	77.4135	3.96750
88.3814	3.93395	84.6922	3.94149	81.0030	3.96037	77.3138	3.96582
88.2817	3.97211	84.5925	3.94024	80.9033	3.96163	77.2141	3.96582
88.1820	3.95995	84.4928	3.93604	80.8036	3.95827	77.1144	3.96540
88.0823	3.95156	84.3931	3.94024	80.7039	3.95995	77.0146	3.96540
87.9826	3.93311	84.2934	3.93772	80.6042	3.95995	76.9149	3.96414
87.8829	3.93311	84.1937	3.94024	80.5044	3.96037	76.8152	3.96624
87.7832	3.93311	84.0940	3.93982	80.4047	3.95743	76.7155	3.96540
87.6835	3.94611	83.9942	3.97421	80.3050	3.96037	76.6158	3.97211
87.5838	3.93982	83.8945	4.04970	80.2053	3.96624	76.5161	3.98511
87.4840	3.94275	83.7948	4.07570	80.1056	3.96414	76.4164	3.97211
87.3843	3.93856	83.6951	4.01447	80.0059	3.96414	76.3167	3.96624
87.2846	3.93059	83.5954	3.97085	79.9062	3.96582	76.2170	3.97798
87.1849	3.93311	83.4957	3.96540	79.8065	3.96414	76.1173	3.99015
87.0852	3.92891	83.3960	3.99518	79.7068	3.96372	76.0176	3.98847
86.9855	3.93227	83.2963	4.04173	79.6071	3.96414	75.9179	3.97924
86.8858	3.93269	83.1966	4.02705	79.5074	3.96288	75.8181	3.97672
86.7861	3.92891	83.0969	4.00021	79.4077	3.96582	75.7184	3.97127
86.6864	3.93311	82.9972	4.08241	79.3079	3.96288	75.6187	3.97127
86.5867	3.94862	82.8975	4.09751	79.2082	3.96205	75.5190	3.97463
86.4870	3.95156	82.7977	4.05977	79.1085	3.98092	75.4193	3.97085
86.3873	3.94359	82.6980	3.97631	79.0088	3.98805	75.3196	3.97211
86.2875	3.93982	82.5983	3.96959	78.9091	3.98973	75.2199	3.96959
86.1878	3.94359	82.4986	3.96708	78.8094	3.97295	75.1202	3.97253
86.0881	3.94527	82.3989	3.96456	78.7097	3.97043	75.0205	3.97085
85.9884	3.94024	82.2992	3.95869	78.6100	3.97211	74.9208	3.97379
85.8887	3.94485	82.1995	3.96205	78.5103	3.97085	74.8211	3.97043
85.7890	3.94024	82.0998	3.96288	78.4106	3.96959	74.7214	3.97127
85.6893	3.94108	82.0001	3.95995	78.3109	3.96959	74.6216	3.97043
85.5896	3.94191	81.9004	3.95743	78.2112	3.96708	74.5219	3.97127
85.4899	3.93478	81.8007	3.95869	78.1114	3.96876	74.4222	3.97463
85.3902	3.94108	81.7010	3.96079	78.0117	3.97043	74.3225	3.98805
85.2905	3.93856	81.6012	3.95911	77.9120	3.96876	74.2228	3.98763
85.1908	3.94024	81.5015	3.96037	77.8123	3.96876	74.1231	3.98763
85.0910	3.94149	81.4018	3.96079	77.7126	3.96582	74.0234	3.97924
84.9913	3.93478	81.3021	3.95827	77.6129	3.96624	73.9237	3.97463
84.8916	3.94191	81.2024	3.96079	77.5132	3.96708	73.8240	3.97589

MW-17D Caliper

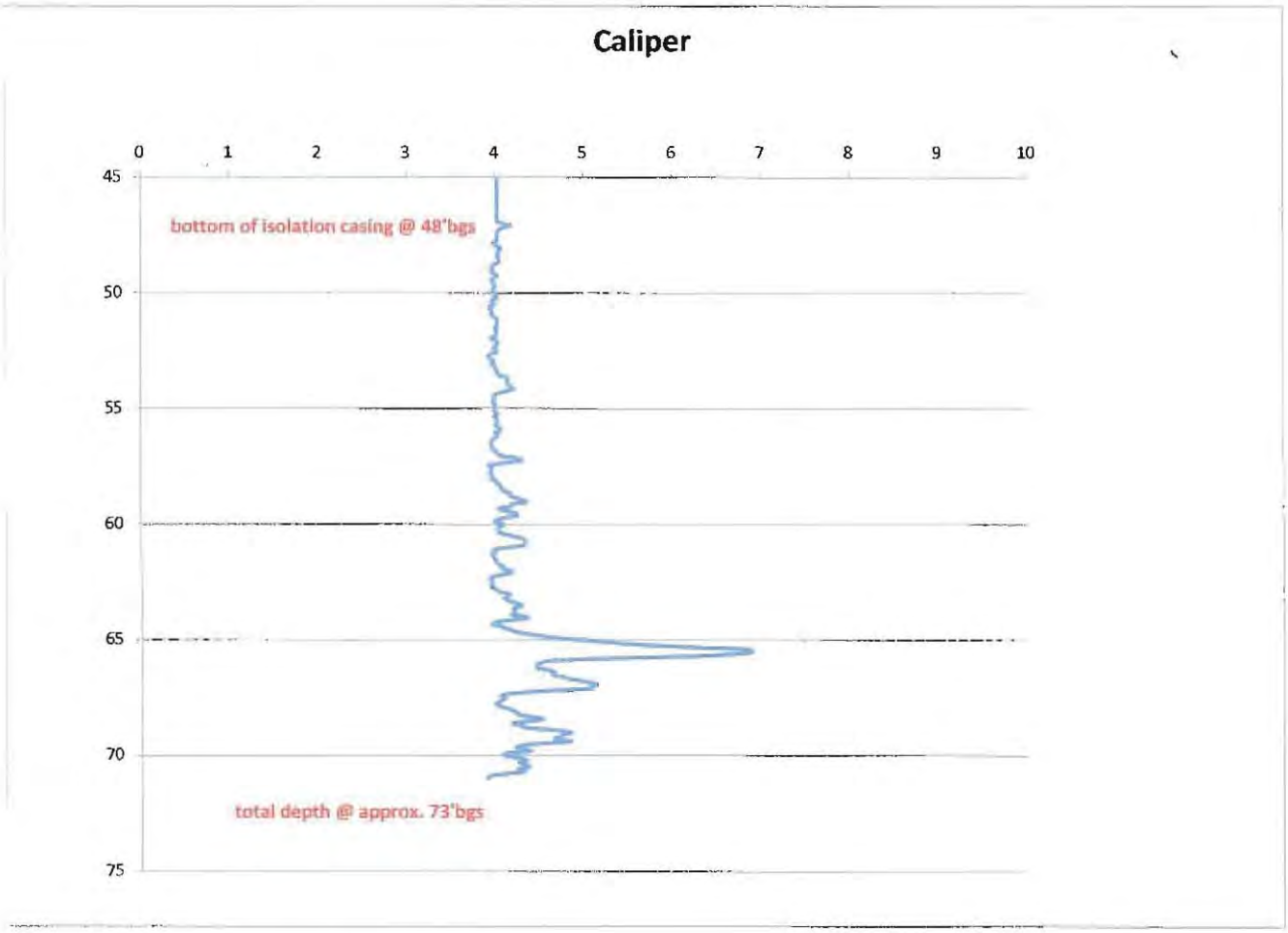
Depth (ft)	Caliper (in)	Depth (ft)	Caliper (in)	Depth (ft)	Caliper (in)
73.7243	3.97043	69.2374	3.97966	64.7505	4.11848
73.6246	3.97127	69.1377	3.97966	64.6508	4.05222
73.5248	3.97211	69.0380	3.97966	64.5511	4.04551
73.4251	3.99140	68.9383	3.98134	64.4514	4.04677
73.3254	3.97631	68.8385	3.97966	64.3517	4.04718
73.2257	3.97379	68.7388	3.98092	64.2519	4.04593
73.1260	3.97547	68.6391	4.00273	64.1522	4.04551
73.0263	3.97547	68.5394	4.01279	64.0525	4.04677
72.9266	3.96876	68.4397	4.01028	63.9528	4.04718
72.8269	3.97379	68.3400	4.00692	63.8531	4.04425
72.7272	3.97085	68.2403	4.00105	63.7534	4.04593
72.6275	3.97043	68.1406	3.99476	63.6537	4.04509
72.5278	3.97127	68.0409	3.99350	63.5540	4.04509
72.4281	3.96918	67.9412	3.99140	63.4543	4.04383
72.3283	3.96918	67.8415	3.99308	63.3546	4.04593
72.2286	3.97085	67.7417	3.99560	63.2549	4.04383
72.1289	3.97127	67.6420	3.99350	63.1552	4.04718
72.0292	3.96959	67.5423	3.98595	63.0554	4.04509
71.9295	3.97127	67.4426	3.98092		
71.8298	3.96959	67.3429	3.97798		
71.7301	3.97295	67.2432	3.97924		
71.6304	3.97127	67.1435	3.97589		
71.5307	3.97211	67.0438	3.97924		
71.4310	3.99392	66.9441	3.98092		
71.3313	4.13065	66.8444	3.98134		
71.2316	4.10129	66.7447	3.97631		
71.1318	4.07277	66.6450	3.98008		
71.0321	4.03754	66.5452	3.97798		
70.9324	4.06186	66.4455	3.97756		
70.8327	4.03880	66.3458	3.98092		
70.7330	4.01992	66.2461	3.97756		
70.6333	4.01489	66.1464	3.98008		
70.5336	4.00399	66.0467	3.97631		
70.4339	4.00692	65.9470	3.97798		
70.3342	3.98889	65.8473	3.97672		
70.2345	3.99392	65.7476	3.98092		
70.1348	3.99350	65.6479	3.97798		
70.0350	3.99350	65.5482	3.97798		
69.9353	3.99308	65.4485	3.97672		
69.8356	3.98973	65.3487	3.97756		
69.7359	3.99015	65.2490	3.97924		
69.6362	3.98008	65.1493	3.97756		
69.5365	3.98260	65.0496	4.01908		
69.4368	3.97840	64.9499	4.65994		
69.3371	3.97924	64.8502	4.36132		

MW-24D



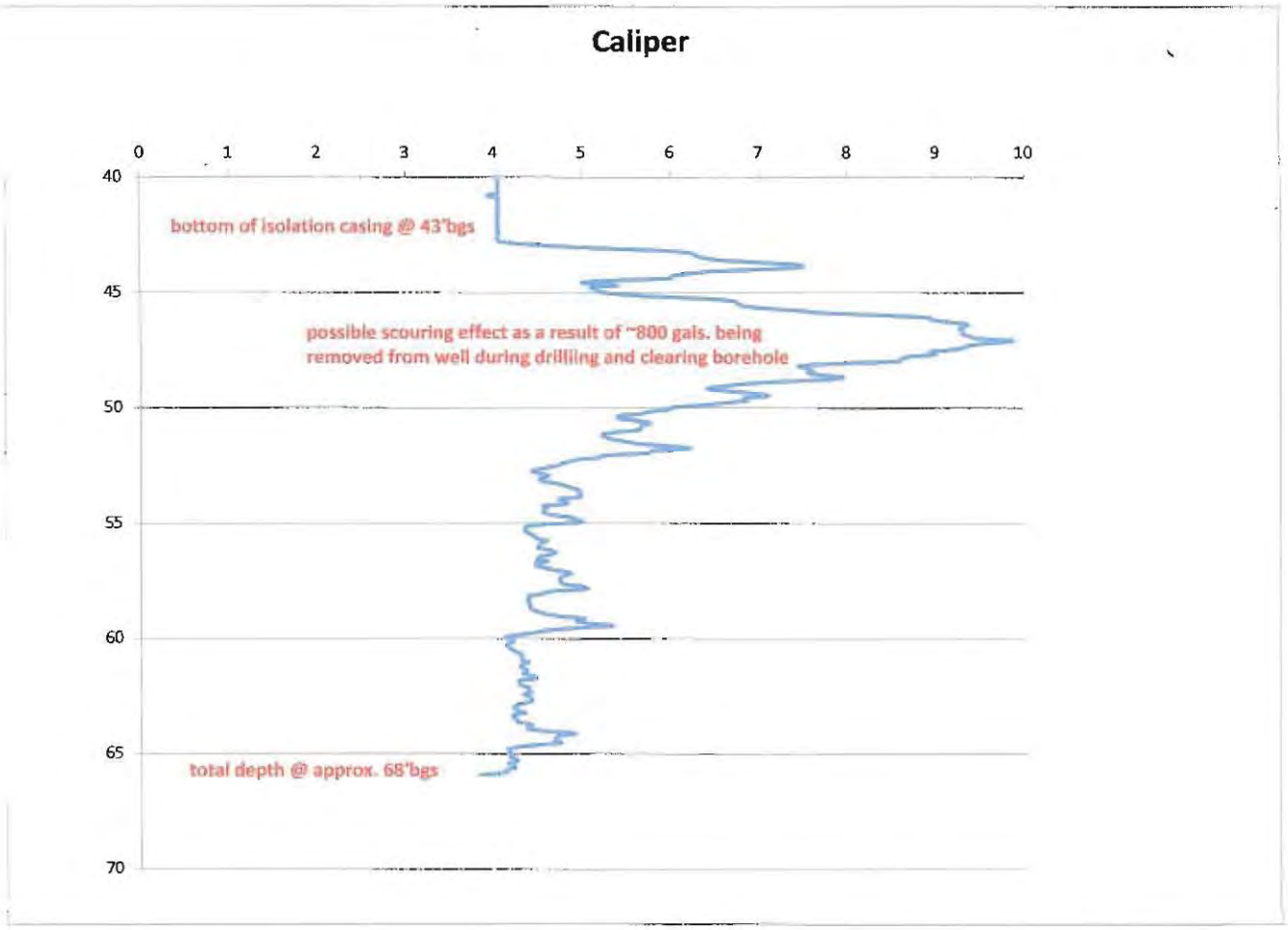
9/3/14 DTW = 26.45' BGS

MW-25D



9/3/14 DTW = 17.1 'BGS

MW-28D



9/2/14 8.15' BGS

Heat Pulse Files

Heat Pulse Flow Measurements

A heat pulse flowmeter is used to assist in determining which fractures or fracture zones that may be producing ground water and where the ground water was likely to flow to, heat pulse flow measurements were recorded in two of the five deep boreholes, MW-13D, and MW-17D with two tests run on MW-13D (Designated MW-13 MS and MW-13D). The heat pulse flow meter is a device that measures vertical water movement within the borehole by heating a small volume of water by inducing an electric charge at a heater grid. Measuring the time from the heat grid discharge to the greatest change in temperature of the heat pulse at an upper or lower thermistor sensor allows for the determination of positive or negative vertical movement. A central diverter (a series of flanges that cuts off the top of the bore hole from the bottom of the bore hole) is used to divert fluid flowing in the borehole through the heat pulse flow meter (Figure 1). The location of each of the heat pulse flow measurements were determined by observing the bore logs, the loss of fluid, change in lithology, and if able, in conjunction with the video logs to identify individual fractures contributing to the total borehole flow in non-stressed conditions (no pump).

Figure 1. Heat flowmeter with stabilizers (yellow tri-prong) and central diverter (black and yellow flanges). Heater grid is located in the center or the central diverter with sensors behind the screens above and below it. (USGS, 2016)

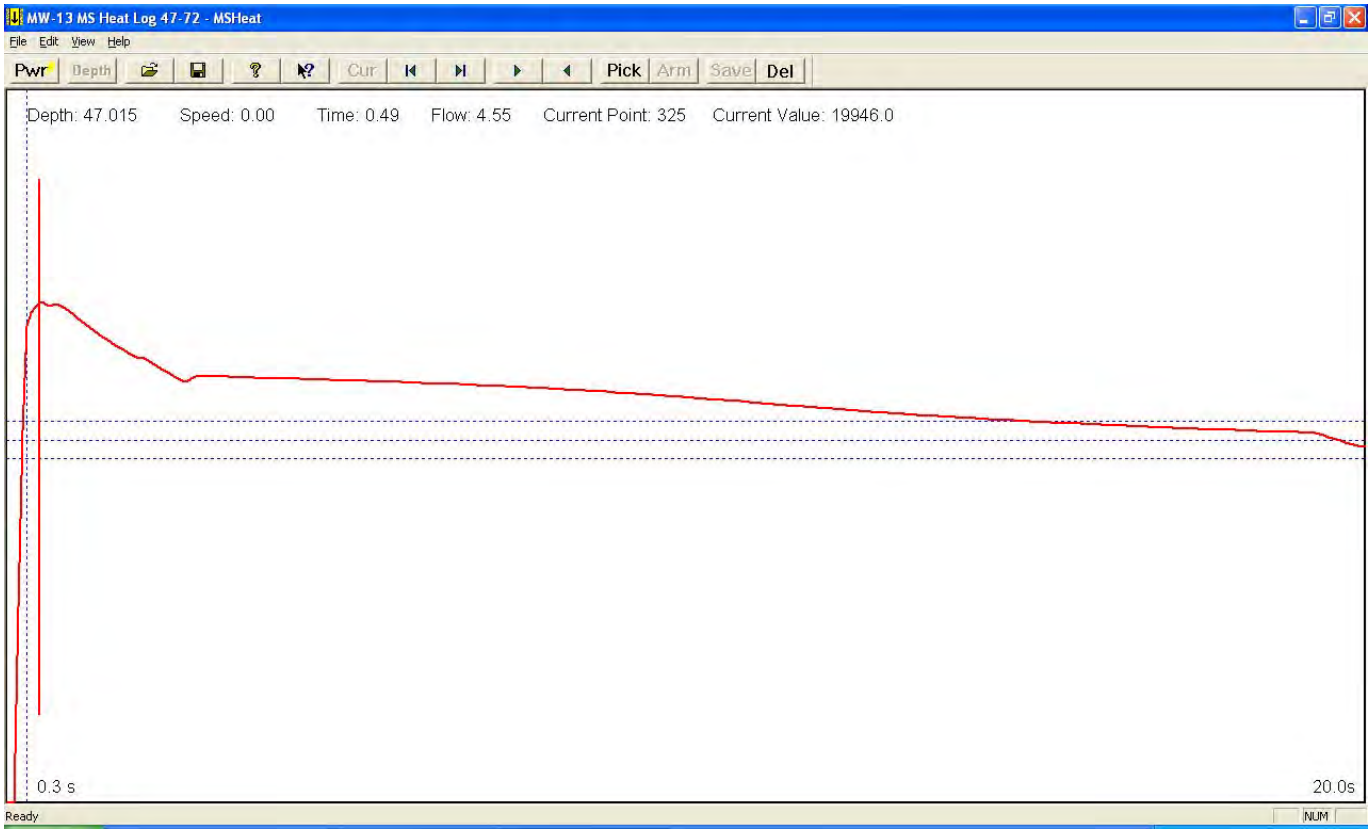
Monitoring wells 13D, and 17D had heat flow metering performed in the open bore hole prior to well installation. Table 1 indicates the depths of each of the locations flow metering was performed. Tests in monitoring wells 13 MS and 17D performed as expected with a positive and continuous bore hole flow under no load indicating a fairly high transmissivity from bottom to top. Monitoring well 13D however shows a break in norms by having both positive and negative flows indicating a higher level of transmissivity at approximately 52 feet bgs with water flowing down from above that level, and flowing up from below. With a vertical movement of 0.0 gal/min, the 52 foot bgs level shows that the water is more than likely moving laterally at this point.

Table 1

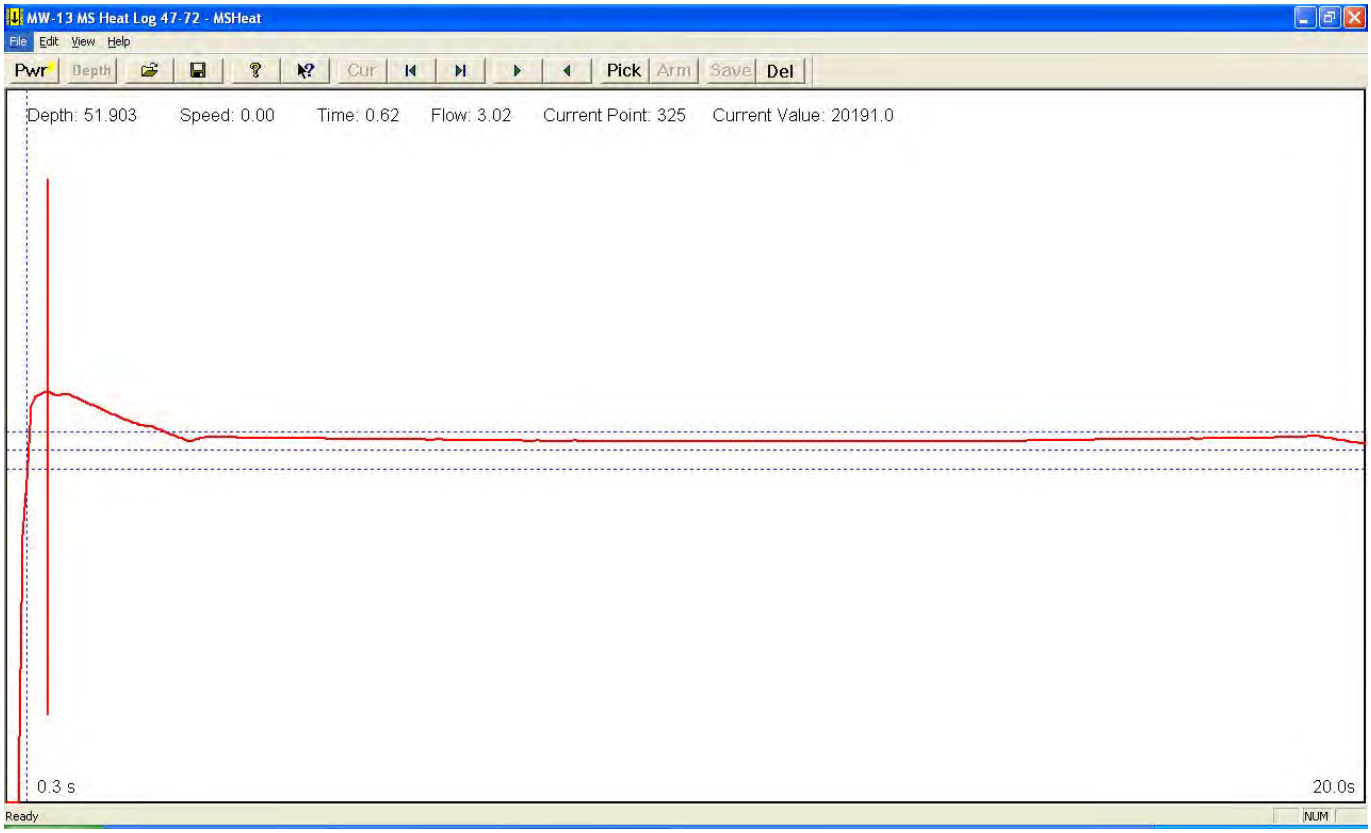
Well ID	TOC Feet amsl	Depth to Water Feet	Total Depth Feet	Probe Depth Feet	Time Seconds	Flow Gal./min
MW-13 MS	33.46	33.90	79.0	47.015	0.492	4.454
MW-13 MS	33.46	33.90	79.0	51.903	0.615	3.016
MW-13 MS	33.46	33.90	79.0	57.006	0.615	3.016
MW-13D	33.46	33.90	79.0	46.995	2.585	-0.170
MW-13D	33.46	33.90	79.0	52.026	0.000	0.000
MW-13D	33.46	33.90	79.0	56.955	0.554	3.660
MW-13D	33.46	33.90	79.0	61.977	0.554	3.660
MW-13D	33.46	33.90	79.0	66.998	0.615	3.020
MW-17D	32.05	33.48	88.6	64.919	0.554	3.657
MW-17D	32.05	33.48	88.6	70.104	0.492	4.545
MW-17D	32.05	33.48	88.6	74.99	0.523	4.101
MW-17D	32.05	33.48	88.6	79.975	0.492	4.545
MW-17D	32.05	33.48	88.6	84.961	0.492	4.545
MW-17D	32.05	33.48	88.6	87.055	0.615	3.016

Reference

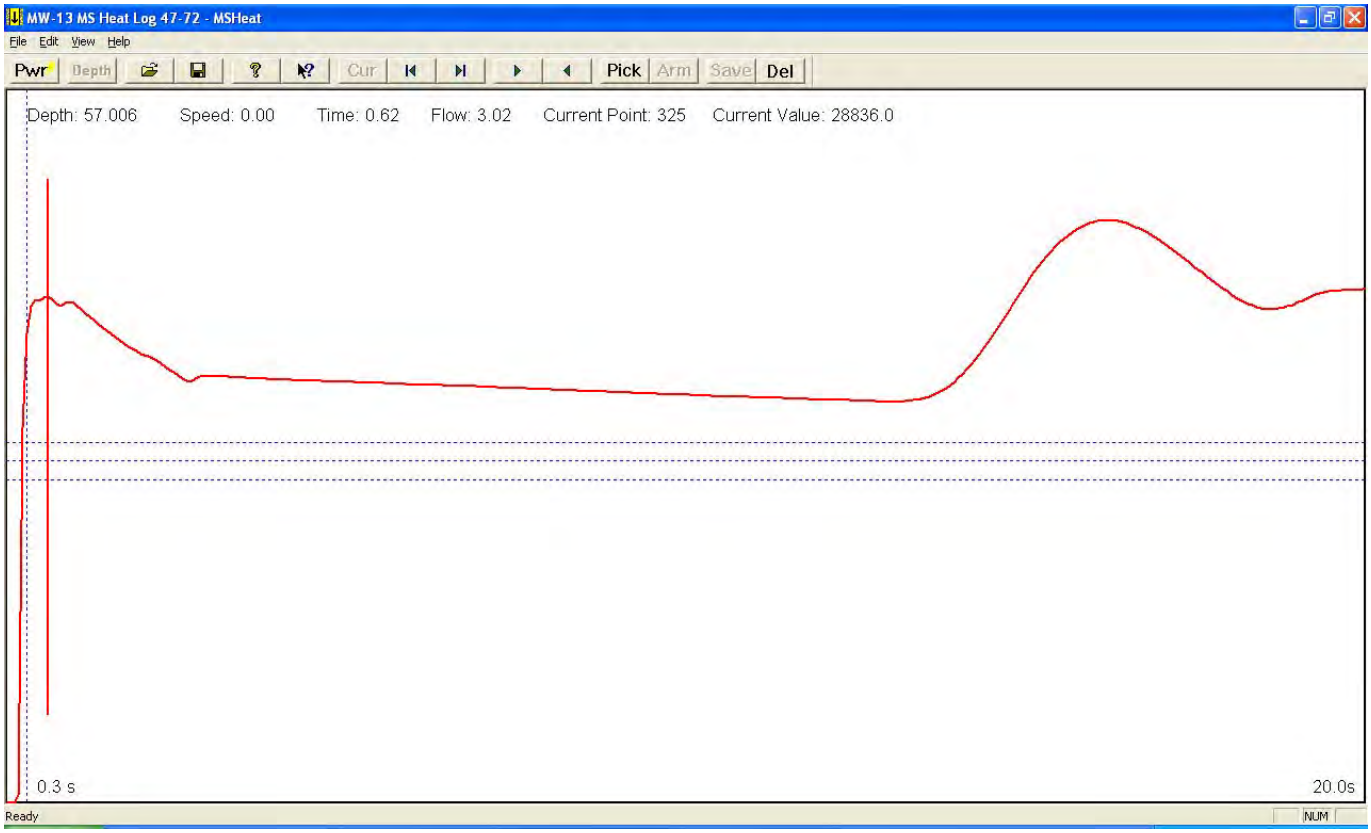
USGS OGW, 2016, BG. Ed. Branch of Geophysics USGS. "Vertical Flowmeter Logging." USGS, 10 Feb. 2016. Web. 18 Mar. 2016.


MW-13 MS Heat Log 47-72 - MSHeat
File Edit View Help
Pwr Depth Cur Pick Arm Save Del
Depth: 47.015 Speed: 0.00 Time: 0.49 Flow: 4.55 Current Point: 325 Current Value: 19946.0
0.3 s
20.0s
Ready
NUM

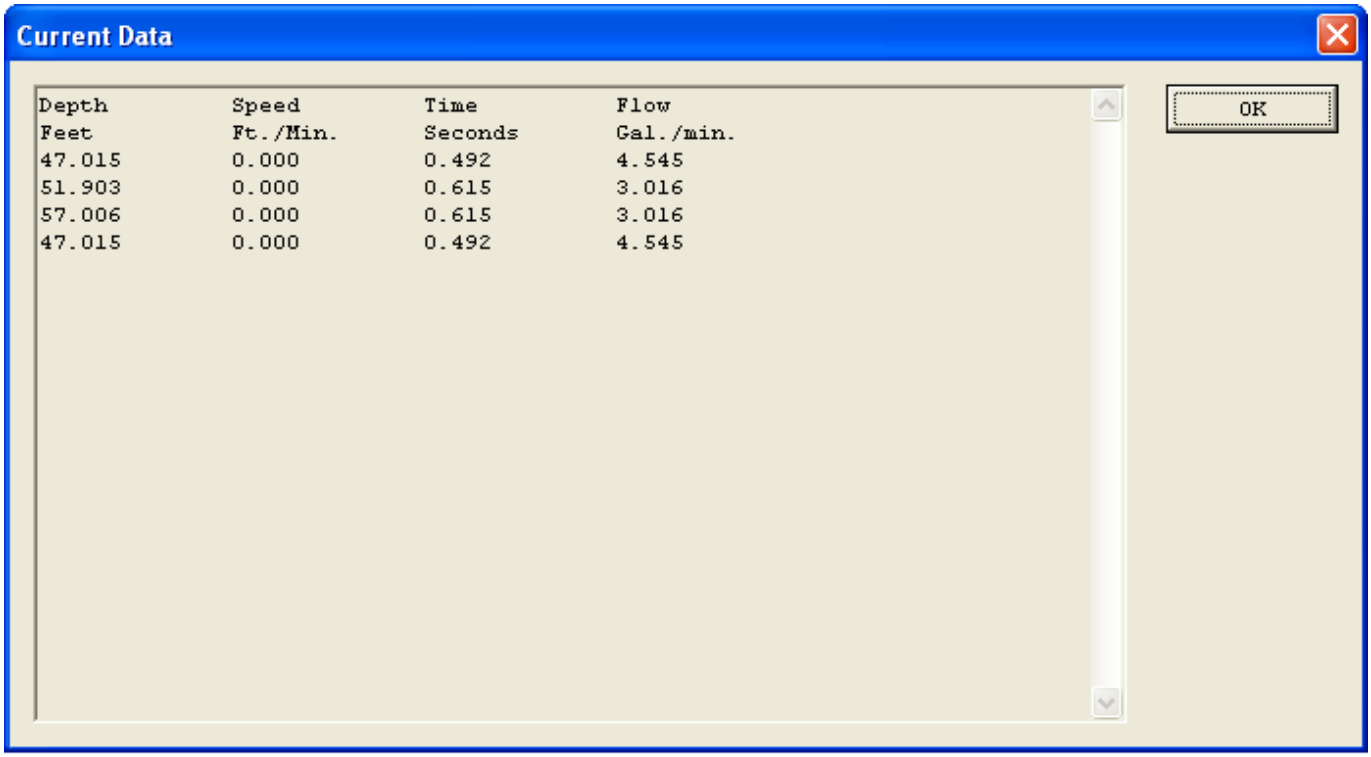
MW-13 (1)


MW-13 MS Heat Log 47-72 - MSHeat
File Edit View Help
Pwr Depth Cur Pick Arm Save Del
Depth: 51.903 Speed: 0.00 Time: 0.62 Flow: 3.02 Current Point: 325 Current Value: 20191.0
0.3 s
20.0s
Ready
NUM

MW-13 (2)

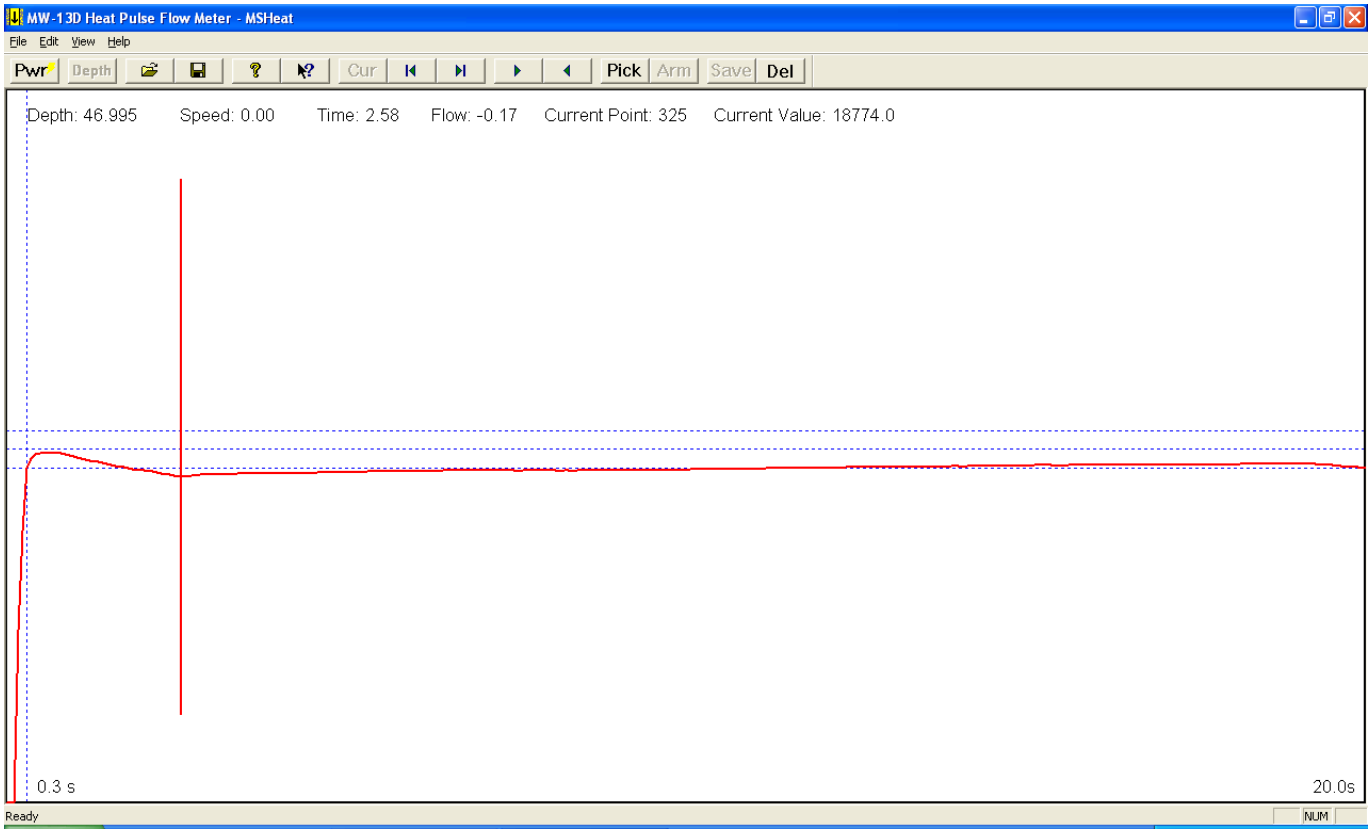


MW-13 (3)

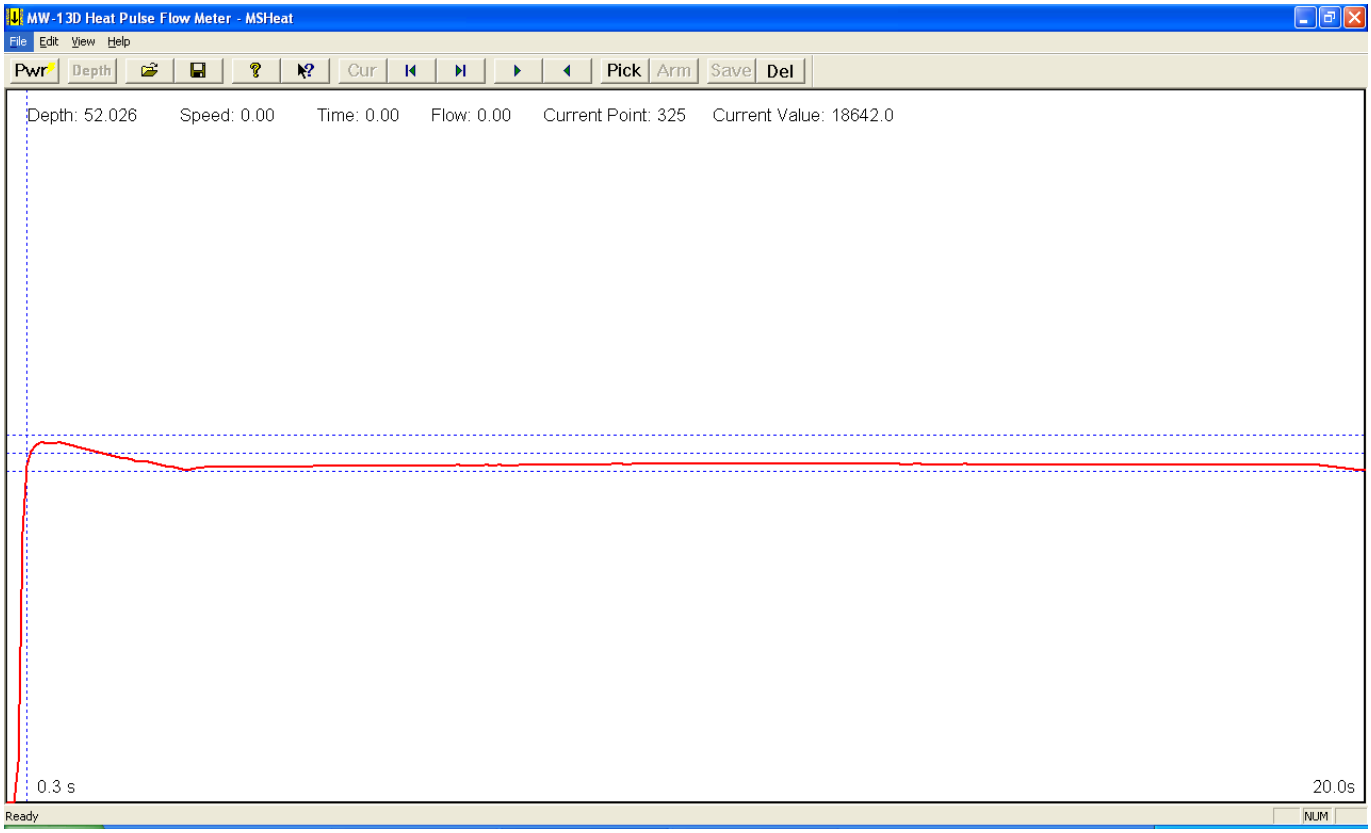


Depth	Speed	Time	Flow
Feet	Ft./Min.	Seconds	Gal./min.
47.015	0.000	0.492	4.545
51.903	0.000	0.615	3.016
57.006	0.000	0.615	3.016
47.015	0.000	0.492	4.545

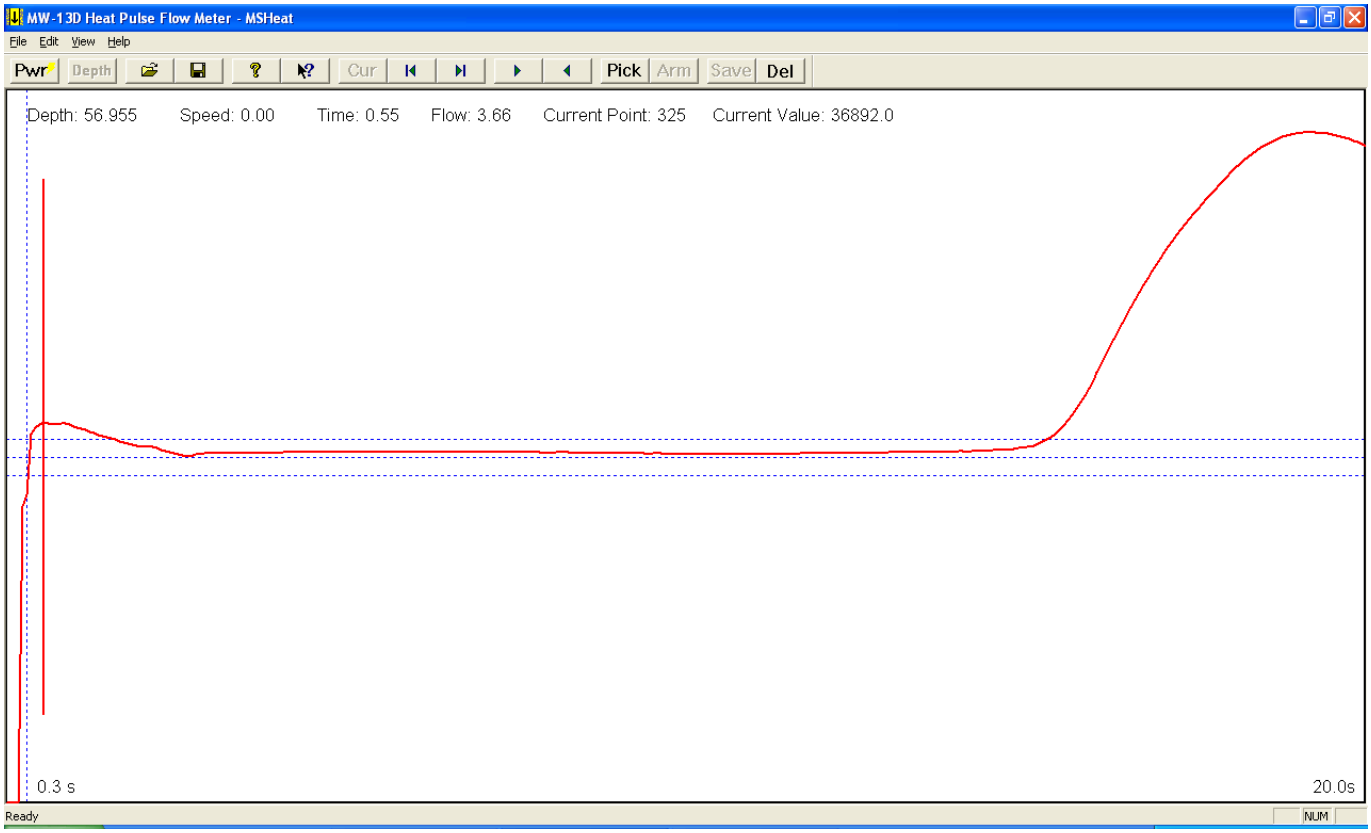
MW-13 (4)



MW-13D (1)



MW-13D (2)



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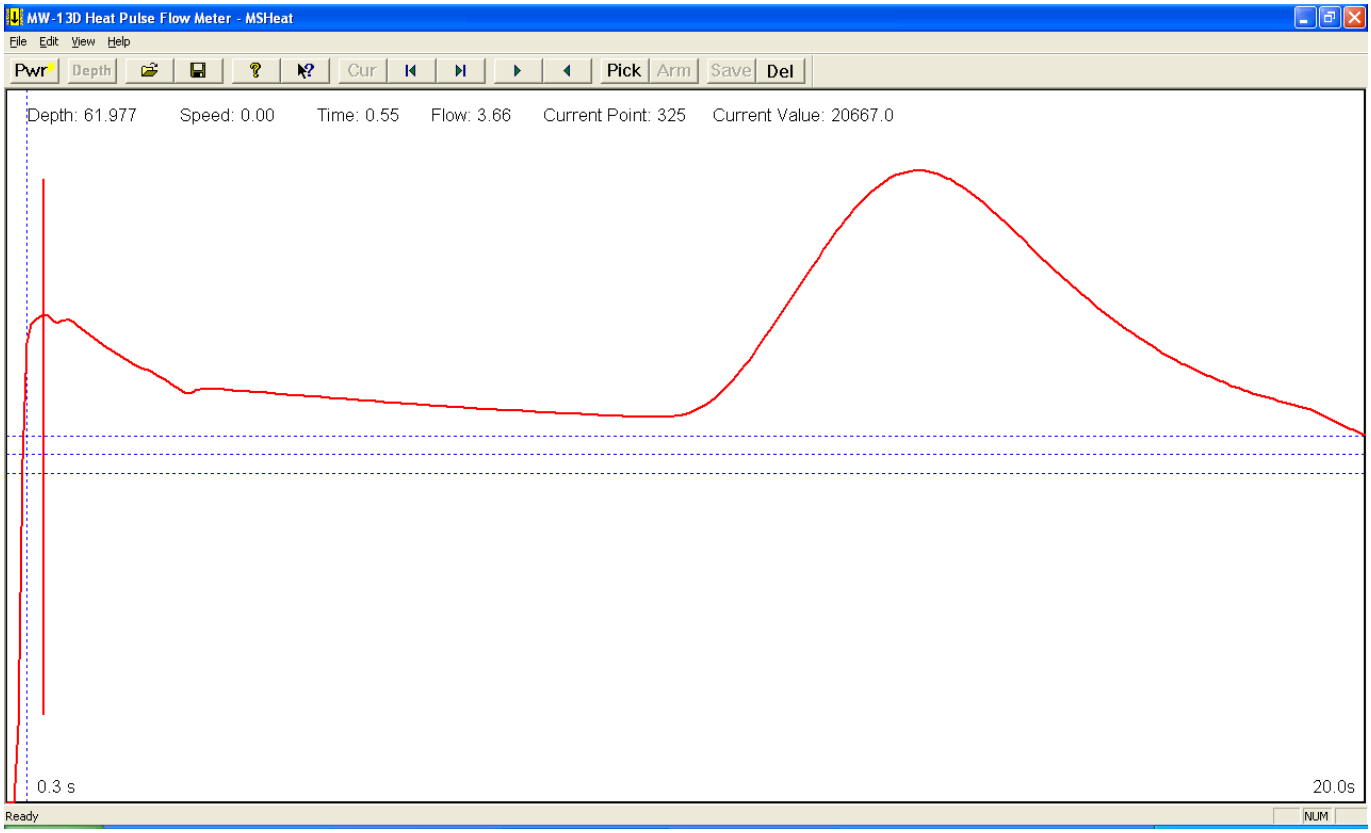
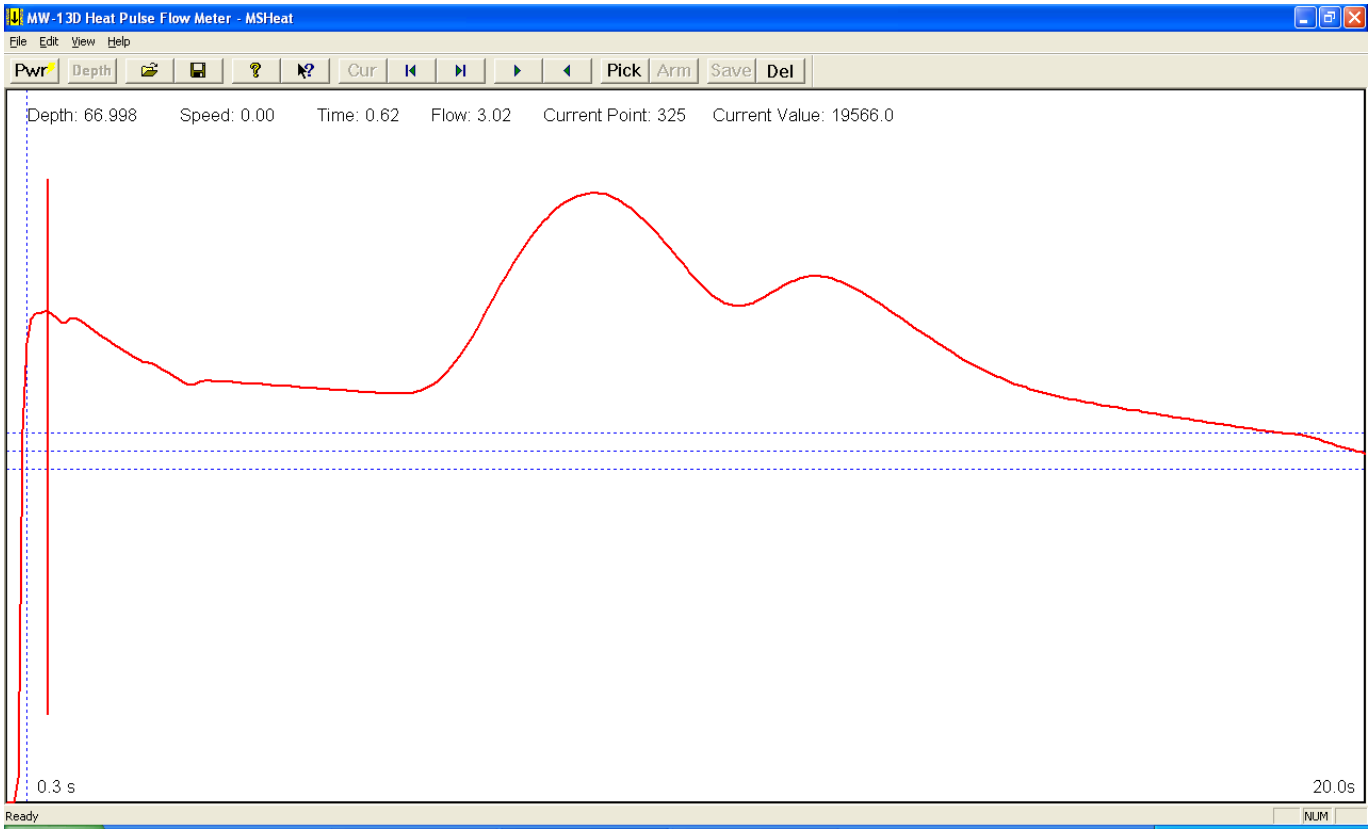


MW-13D (4)



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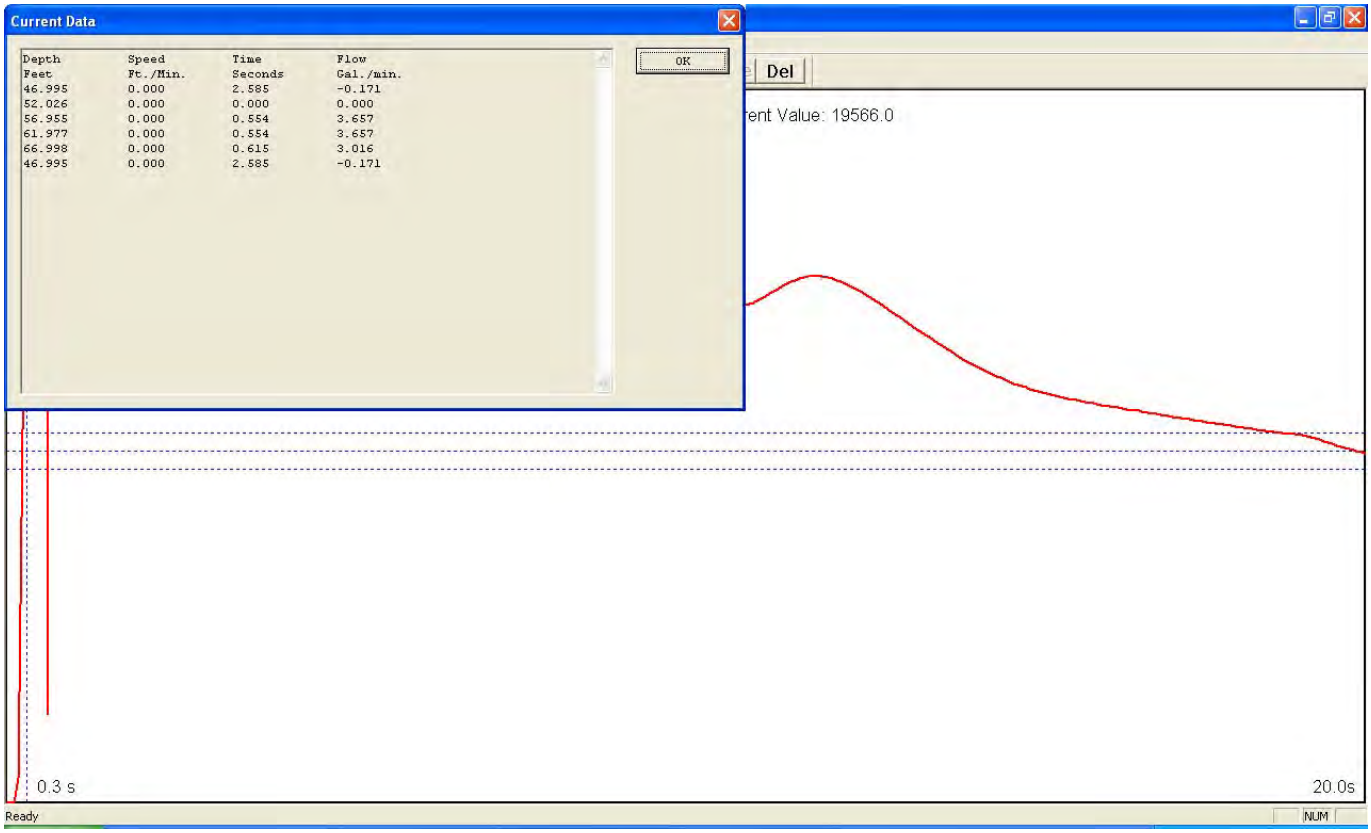
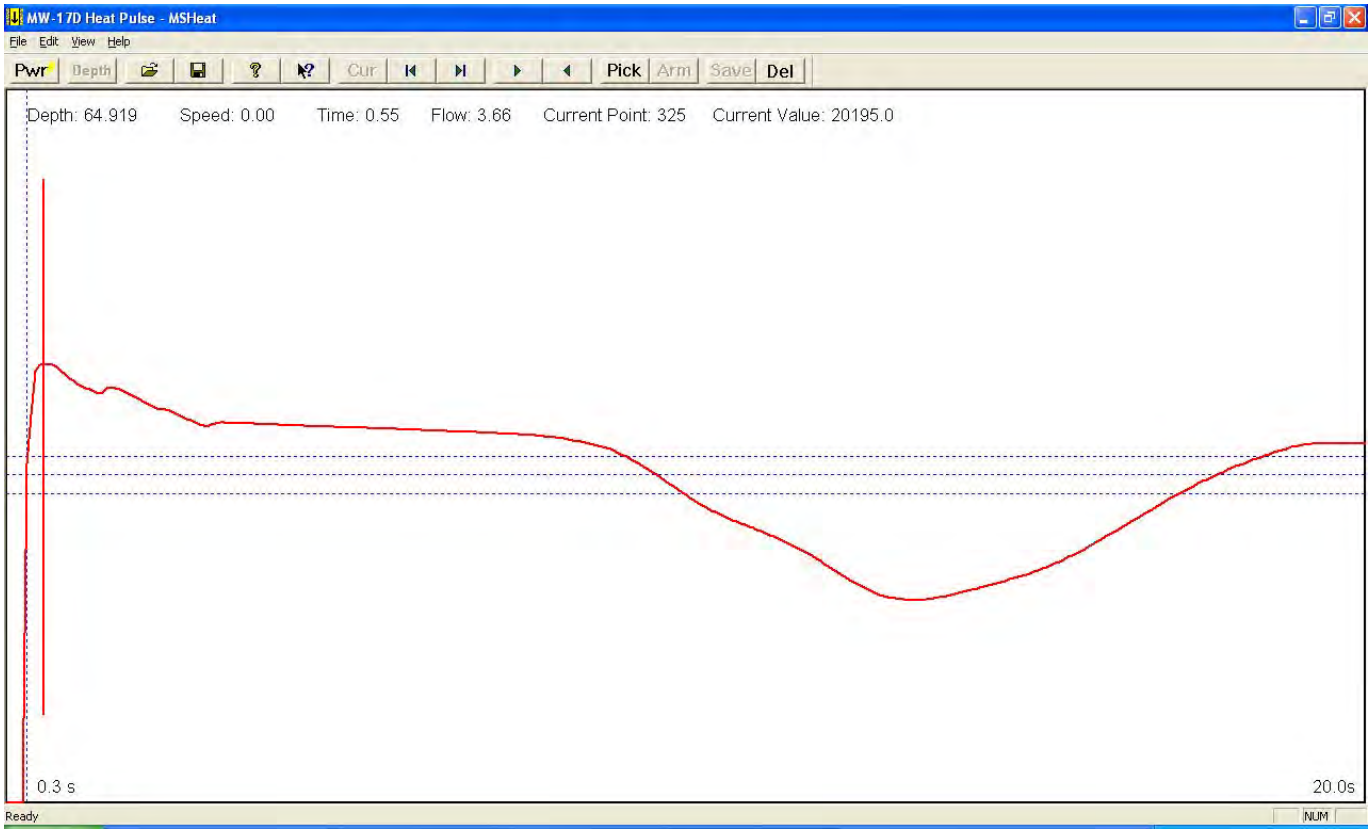
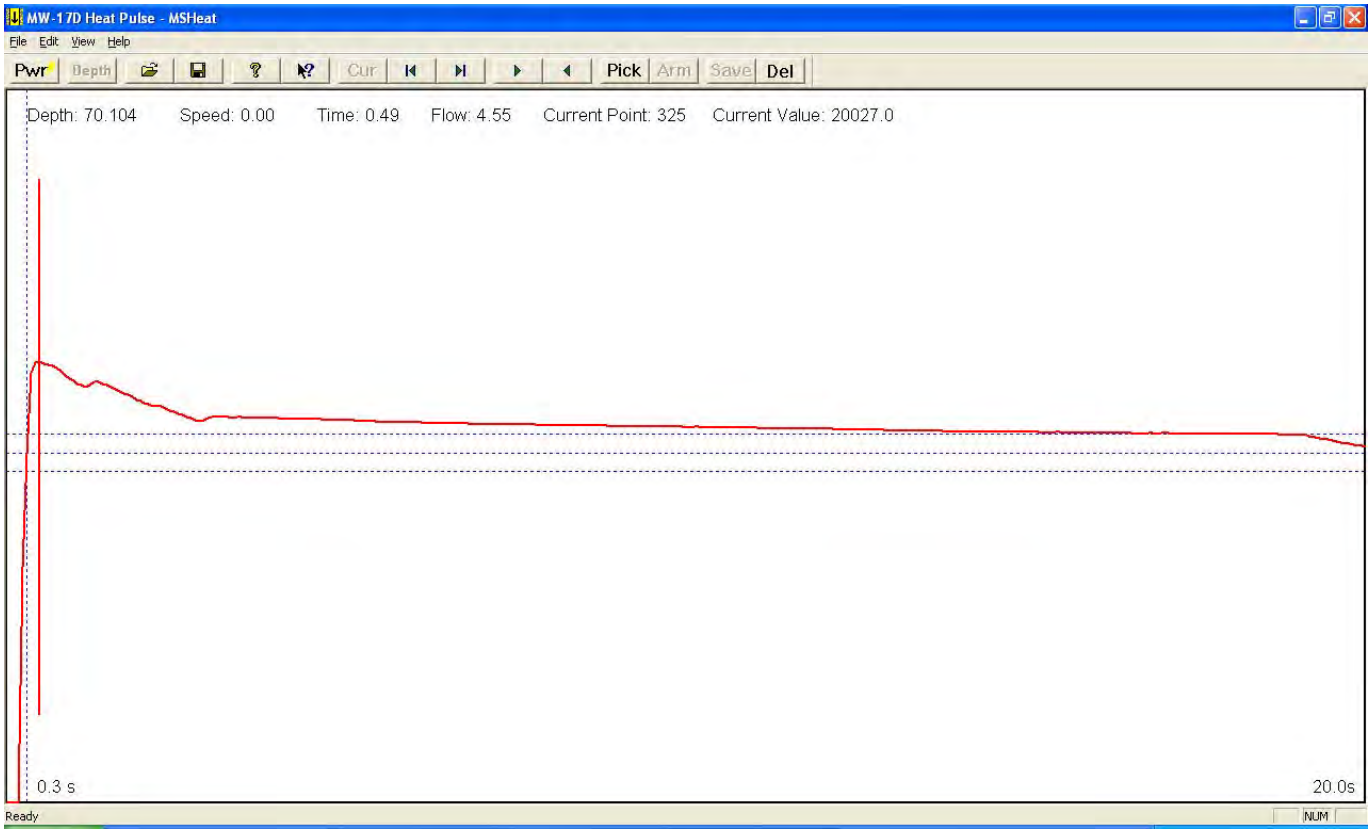


Depth Feet	Speed Ft./Min.	Time Seconds	Flow Gal./min.
46.995	0.000	2.585	-0.171
52.026	0.000	0.000	0.000
56.955	0.000	0.554	3.657
61.977	0.000	0.554	3.657
66.998	0.000	0.615	3.016
46.995	0.000	2.585	-0.171

MW-13D (6)



MW-17D (1)



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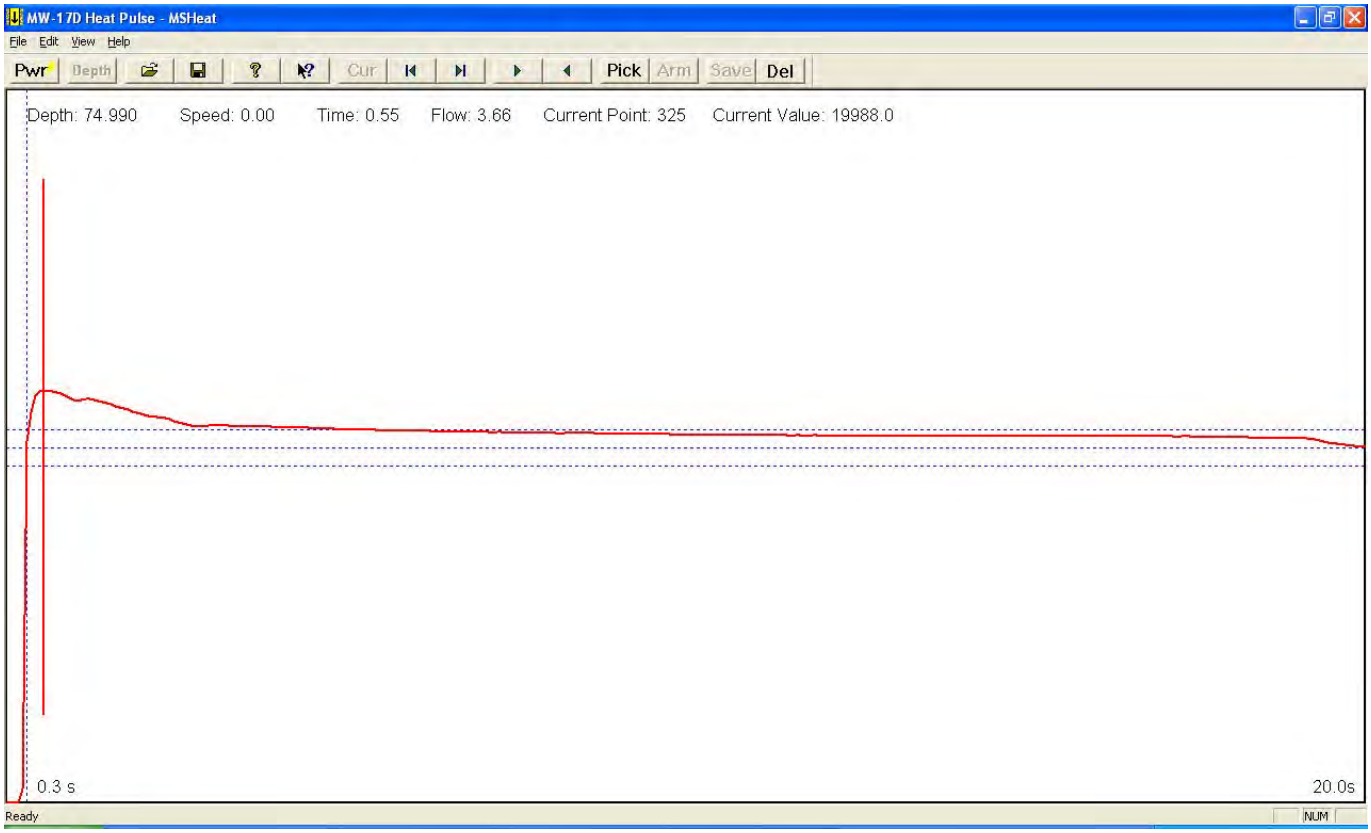

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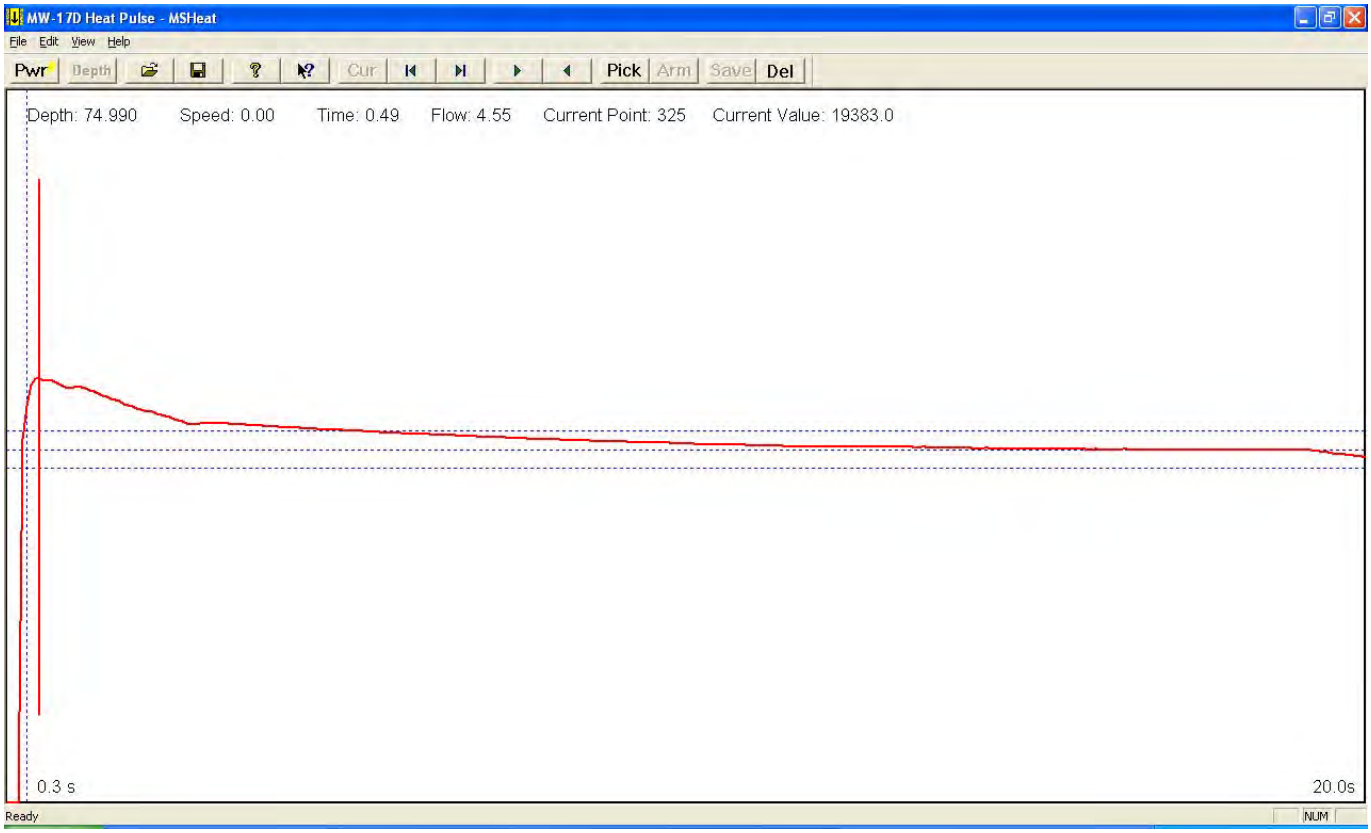

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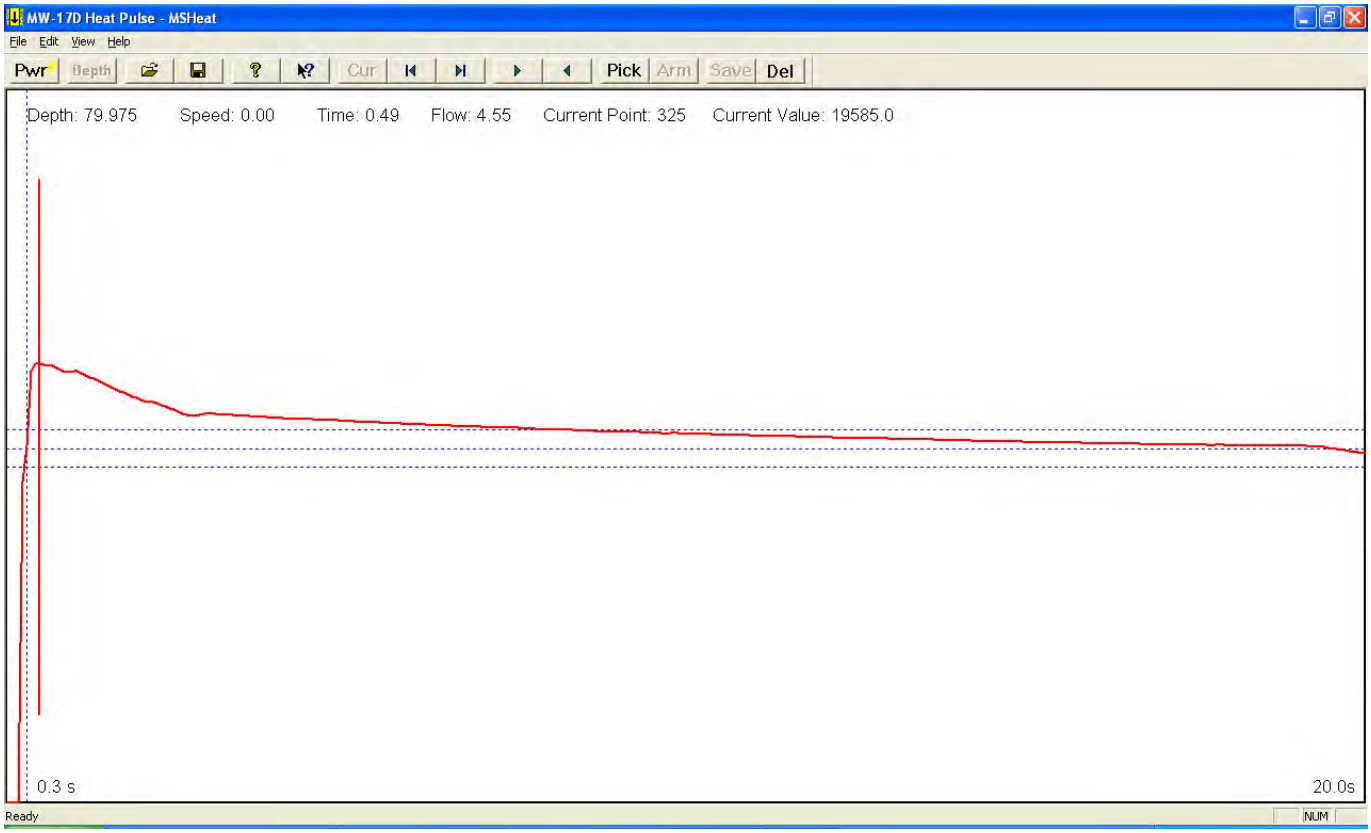
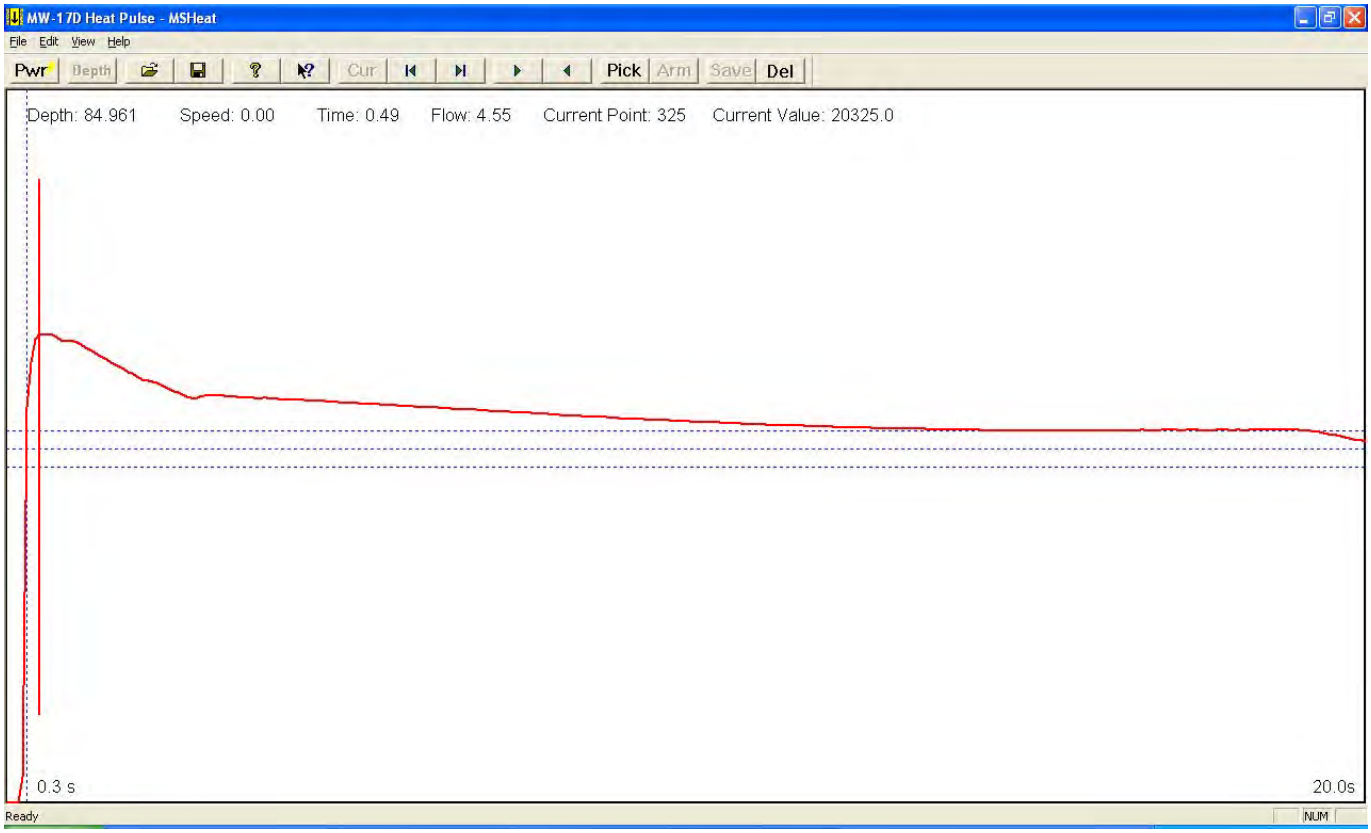
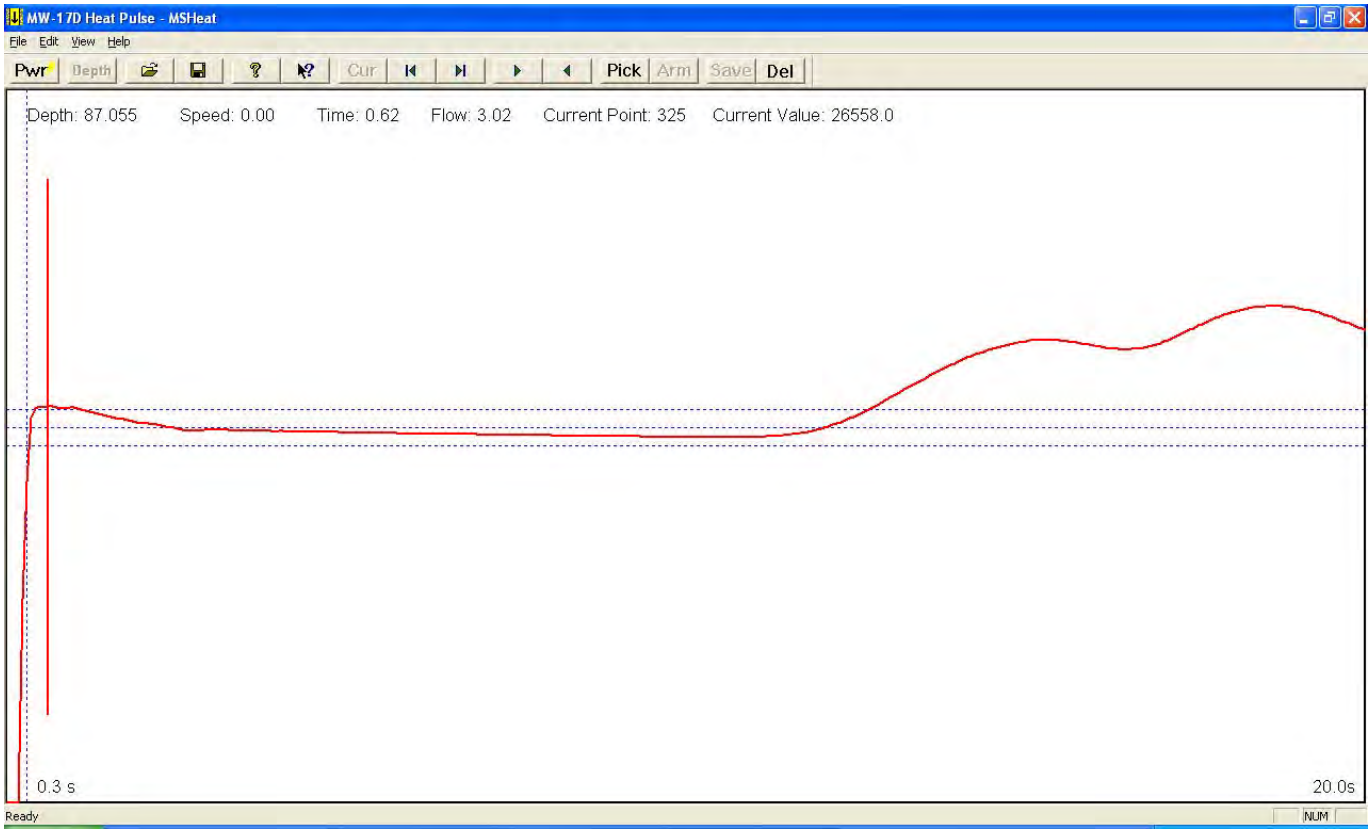


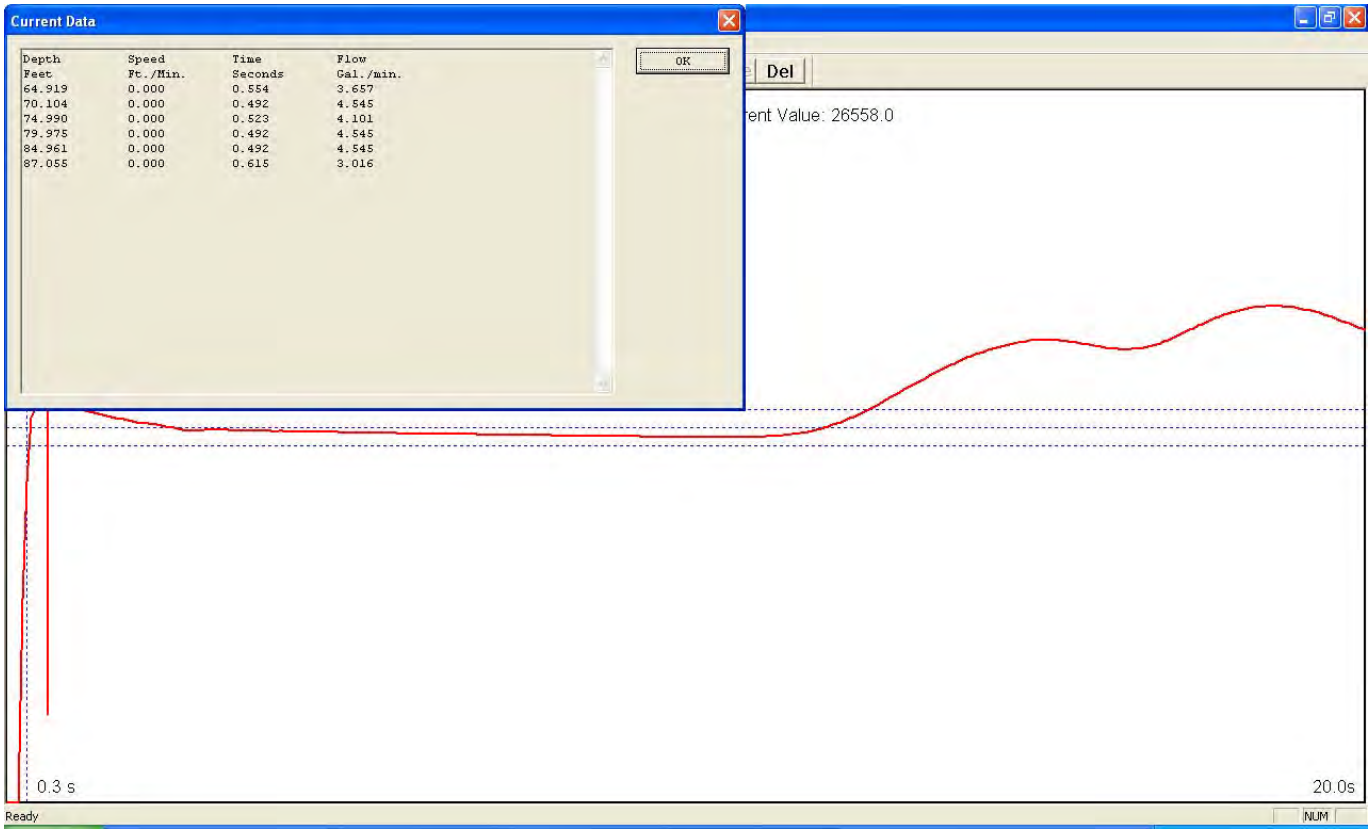
MW-17D (5)



MW-17D (6)



MW-17D (7)



Depth Feet	Speed Ft./Min.	Time Seconds	Flow Gal./min.
64.919	0.000	0.554	3.657
70.104	0.000	0.492	4.545
74.990	0.000	0.523	4.101
79.975	0.000	0.492	4.545
84.961	0.000	0.492	4.545
87.055	0.000	0.615	3.016

MW-17D (8)

Appendix D
Photo Documentation of Site

Photo 1: Vegetation clearance for well installation (9-30-2011)

Photo 2: Surface depression (11-07-2011)

Photo 3: Moving drill rig to boring location (11-04-2011)

Photo 4: Removing soil/rock from boring prior to well installation (11-02-2011)

Photo 5: MW-11 well installation through hollow stem auger (11-16-2011)

Photo 6: MW-12 placing sand in annulus of well (11-17-2011)

Photo 7: Drilling at MW-11 location (11-02-2011)

Photo 8: MW-11 checking depth of sand and bentonite (11-16-2011)

Photo 9: MW-11 pulling augers from around well casing (11-16-2011)

Photo 10: MW-11 pulling augers from around well casing (11-16-2011)

Photo 11: MW-09 monument completion (11-10-2011)

Photo 12: MW-12 set up of groundwater sampling (11-21-2011)

Photo 13: MW-11 sampling well (11-20-2011)

Photo 14: SWMU 20 site with completed wells (11-20-2011)

Photo 15: Surface depression (11-29-2011)

Photo 16: SWMU 20 perforated steel plate

Photo 17: SWMU 20 Area 1 excavation at surface depression location

Photo 18: SWMU 20 Area 1 excavation close-up at surface depression location

Photo 19: SWMU 20 Area 2 excavation at surface depression location

Photo 20: SWMU 20 Area 3 excavation at surface depression location

Photo 21: SWMU 20 facing southeast

Appendix E
Well Development Logs

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	WELL NUMBER MW-08	SHEET 1 of 2

WELL DEVELOPMENT LOG

PROJECT : PI-4 Supplemental Expanded Site Inspection LOCATION : Vieques, P.R. SWMU-20 (PI-4) DATE: 11/11/11

DEVELOPMENT CONTRACTOR : CH2M HILL

DEVELOPMENT METHOD AND EQUIPMENT USED : Surge block and SS Hurricane pump

START WATER LEVELS: 32.17 @ 0855 START : 11/11/2011: 0855 END : 11/11/11: 1203 LOGGER : Kenji Butler

MAXIMUM DRAWDOWN DURING PUMPING: 39.25 ft, 7.08' drawdown

RANGE AND AVERAGE DISCHARGE RATE: 1.25 gpm to 0.75 gpm averaged 1.04 gpm

TOTAL QUANTITY OF WATER DISCHARGED: 159 gal

DISPOSITION OF DISCHARGE WATER: Drums held pending analysis

TOTAL DEPTH OF WELL:

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm)	Comments
0855	0.00	32.17					Original Water Level BTOC
0905							Surging to 0952
0930							Started Pumping
1025	55.0		2383				
1105	110.0	39.25	586				1.25 gpm
1150	150.0	35.11					0.75 gpm
1157	155.0		0.97	28.4	6.78	7968	
1200	157.0	35.12	0.49	28.3	6.79	7986	
1203	159.0	35.12	0.27	28.3	6.79	7985	Development Complete

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	WELL NUMBER MW-8	SHEET 2 OF 2

WELL DEVELOPMENT LOG

PROJECT : PI-4 Supplemental Expanded Site Inspection LOCATION : Vieques, P.R. DATE: 11/11/2011

NOTES

SOP(s) used (refer to SOP Log)?

Were all requirements of the SAP, PIs and above mentioned SOP(s) met?

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Used Surge Block on PVC Pipe, hurricane pump to develop, followed SOPs.

Sampler Signature: Kenji Butler Date: 11/11/2011

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	WELL NUMBER MW-09	SHEET 1 of 2

WELL DEVELOPMENT LOG

PROJECT : PI-4 Supplemental Expanded Site Inspection LOCATION : Vieques, P.R. DATE: 11/16/11

DEVELOPMENT CONTRACTOR : CH2M HILL

DEVELOPMENT METHOD AND EQUIPMENT USED : Surge block and SS Hurricane pump

START WATER LEVELS : 31.16 START : 11/16/11: 0745 END : 11/16/11: 0940 LOGGER : C. Cigneios/K. Butler

MAXIMUM DRAWDOWN DURING PUMPING: 0.1 ft

RANGE AND AVERAGE DISCHARGE RATE: 0.5gal/min

TOTAL QUANTITY OF WATER DISCHARGED: 70 gal

DISPOSITION OF DISCHARGE WATER: Drums pending analysis

TOTAL DEPTH OF WELL: 42.80'

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm)	Comments
0745	0	31.16					Original Water Level BTOC/ begin surging
0835							Begin pumping
0850	30	31.69	2,536				0.5 gal/min
0855	33	31.70	106.5	28.5	6.41	8,747	
0900	36	31.71	687.0	28.5	6.45	8,823	Pump raised from bottom to 5 ft off bottom
0905	40	31.73	510.0	28.5	6.47	8,778	
0910	43	31.75	20.30	28.5	6.47	8,870	
0915	46	31.75	14.40	28.4	6.47	8,892	
0920	55	31.76	7.91	28.4	6.46	8,892	
0925	60	31.76	6.11	28.4	6.47	8,901	
0930	63	31.76	3.66	28.4	6.47	8,888	
0936	66	31.76	3.16	28.4	6.47	8,912	
0940	70	31.79	2.38	28.4	6.47	8,911	Development complete at 0940

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	WELL NUMBER MW-09	SHEET 2 OF 2

WELL DEVELOPMENT LOG

PROJECT : PI-4 Supplemental Expanded Site Inspection LOCATION : Vieques, P.R. DATE: 11/16/2011

NOTES

SOP(s) used (refer to SOP Log)?

Were all requirements of the SAP, PIs and above mentioned SOP(s) met?

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Used Surge Block on PVC Pipe, hurricane pump to develop, followed SOPs.

Sampler Signature: C. Cisneros/K. Butler Date: 11/16/2011

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	WELL NUMBER MW-10	SHEET 1 of 2

WELL DEVELOPMENT LOG

PROJECT : PI-4 Supplemental Expanded Site Inspection LOCATION : Vieques, P.R. DATE: 11/18/11

DEVELOPMENT CONTRACTOR : CH2M HILL

DEVELOPMENT METHOD AND EQUIPMENT USED : Surge block and SS Hurricane pump

START WATER LEVELS : 33 ft at 1330 START : 1319 END : 1540 LOGGER : C. Cisneros/K. Butler

MAXIMUM DRAWDOWN DURING PUMPING: 14 ft

RANGE AND AVERAGE DISCHARGE RATE: 1 gal/min max : 0.5 gal/ min average at 15 V

TOTAL QUANTITY OF WATER DISCHARGED: 70 gal

DISPOSITION OF DISCHARGE WATER: Drummed Pending alaysis

TOTAL DEPTH OF WELL: 42.00' bgs

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm)	Comments
1319	0.00	33.00					Begin Surging
1330		33..35					Start Pump
1340		38.0					turbidity still too high
1350		38.0					Stop pump to allow recharge
1405		32.35	635				Begin pumping again
1410		32.0	387				Stop pump to allow recharge
1415		36.1	66.8				Resume at slower rate 15V
1420		35.8	43.5	28.7	6.78	12926	15.5V
1425	40.0	35.92	22.4	28.6	6.41	13594	Clear water, no odor
1428		35	20.5	28.8	6.35	13471	15.7V
1435		36.60	51.4	28.7	6.33	13868	15.5V
1440		36.69	31.7	28.7	6.34	13557	
1445		37.14	20.1	28.7	6.34	13495	
1450	50.0	37.41	19.8	28.7	6.33	13630	15.4V
1455		36.50	19.3	28.7	6.33	18670	
1500		35.60	18.8	28.8	6.34	13300	Development complete at 1500
		37.60	859	28.1	6.45	14508	for bottom of well
1505		36.90	226	29.6	6.40	13121	Move to 37' bgs
1510	60	35.03	73.4	29.0	6.36	13008	15.2V
1515		34.60	31.1	29.0	6.34	13091	
1520		35.10	9.82	28.9	6.33	13056	
1525		35.40	12.50	28.9	6.33	13099	
1530		35.50	17.60	28.7	6.33	13140	14.2V
1535	70	34.30	14.50	29.0	6.33	13200	Development complete at 1540

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	WELL NUMBER MW-10	SHEET 2 OF 2

WELL DEVELOPMENT LOG

PROJECT : PI-4 Supplemental Expanded Site Inspection LOCATION : Vieques, P.R. DATE: 11/18/2011

NOTES

SOP(s) used (refer to SOP Log)?

Were all requirements of the SAP, PIs and above mentioned SOP(s) met?

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Used Surge Block on PVC Pipe, hurricane pump to develop, followed SOPs.

Turbidity goal not met, but close (SB 12/20/11)

Sampler Signature: C. Cisneros/K. Butler Date: 11/18/2011

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	WELL NUMBER MW-11	SHEET 1 of 2

WELL DEVELOPMENT LOG

PROJECT : PI-4 Supplemental Expanded Site Inspection LOCATION : Vieques, P.R. DATE: 11/18/11

DEVELOPMENT CONTRACTOR : CH2M HILL

DEVELOPMENT METHOD AND EQUIPMENT USED : Surge block and SS Hurricane pump

START WATER LEVELS : 32.37 BTOC START : 11/18/11:1030 END : 11/19/11:0740 LOGGER: Stephen Brand

MAXIMUM DRAWDOWN DURING PUMPING: 8.24 ft

RANGE AND AVERAGE DISCHARGE RATE: 0.04' gpm to ~2 gpm

TOTAL QUANTITY OF WATER DISCHARGED: 61 gal

DISPOSITION OF DISCHARGE WATER: Drums held pending analysis

TOTAL DEPTH OF WELL:

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm)	Comments
1029		32.33					Can't sustain yield
1558	45.00	39.80	133	29.7	6.21	11232.00	Pumping intermittently
1610		39.8	105	29.7	6.25	11303.00	down to aprox. 32' BTOC
1614	47.0	39.7					
1618	48.0	40.10	49.1	6.28	6.28	11284.00	
1632	55.0	40.3	38.1	6.30	6.30	11224.00	Pumping at ~ 0.125 gpm
1642	56.0	40.5	38.1	6.30	6.30	11172.00	
1352	57.0	40.6	72.5	3.31	6.31	11100.00	
1702		40.25	19.9	3.31	6.31	11048.00	
1706	59	40	65.3	3.32	6.32	11007.00	0.2 gpm
							Stop Development for the evening
11/19/2011							
0640		32.29					Start pumping at 250ml/min
0641		32.41	243	28.2	6.35	10,423	Pumping at 150 ml/min or 0.0396 gal/min
0715		32.43	188	29.7	6.36	10,412	
0729		32.43	209	29.7	6.35	10,656	
0734		32.43	184	29.9	6.35	10,701	
0740	61.0						Stopped pumping, well remains turbid
							developed

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	WELL NUMBER MW-11	SHEET 2 OF 2

WELL DEVELOPMENT LOG

PROJECT : PI-4 Supplemental Expanded Site Inspection LOCATION : Vieques, P.R. DATE: 11/19/2011

NOTES

SOP(s) used (refer to SOP Log)?

Were all requirements of the SAP, PIs and above mentioned SOP(s) met?

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Well remains turbid at 184 NTU, but sampling for VOCs an dturbidity not improving

SOPs followed otherwise, turbidity is a "goal" only

Sampler Signature: Stephen Brand Date: 11/19/2011

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	WELL NUMBER MW-12	SHEET 1 of 2

WELL DEVELOPMENT LOG

PROJECT : PI-4 Supplemental Expanded Site Inspection LOCATION : Vieques, P.R. DATE: 11/19/2011

DEVELOPMENT CONTRACTOR : CH2M HILL

DEVELOPMENT METHOD AND EQUIPMENT USED : Surge block and SS Hurricane pump

START WATER LEVELS : 32.39 ft BTOC START: 11/19/2011:0817 END: 11/19/11:1015 LOGGER : S. Brand/K. Butler

MAXIMUM DRAWDOWN DURING PUMPING:

RANGE AND AVERAGE DISCHARGE RATE:

TOTAL QUANTITY OF WATER DISCHARGED: 98 Gallons

DISPOSITION OF DISCHARGE WATER: Drums held pending analysis

TOTAL DEPTH OF WELL:

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm)	Comments
0816	0.00	32.39					Not much sediment of bottom when surge
0817	0.00						Pump on bottom 6" up
0833			254				1.25 gpm
0835	22.0	35.49	126	28.900	6.43	7,173	
0840	28.0	36.30	37.5	28.900	6.37	7,459	
0845	35.0	34.95	30.5	29.000	6.34	7,787	
0850	40.0	34.70	14.0	29.000	6.34	7,969	
0855	45.0	34.65	10.99	29.000	6.33	8,068	
0900	50.0	34.34	9.99	29.200	6.32	8,210	
0905	54	34.18	9.75	29.300	6.32	8,323	
0908	55			20.300	6.32	8,421	Switched drums
0915	Pulled to mid screen, very turbid						70 gallons
0920	72.50		2,255				
0926	75.0	33.64	505	29.600	6.30	8,697	0.5 gpm
0933	78.0	33.91	211	29.300	6.29	8,747	
0938	80.0	34.34	138				2.5 L/min
0950	86.0	33.80	27.1	28.900	6.28	9,009	
0938	90.0	34.96	12.5	28.900	6.25	9,184	
1003	92.0	35.39	14.0	28.800	6.27	9,257	
1008	95.0	35.59	15.4	28.800	6.26	9,249	
1014	98.0	36.12	24.6	28.700	6.27	9,292	
1015							Developed, stopped pump

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	WELL NUMBER MW-12	SHEET 2 OF 2

WELL DEVELOPMENT LOG

PROJECT : PI-4 Supplemental Expanded Site Inspection LOCATION : Vieques, P.R. DATE: 11/19/2011

NOTES

SOP(s) used (refer to SOP Log)?

Were all requirements of the SAP, PIs and above mentioned SOP(s) met?

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Followed SOPs, turbidity didn't reach goal, but close

Sampler Signature: L. Hill Date: 12/4/2011

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	WELL NUMBER MW-13	SHEET 1 of 2

WELL DEVELOPMENT LOG

PROJECT : PI-4 Supplemental Expanded Site Inspection LOCATION : Vieques, P.R. DATE: 12/3/11

DEVELOPMENT CONTRACTOR : CH2M HILL

DEVELOPMENT METHOD AND EQUIPMENT USED : Surge block and SS Hurricane pump

START WATER LEVELS : 32.68 START : 12/3/2011 END : 12/4/2011 LOGGER : L. Hill

MAXIMUM DRAWDOWN DURING PUMPING: 42 ft.

RANGE AND AVERAGE DISCHARGE RATE: ~ 1 gallon per minute

TOTAL QUANTITY OF WATER DISCHARGED: 130 gallons

DISPOSITION OF DISCHARGE WATER: TBD

TOTAL DEPTH OF WELL: 47.25

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm)	Comments
1449		32.68					
1456							Begin pumping
1504		35.9					
1517		39.3					
1520							Stop pumping
1528		36.2					Pump on
1532		35.5					
1542		41.4					Stop pumping
1554							Start pumping
1605	55	42					
1616	42		116				
1625			233	28.7	6.56	14,512	
1650			329				
1730			167	28.6	6.5	15,377	
12/4/2011							
0746		32.72					Initial reading in morning
0750							Pumping begins
0752	105	36.41	89.6	28.4	7.02	10,324	
0758	107	37.44	68.1	28.4	6.60	14,486	
0803	114	38.70	192	28.4	6.50	16,038	Pump turned down
0808	116.5	37.69	206	28.5	6.48	16,547	
0813	119	37.46	100.3	28.5	6.46	16,750	
0818	122	37.39	37.8	28.5	6.44	17,345	
0823	124	37.42	8.55	28.5	6.43	17,680	
0828	126	37.43	1.47	28.5	6.42	17,890	
0833	128	37.46	5.41	28.5	6.41	18,055	
0838	130	37.45	9.38	28.6	6.41	18,126	

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	WELL NUMBER MW-13	SHEET 2 OF 2

WELL DEVELOPMENT LOG

PROJECT : PI-4 Supplemental Expanded Site Inspection LOCATION : Vieques, P.R. DATE: 12/3/2011

NOTES

SOP(s) used (refer to SOP Log)?

Were all requirements of the SAP, PIs and above mentioned SOP(s) met?

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Sampler Signature: L. Hill Date: 12/4/2011

CH2MHILL	PROJECT NUMBER	WELL NUMBER	
	433193.FI.FK.20	EPI04-MW13D	SHEET 1 of 2

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation — LOCATION : Vieques, Puerto Rico — DATE: 06/27/13

DEVELOPMENT CONTRACTOR : CH2M Hill

DEVELOPMENT METHOD AND EQUIPMENT USED : Surge Block/ Hurricane Pump

START WATER LEVEL : 38.0 ft bTOC — START : 06-27-13/ 1150 — END : 06-28-13/ 1010 — LOGGER : T. Horn

MAXIMUM DRAWDOWN DURING PUMPING : Dry

RANGE AND AVERAGE DISCHARGE RATE : 300 mL/min; ~ 1.3 gal/min

TOTAL QUANTITY OF WATER DISCHARGED : 53 gal

DISPOSITION OF DISCHARGE WATER : Cloudy, Silty

TOTAL DEPTH OF WELL : 76.2 ft bTOC

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm)	Comments
1135	Surge / Purge begins- Well runs dry stop to recharge						Cloudy
1330	25	--	--	--	--	--	Stop pump for today
	Surge then Purge						06/28/13
0950	50	66.08	28.5	29.92	6.68	9298	low flow 400 mL/min
0955	--	64.65	20.5	30.03	6.57	9330	
1000	--	62.85	11.8	29.79	6.57	9249	
1005	--	61.91	5.79	29.65	6.59	9167	
1010	~52	61.50	5.00	29.79	6.61	9148	

Sampler Signature: T. Horn — Date: 06/28/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	
	433193.FI.FK.20	EPI04-MW13D	SHEET 2 OF 2

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 05/29/13

NOTES

SOP(s) used (refer to SOP Log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Sampler Signature: T. Horn Date: 06/27/13

CH2MHILL	PROJECT NUMBER 403743.FI.FK.P4	WELL NUMBER MW-14	SHEET 1 of 2

WELL DEVELOPMENT LOG

PROJECT : PI-4 Supplemental Expanded Site Inspection LOCATION : Vieques, P.R. DATE: 12/4/11

DEVELOPMENT CONTRACTOR : CH2M HILL

DEVELOPMENT METHOD AND EQUIPMENT USED : Surge and SS Hurricane pump

START WATER LEVELS : 30.20 START : 12/4/11 END : 12/4/11 LOGGER : L. Hill

MAXIMUM DRAWDOWN DURING PUMPING: 37.50

RANGE AND AVERAGE DISCHARGE RATE: ~ 1 gallon per minute

TOTAL QUANTITY OF WATER DISCHARGED: ~ 100 gallons

DISPOSITION OF DISCHARGE WATER: TBD

TOTAL DEPTH OF WELL: 44.78

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm)	Comments
1110		30.20					
1128							Begin Pumping
1132		32.50					
1145							Stop Pumping=Recharge
1148							Begin Pumping
1152			1797.0				Stop Pumping to recharge to 33 ft.
1154		33					Pump on/ Not True 33 ft. Read
1200		32					Pump On
1202			325.0				
1204		37.50					
1209	40	37.40	217.0	28.7	6.66	11014	
1215							Pump Off; Go get another water level Meter
1228		30.30					Pump On
1229			2170.0				
1233	43	34.66	3343.0	28.6	6.61	10853	
1238		35.21	861.0	28.6	6.57	10771	
1243		35.21	159.0	28.6	6.55	10793	
1248		35.32	123.0	28.6	6.54	10774	
1253		34.85	56.1	28.6	6.53	10834	
1258		35.11	31.4	28.6	6.53	10860	
1303	55	35.11	38.6	28.6	6.53	10856	
1308		35.02	27.9	28.6	6.52	10916	
1313		35.13	44.6	28.6	5.52	10918	
1318		--	40.7	28.6	6.52	10981	Move Pump 5ft. From Bottom Of Well
1323		34.45	754.0	28.7	6.51	10609	
1328		34.75	58.9	28.7	6.51	10769	
1333		34.80	41.6	28.6	6.51	10809	
1338		34.82	33.7	28.6	6.51	10835	
1343		35.45	32.0	28.6	6.51	10824	
1348		33.41	10.77	28.7	6.51	10789	
1353		33.71	6.76	28.7	6.51	10888	
1358		33.65	8.09	28.7	6.51	10886	
1403		33.90	7.43	28.8	6.50	10926	
1408		34.24	9.42	28.7	6.50	10928	
1413		34.46	26.9	28.6	6.50	10915	
1418		34.48	33.6	28.7	6.50	10939	
1423		33.55	5.32	28.8	6.50	11090	
1428		33.50	6.89	28.7	6.50	11146	
1433	100	33.45	6.15	28.8	6.50	11161	Well Developed

CH2MHILL	PROJECT NUMBER	WELL NUMBER MW-14	SHEET 2 OF 2

WELL DEVELOPMENT LOG

PROJECT : LOCATION : DATE:

NOTES

SOP(s) used (refer to SOP Log)?

Were all requirements of the SAP, PIs and above mentioned SOP(s) met?

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Sampler Signature: _____ Date: _____

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	EPI04-MW15	SHEET 1 of 2

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 05/29/13

DEVELOPMENT CONTRACTOR : CH2M Hill

DEVELOPMENT METHOD AND EQUIPMENT USED : Monsoon Pump and Surge Block

START WATER LEVEL : 38.88 ft bTOC START : 05-29-13/ 0810 END : 05-29-13/ 1151 LOGGER : J. Acaron

MAXIMUM DRAWDOWN DURING PUMPING : 0.62 ft

RANGE AND AVERAGE DISCHARGE RATE : 0.75 - 2 gal/min; 1 gal/min

TOTAL QUANTITY OF WATER DISCHARGED : 86 gal

DISPOSITION OF DISCHARGE WATER : milky white to clear, mild chemical odor

TOTAL DEPTH OF WELL : 52.10 ft bTOC

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm)	Comments
0825	Surge Well	--	--	--	--	--	
0843	Start Purge	--	--	--	--	--	Brown, Sandy
0853	12	39.55	178	28.69	6.92	4035	Milky White
0855	15	39.55	105	28.70	6.91	4034	Mild Chemical Odor
0857	18	39.55	69.9	28.69	6.90	4034	
0859	21	39.55	54.5	28.69	6.90	4037	
0901	24	39.55	36.7	28.70	6.89	4037	
0902	Stop Pump, Surge Well	--	--	--	--	--	
0917	Pump on	--	--	--	--	--	
0921	31	39.55	951	28.82	6.89	4039	
0925	36	39.50	340	28.68	6.88	4038	
0927	38	39.50	168	28.65	6.88	4042	
0929	41	39.50	73.9	28.62	6.87	4044	
0933	44	39.50	38.6	28.62	6.87	4046	Cloudy
0937	48	39.50	22.4	28.61	6.87	4049	Mild Chemical Odor
0938	Stop Pump, Surge Well	--	--	--	--	--	
1015	Pump On	--	--	--	--	--	
1022	55	39.50	514	28.75	6.88	4037	Milky White
1025	58	39.50	179	28.71	6.87	4042	Mild Chemical Odor
1028	60	39.50	81.7	28.68	6.87	4045	
1031	62	39.50	43.1	28.66	6.86	4051	
1035	64	39.50	23.2	28.65	6.87	4058	
1036	Stop Pump, Surge Well	--	--	--	--	--	
1125	Pump On	--	--	--	--	--	
1130	69	39.50	199	28.89	6.89	4040	Cloudy. Mild Chemical Odor
1135	73	39.50	47.2	28.74	6.86	4056	
1138	76	39.50	19.2	28.72	6.86	4061	
1141	79	39.50	10.9	28.77	6.86	4058	
1145	82	39.50	4.96	28.75	6.85	4058	Clear. Mild Chemical Odor
1148	84	39.50	4.88	28.76	6.85	4058	
1151	86	39.50	4.68	28.77	6.85	4059	Clear, Mild Chemical Odor

Sampler Signature: J. Acaron Date: 05/29/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	SHEET 2 OF 2
	433193.FI.FK.20	EPI04-MW15	

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/29/13

NOTES

SOP(s) used (refer to SOP Log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Sampler Signature: J. Acaron Date: 05/29/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	
	433193.FI.FK.20	EPI04-MW16	SHEET 1 of 3

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 05/31/13

DEVELOPMENT CONTRACTOR : CH2M Hill

DEVELOPMENT METHOD AND EQUIPMENT USED : Geotech Stainless Steel Geosub Pump, Surge Block

START WATER LEVEL : 36.35 ft bTOC START : 05-31-13/ 0815 END : 05-31-13/ 1340 LOGGER : J. Acaron

MAXIMUM DRAWDOWN DURING PUMPING : 13 ft

RANGE AND AVERAGE DISCHARGE RATE : 0.3 gal/min -2 gal/min

TOTAL QUANTITY OF WATER DISCHARGED : 133 gal

DISPOSITION OF DISCHARGE WATER : brown to colorless, high turbidity to very low turbidity, odorless

TOTAL DEPTH OF WELL : 54.66 ft bTOC

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm)	Comments
0825	Surge Well	--	--	--	--	--	
0841	Pump on	--	--	--	--	--	
0902	12	45.65	>1000	28.92	6.79	5049	Brown, Sandy, Odorless
0906	17	45.20	>1000	28.81	6.80	5030	
0918	24	46.10	>1000	29.28	6.87	5160	
0930	36	47.00	>1000	28.92	6.79	5114	
0931	Stop pump, surge well	--	--	--	--	--	
0939	Pump on	--	--	--	--	--	
0956	48	47.40	>1000	28.76	6.77	5081	Brown, Sandy, Odorless
1001	54	48.27	>1000	28.72	6.75	5084	
1007	60	48.88	>1000	28.73	6.78	5088	
1022	75	49.31	>1000	28.70	6.78	5111	
1033	78	48.90	>1000	29.48	6.80	5118	
1034	Stop pump, surge well	--	--	--	--	--	
1040	Pump on	--	--	--	--	--	
1045	81	44.95	>1000	29.79	6.81	4654	Brown, Sandy, Odorless
1051	84	44.21	>1000	29.15	6.78	5127	
1059	87	44.15	>1000	29.15	6.77	5124	
1103	90	44.15	518	29.10	6.76	5139	
1107	92	44.15	78.0	29.01	6.75	5147	
1110	94	44.15	58.7	29.02	6.75	5145	Cloudy, Odorless
1114	96	44.15	75.0	28.99	6.75	5140	
1118	98	44.15	65.1	28.99	6.74	5136	
1122	100	44.15	24.5	29.00	6.74	5137	Slightly Cloudy, Odorless
1123	Pump off, surge well	--	--	--	--	--	
1130	Pump on	--	--	--	--	--	
1150	107	41.51	>1000	29.31	6.74	5129	Brown, Sandy, Odorless
1205	112	41.68	446	29.35	6.73	5156	
1210	114	41.68	110	29.30	6.73	5160	
1216	116	41.68	42.4	29.29	6.73	5168	Slightly Cloudy, Odorless
1221	118	41.68	25.0	29.33	6.73	5168	
1226	120	41.68	14.3	29.33	6.73	5172	
1232	122	41.68	10.7	29.34	6.73	5187	
1258	124	41.68	9.14	29.32	6.73	5174	
1241	125	41.68	8.46	29.30	6.73	5169	Clear, Odorless
1244	126	41.68	11.1	29.30	6.73	5172	
1248	127	41.68	9.57	29.48	6.74	5168	

Sampler Signature: J. Acaron Date: 05/31/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	
	433193.FI.FK.20	EPI04-MW16	SHEET 2 of 3

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 05/31/13

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm)	Comments
1253	128	41.08	11.2	30.11	6.74	5136	
1259	129	41.68	6.95	30.09	6.73	5170	
1304	130	41.68	5.92	30.08	6.73	5163	
1308	131	41.68	5.75	30.05	6.73	5161	
1312	132	41.68	6.14	29.98	6.73	5170	Clear, Odorless
1317	133	41.68	6.48	30.02	6.72	5168	

Sampler Signature: J. Acaron Date: 05/31/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	SHEET 3 OF 3
	433193.FI.FK.20	EPI04-MW16	

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/29/13

NOTES

SOP(s) used (refer to SOP Log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Sampler Signature: J. Acaron Date: 05/31/13

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	EPI04-MW17	SHEET 1 of 2

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 06/03/13

DEVELOPMENT CONTRACTOR : CH2M Hill

DEVELOPMENT METHOD AND EQUIPMENT USED : Geotech Stainless Steel Geosub Pump, Surge Block

START WATER LEVEL : 33.72 ft bTOC START : 06-3-13/ 1110 END : 06-3-13/ 1500 LOGGER : J. Acaron

MAXIMUM DRAWDOWN DURING PUMPING : 3.0 ft

RANGE AND AVERAGE DISCHARGE RATE : 0.5 L/min - 2 gal/min; 1 L/min

TOTAL QUANTITY OF WATER DISCHARGED : 84 gal

DISPOSITION OF DISCHARGE WATER : brown to colorless, turbid to clear, odorless

TOTAL DEPTH OF WELL : 54.10 ft bTOC

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm)	Comments
1115	Surge Well	--	--	--	--	--	
1129	Pump On	--	--	--	--	--	Brown, Sandy, Odorless
1138	12	36.28	272	28.34	6.77	9120	
1141	15	35.60	176	28.35	6.77	9183	Cloudy, Odorless
1145	18	35.60	160	28.33	6.77	9179	
1148	21	35.60	150	28.34	6.77	9178	
1151	24	35.60	138	28.33	6.77	9180	
1152	Pump Off, Surge Well	--	--	--	--	--	
1209	Pump on	--	--	--	--	--	Brown, Sandy, Odorless
1215	30	35.28	611	28.48	6.78	9541	Cloudy, Odorless
1221	36	35.28	295	28.42	6.78	9557	
1228	42	35.28	132	28.38	6.77	9573	
1234	48	35.28	91.2	28.40	6.77	9578	
1235	Pump Off, Surge Well	--	--	--	--	--	
1242	Pump on	--	--	--	--	--	
1249	54	35.28	431	28.55	6.78	9498	Cloudy, Odorless
1251	56	35.20	250	28.69	6.77	9745	
1255	58	35.10	139	28.75	6.77	9595	
1259	60	35.10	125	28.75	6.77	9598	
1304	62	35.04	95.0	29.14	6.78	9712	
1312	64	35.04	88.3	29.22	6.79	9674	
1320	66	35.04	75.6	29.27	6.79	9668	
1332	69	35.04	54.0	29.13	6.79	9667	
1345	72	35.04	38.0	28.94	6.79	9720	
1356	74	35.04	34.6	28.82	6.78	9708	
1403	76	35.04	20.7	28.95	6.79	9728	
1412	78	35.04	14.6	28.99	6.78	9727	Clear, Odorless
1416	79	35.04	12.2	29.00	6.78	9720	
1420	80	35.04	11.1	28.94	6.78	9721	
1431	82	35.04	6.13	28.90	6.77	9731	
1436	83	35.04	4.87	28.91	6.78	9704	
1441	84	35.04	4.24	28.92	6.78	9724	

Sampler Signature: J. Acaron Date: 06/03/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	SHEET 2 OF 2
	433193.FI.FK.20	EPI04-MW17	

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/29/13

NOTES

SOP(s) used (refer to SOP Log)?

Were all requirements of the SAP, PIs and above mentioned SOP(s) met?

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Sampler Signature: J. Acaron Date: 06/03/13

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	EPI04-MW17D	SHEET 1 of 2

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 06/27/13

DEVELOPMENT CONTRACTOR : CH2M Hill

DEVELOPMENT METHOD AND EQUIPMENT USED : Hurricane Pump, Surge Block

START WATER LEVEL : 33.85 ft bTOC START : 06-27-13/ 0925 END : 06-27-13/ 1105 LOGGER : T. Horn

MAXIMUM DRAWDOWN DURING PUMPING : 14.82 ft

RANGE AND AVERAGE DISCHARGE RATE : 5 00mL/min - 1.25 gal/min

TOTAL QUANTITY OF WATER DISCHARGED : 49 gal

DISPOSITION OF DISCHARGE WATER : Clear

TOTAL DEPTH OF WELL : 89.21 ft bTOC

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm)	Comments
0918	Surge/Purge begins	--	--	--	--	--	
1030	45	48.67	3.50	28.56	6.27	21310	purge rate: 500 mL/min
1035	45	48.56	2.02	28.58	6.27	21314	clear, colorless
1040	45	48.35	2.19	28.64	6.27	21130	
1045	46	48.26	2.16	28.90	6.32	22947	
1050	47	48.19	2.08	28.93	6.45	22944	
1055	48	48.06	1.61	29.32	6.74	21378	
1100	48	48.18	2.11	28.98	6.81	21359	
1105	49	48.21	1.96	29.10	6.78	21383	

Sampler Signature: T. Horn Date: 06/27/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	SHEET 2 OF 2
	433193.FI.FK.20	EPI04-MW17D	

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/29/13

NOTES

SOP(s) used (refer to SOP Log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Sampler Signature: T. Horn Date: 06/27/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	WELL NUMBER EPI04-MW18	SHEET 1 of 3

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 05/30/13

DEVELOPMENT CONTRACTOR : CH2M Hill

DEVELOPMENT METHOD AND EQUIPMENT USED : Geotech Stainless Steel Geosub Pump, Surge Block

START WATER LEVEL : 30.34 ft bTOC START : 05-30-13/ 0750 END : 05-30-13/ 1315 LOGGER : J. Acaron

MAXIMUM DRAWDOWN DURING PUMPING : 3.66 ft

RANGE AND AVERAGE DISCHARGE RATE : 0.3 gal/min - 2 gal/min; 0.5 gal/min

TOTAL QUANTITY OF WATER DISCHARGED : 129 gal

DISPOSITION OF DISCHARGE WATER : light brown to milky white to colorless, turbid to clear, odorless

TOTAL DEPTH OF WELL : 47.92 ft bTOC

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm)	Comments
0755	Start Surge	--	--	--	--	--	
0806	Pump On	--	--	--	--	--	
0818	12	32.00	> 1000	28.54	6.74	10530	Light brown, Odorless
0820	15	32.00	744	28.53	6.73	10546	
0823	18	32.00	452	28.52	6.71	10541	
0826	21	32.00	480	28.53	6.70	10547	
0829	24	32.00	290	28.50	6.69	10541	Milky white, Odorless
0830	Pump Off, Surge Well	--	--	--	--	--	
0858	Pump On	--	--	--	--	--	
0903	30	32.70	>1000	28.79	6.73	10720	Light brown, Odorless
0906	33	32.70	>1000	28.72	6.70	10737	
0909	36	32.70	381	28.68	6.69	10745	
0914	39	32.70	261	28.64	6.68	10732	Milky white, Odorless
1918	42	32.70	171	28.64	6.67	10712	
0921	45	32.70	154	28.61	6.67	10710	
0924	48	32.70	149	28.62	6.66	10726	
0925	Pump Off, Surge Well	--	--	--	--	--	
0946	Pump On	--	--	--	--	--	
0950	Pump inoperable, will return with new pump						
1038	Pump On	--	--	--	--	--	
1044	56	34.00	>1000	28.69	6.69	10667	Light brown, Odorless
1046	60	34.00	788	28.63	6.68	10707	
1050	63	34.00	353	28.66	6.68	10554	Milky white, Odorless
1053	66	34.00	120	28.60	6.66	10651	
1056	69	34.00	46.6	28.56	6.66	10661	
1059	72	34.00	32.5	28.56	6.65	10656	
1100	Pump Off, Surge Well	--	--	--	--	--	
1108	Pump On	--	--	--	--	--	
1112	78	32.30	>1000	28.74	6.66	10715	
1118	84	32.30	494	28.68	6.65	10749	
1121	87	32.30	302	28.68	6.64	10779	
1125	90	32.30	126	28.69	6.64	10719	
1132	93	32.30	140	28.70	6.64	10711	
1135	96	32.30	98.3	28.80	6.64	10774	
1140	99	32.30	81.9	29.17	6.64	10619	
1145	101	32.30	81.2	29.17	6.64	10607	Milky white, Odorless
1149	102	32.14	78.4	29.39	6.65	10348	

Sampler Signature: J. Acaron Date: 05/30/13

CH2MHILL	PROJECT NUMBER 433193.FI.FK.20	WELL NUMBER EPI04-MW18	SHEET 2 of 3

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 05/30/13

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm)	Comments
1155	104	31.40	231	29.22	6.64	10544	
1159	105	31.40	155	29.21	6.64	10580	
1202	107	31.40	141	29.21	6.64	10582	
1214	112	31.40	57.9	29.28	6.64	10582	
1220	114	31.40	50.3	29.19	6.64	10565	Slightly Cloudy, Odorless
1229	117	31.40	28.8	29.17	6.63	10555	
1236	120	31.40	14.18	29.14	6.63	10621	Clear, Odorless
1245	124	31.40	7.56	29.12	6.63	10607	
1250	126	31.40	5.89	29.13	6.63	10606	
1253	127	31.40	4.94	29.14	6.64	10603	
1256	128	31.40	4.91	29.14	6.63	10609	Clear, Odorless
1259	129	31.40	4.37	29.13	6.63	10614	

Sampler Signature: J. Acaron Date: 05/30/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	SHEET 3 OF 3
	433193.FI.FK.20	EPI04-MW18	

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/29/13

NOTES

SOP(s) used (refer to SOP Log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Sampler Signature: J. Acaron Date: 05/30/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	
	433193.FI.FK.20	EPI04-MW19	SHEET 1 of 3

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 05/28/13

DEVELOPMENT CONTRACTOR : CH2M Hill

DEVELOPMENT METHOD AND EQUIPMENT USED : Stainless Steel Monsoon Pump, Surge Block

START WATER LEVEL : 27.30 ft bTOC START : 05-28-13/ 1140 END : 05-28-13/ 1506 LOGGER : J. Acaron

MAXIMUM DRAWDOWN DURING PUMPING : 5.04 ft

RANGE AND AVERAGE DISCHARGE RATE : 0.5-2.0 gal/min ; 1.0 gal/min

TOTAL QUANTITY OF WATER DISCHARGED : 102 gal

DISPOSITION OF DISCHARGE WATER : Turbid, cloudy and white to clear and colorless, odorless

TOTAL DEPTH OF WELL : 42.80 ft bTOC

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm)	Comments
1153	Surge Well	--	--	--	--	--	
1207	Pump On	--	--	--	--	--	
1240	12	--	--	--	--	--	Pump Off; Turbid
1241	Surge Well	--	--	--	--	--	
1253	Pump On	--	--	--	--	--	
1301	24	31.75	>1000	28.98	6.65	9674	Sandy, Odorless
1315	31	32.30	>1000	28.70	6.66	9672	
1317	36	32.34	>1000	28.65	6.65	9681	
1318	Pump Off, Surge Well	--	--	--	--	--	
1326	Pump On	--	--	--	--	--	
1332	44	32.40	>1000	28.68	6.65	9645	
1335	48	32.35	>1000	28.65	6.65	9651	
1336	Pump Off, Surge Well	--	--	--	--	--	
1348	Pump On	--	--	--	--	--	
1350	51	31.90	703	28.63	6.67	9637	
1353	55	31.90	105	28.59	6.65	9670	
1355	58	31.90	44.5	28.53	6.64	9695	
1357	60	31.90	26.5	28.54	6.64	9698	
1358	Pump Off, Surge Well	--	--	--	--	--	
1409	Pump On	--	--	--	--	--	
1412	64	31.11	>1000	28.67	6.66	9604	
1414	67	31.10	>1000	28.57	6.65	9636	
1417	70	31.10	265	28.57	6.64	9655	
1419	72	31.11	146	28.57	6.64	9656	Cloudy, White, Odorless
1420	Pump Off, Surge Well	--	--	--	--	--	
1424	Pump On	--	--	--	--	--	
1426	74	31.11	496	28.61	6.66	9603	
1430	76	31.11	184	28.48	6.65	9695	Milky, White, Odorless
1432	78	31.11	55.3	28.47	6.64	9697	
1434	80	31.11	22.9	28.49	6.64	9705	Clear, Odorless
1436	85	31.11	16.6	28.47	6.64	9698	
1437	Pump Off, Surge Well	--	--	--	--	--	
1444	Pump On	--	--	--	--	--	
1467	84	31.11	127	28.61	6.65	9688	
1449	86	31.10	61.7	28.55	6.64	9720	
1451	88	31.10	30.0	28.55	6.64	9710	Clear, Odorless
1453	90	31.10	11.8	28.54	6.64	9710	

Sampler Signature: J. Acaron Date: 05/28/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	
	433193.FI.FK.20	EPI04-MW19	SHEET 2 of 3

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 5/28/13

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm)	Comments
1455	91	31.10	8.38	28.53	6.65	9709	
1456	92	31.10	6.69	28.53	6.65	9713	
1457	93	31.11	4.48	28.51	6.64	9703	
1500	96	31.11	2.64	28.47	6.64	9724	
1505	99	31.11	2.54	28.45	6.64	9719	
1506	102	31.10	2.45	28.46	6.64	9720	Clear, Odorless

Sampler Signature: J. Acaron Date: 05/28/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	SHEET 3 OF 3
	433193.FI.FK.20	EPI04-MW19	

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/29/13

NOTES

SOP(s) used (refer to SOP Log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Sampler Signature: J. Acaron Date: 05/28/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	
	433193.FI.FK.20	EPI04-MW20	SHEET 1 of 2

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 6/13/13

DEVELOPMENT CONTRACTOR : CH2M Hill

DEVELOPMENT METHOD AND EQUIPMENT USED : Monsoon Pump, Surge Block

START WATER LEVEL : 34.13 ft bTOC START : 06-13-13/ 0850 END : 06-13-13/ 1120 LOGGER : J. Acaron

MAXIMUM DRAWDOWN DURING PUMPING : 8.8 ft

RANGE AND AVERAGE DISCHARGE RATE : 1-3 gal/min ; 1 gal/min

TOTAL QUANTITY OF WATER DISCHARGED : 118 gal

DISPOSITION OF DISCHARGE WATER : Brown to Clear, Odorless

TOTAL DEPTH OF WELL: 52.25 ft bTOC

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm)	Comments
0900	0	--	--	--	--	--	Surge block 10x
0910	0	--	--	--	--	--	Begin Purging
0918	12	39.35	>1000	28.79	6.78	5856	Brown, Odorless
1920	15	39.50	428	28.78	6.77	5849	
0921	18	39.54	245	28.80	6.76	5829	
0924	24	39.60	149	28.80	6.76	5833	
0927	30	39.60	166	28.78	6.75	5833	
0930	36	39.60	--	28.80	6.75	5843	Cloudy, Odorless
0931	Stop Pump, Surge Well	--	--	--	--	--	
0945	Pump On	--	--	--	--	--	
0952	48	41.70	810	28.83	6.80	5884	
0956	54	41.79	478	28.80	6.76	5887	Light brown, Odorless
1000	60	41.90	247	28.79	6.75	5897	
1003	66	41.90	159	28.79	6.75	5900	
1006	72	41.90	94.9	28.80	6.75	5899	Slightly cloudy, Odorless
1007	Stop Pump, Surge Well	--	--	--	--	--	
1030	Pump On	--	--	--	--	--	
1036	84	42.34	>1000	28.95	6.84	5797	Light brown, Odorless
1041	90	42.34	59.6	28.89	6.77	5838	
1043	93	42.34	45.9	28.84	6.75	5852	
1046	96	42.34	56.5	28.81	6.75	5857	
1052	100	42.90	23.2	28.74	6.73	5820	Cloudy, Odorless
1055	103	42.75	10.1	28.96	6.73	5819	
1058	106	42.75	5.31	28.74	6.74	5815	
1101	109	42.75	7.20	28.73	6.74	5818	Clear, Odorless
1104	112	42.75	4.16	28.75	6.74	5824	
1107	115	42.75	4.25	28.76	6.74	5825	
1110	118	42.75	4.11	28.74	6.74	5820	Clear, Odorless

Sampler Signature: J. Acaron Date: 06/13/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	SHEET 2 OF 2
	433193.FI.FK.20	EPI04-MW20	

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/29/13

NOTES

SOP(s) used (refer to SOP Log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Sampler Signature: J. Acaron Date: 06/13/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	
	433193.FI.FK.20	EPI04-MW21	SHEET 1 of 2

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 06/21/13

DEVELOPMENT CONTRACTOR : CH2M Hill

DEVELOPMENT METHOD AND EQUIPMENT USED : Hurricane Pump, Surge Block

START WATER LEVEL : 35.85 ft bTOC START : 06-21-13/ 1407 END : 06-27-13/ 0835 LOGGER : T. Horn

MAXIMUM DRAWDOWN DURING PUMPING : 1.15 ft

RANGE AND AVERAGE DISCHARGE RATE : 250 mL/min - 1+ gal/min

TOTAL QUANTITY OF WATER DISCHARGED: 216.5 gal

DISPOSITION OF DISCHARGE WATER: chocolate milk consistency

TOTAL DEPTH OF WELL: 63.17 ft bTOC

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm)	Comments
1025	80.0	37.00	35.6	29.17	7.38	4389	
1030	80.3	36.75	47.8	29.17	7.04	4254	
1035	80.5	36.65	70.0	29.28	7.04	4250	
1040	80.8	36.65	85.2	29.25	7.03	4240	
1045	80.9	35.77	93.4	29.71	7.04	4240	
1050	81.0	35.73	113	30.12	7.05	4244	
1055	81.2	35.77	175	30.10	7.03	4277	Low flow : 145 mL/min
1100	81.3	35.75	268	30.05	7.04	4278	Stop to surge
1200	Begin purging again	--	--	--	--	--	
1205	145.5	--	830	29.79	7.09	4398	Low flow : 145 mL/min
1210	145.8	36.27	503	29.71	7.04	4457	
1215	146.3	36.06	263	29.67	7.00	4582	
1220	146.6	36.19	103	29.84	6.96	4567	
1225	147.0	35.92	63.2	30.02	6.94	4532	
1230	147.5	36.06	57.4	30.09	6.96	4525	
1235	148.2	36.05	--	30.16	6.97	4485	
1240	148.5	35.77	188	30.39	7.00	4452	
1250	148.8	35.92	362	30.11	6.97	4429	
1355	--	--	27.3	--	--	--	
1400	--	--	19.5	--	--	--	
1405	--	36.57	25.4	29.39	6.89	4547	
1410	--	36.57	46.4	29.39	6.90	4532	
1415	--	35.95	52.3	29.48	6.92	4529	
1420	--	35.97	105	30.14	7.05	4586	
1425	~190	35.97	97.1	30.16	7.07	4584	
0726	Pump On	--	--	--	--	--	06/27/13
0820	215.0	36.55	30.6	28.66	6.83	5111	
0825	215.5	36.56	9.30	28.84	6.76	4928	
0830	216.0	36.57	8.84	28.90	6.75	4891	
0835	216.5	36.56	7.89	28.94	6.74	4880	

Sampler Signature: T. Horn Date: 06/21/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	
	433193.FI.FK.20	EPI04-MW21	SHEET 2 OF 2

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 05/29/13

NOTES

SOP(s) used (refer to SOP Log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Sampler Signature: T. Horn Date: 06/21/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	
	433193.FI.FK.20	EPI04-MW22	SHEET 1 of 2

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation — LOCATION : Vieques, Puerto Rico — DATE: 6/21/13

DEVELOPMENT CONTRACTOR : CH2M Hill

DEVELOPMENT METHOD AND EQUIPMENT USED : Monsoon Pump, Surge Block

START WATER LEVEL : 30.65 ft bTOC — START : 06-21-13/ 0815 — END : 06-21-13/ 1145 — LOGGER : J. Acaron, T. Horn

MAXIMUM DRAWDOWN DURING PUMPING : 0.41 ft

RANGE AND AVERAGE DISCHARGE RATE : 1 gal/min - 1.5 gal/min

TOTAL QUANTITY OF WATER DISCHARGED : 150 gal

DISPOSITION OF DISCHARGE WATER : Cloudy

TOTAL DEPTH OF WELL : 41.0 ft bTOC

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm)	Comments
0825	Surge Well	--	--	--	--	--	
0832	Pump On	--	--	--	--	--	
0840	Pump off; Surge Well	--	--	--	--	--	
0900	Pump On	--	--	--	--	--	
1100	After 5 rounds of surge/purge and approximately 120 gal of purge water at 1+ gal/min, purge water began to clear up						
1115	~120	31.06	249	28.79	7.27	2803	Issues with low flow
1120	125	31.06	108	28.75	7.32	2859	
1125	130	31.06	420	28.79	7.12	2804	
1130	135	31.06	17.3	28.79	7.06	2828	
1135	140	31.06	13.2	28.75	7.02	2842	
1140	145	31.06	14.3	28.77	7.02	2800	
1145	150	31.06	10.01	28.78	7.01	2801	

Sampler Signature: J. Acaron, T. Horn — Date: 06/21/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	SHEET 2 OF 2
	433193.FI.FK.20	EPI04-MW22	

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/29/13

NOTES

SOP(s) used (refer to SOP Log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes with exception of low flow

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Control box having issues maintaining low flow- either <1 gal/min or losing the flow of water altogether. Well had limited draw down.

Sampler Signature: J. Acaron, T. Horn Date: 06/21/13

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	EPI04-MW23	SHEET 1 of 2

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 07/19/13

DEVELOPMENT CONTRACTOR : CH2M Hill

DEVELOPMENT METHOD AND EQUIPMENT USED : Monsoon Pump and Surge Block

START WATER LEVEL : 29.31 ft bTOC START : 07-19-13/ 0745 END : 07-19-13/ 1320 LOGGER : R. Fields

MAXIMUM DRAWDOWN DURING PUMPING : 6.3 ft

RANGE AND AVERAGE DISCHARGE RATE : 2 L/min or 0.5 gal/min; ~ 1 gal/min

TOTAL QUANTITY OF WATER DISCHARGED : 110 gal

DISPOSITION OF DISCHARGE WATER : very dark brown and cloudy to clear and colorless

TOTAL DEPTH OF WELL : 41.30 ft bTOC

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm)	Comments
0910	Start Purge	29.50	--	--	--	--	Soft Bottom to Well
0925	8	Pump quit working, stop to repair pump					Flow rate= ~ 2 Lpm/ 0.5 gpm
1040	8	Replaced motor, resume purging					Very Dark Brown
1105	23	39.55	105	28.70	6.91	4034	Light Brown
1120	32	39.55	69.9	28.69	6.90	4034	
1125	Stop Pump, Surge Well	--	--	--	--	--	
1150	Pump on	30.10	--	--	--	--	Very Dark Brown
1200	50	31.00	> 1000	29.44	5.65	17318	
1210	60	34.00	870.00	28.87	5.56	17318	
1220	69	34.00	158	29.49	5.41	17444	
1230	77	34.10	75.1	28.56	5.38	17134	Cloudy
1235	79	34.10	74.6	28.58	5.37	17133	Cloudy
1240	82	34.10	45.8	28.52	5.37	17077	Slightly Cloudy
1245	85	34.10	25.4	28.51	5.35	17083	
1250	88	34.10	25.0	28.51	5.34	17102	
1255	91	34.10	21.3	28.51	5.33	17091	
1300	94	34.10	18.5	28.53	5.33	17091	
1305	97	34.10	15.2	28.53	5.35	17069	Clear
1310	100	34.10	12.1	28.56	5.34	17084	
1315	105	34.10	11.0	28.56	5.34	17078	
1320	110	34.10	9.7	28.58	5.35	17074	

Sampler Signature: R. Fields Date: 07/19/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	SHEET 2 OF 2
	433193.FI.FK.20	EPI04-MW23	

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 07/19/13

NOTES

SOP(s) used (refer to SOP Log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Sampler Signature: R. Fields Date: 07/19/13

PROJECT NUMBER	WELL NUMBER	
433193.FI.FK.20	EPI04-MW24	SHEET 1 of 2

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 06/28/13

DEVELOPMENT CONTRACTOR : CH2M Hill

DEVELOPMENT METHOD AND EQUIPMENT USED : Hurricane Pump and Surge Block

START WATER LEVEL : 29.13 ft bTOC START : 06-28-13/ 1116 END : 07-22-13/ 1345 LOGGER : T. Horn

MAXIMUM DRAWDOWN DURING PUMPING : 1.32 ft

RANGE AND AVERAGE DISCHARGE RATE : 0.75 gal/min - 1.25 gal/min

TOTAL QUANTITY OF WATER DISCHARGED : 190 gal

DISPOSITION OF DISCHARGE WATER : milky brown and turbid to clear

TOTAL DEPTH OF WELL : 47.66 ft bTOC

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm)	Comments
1116	Surge Well; Purge Well	--	--	--	--	--	06/28/13
1330	70 +	--	--				Brown, Sandy
1230	120	--	--	--	--	--	07/01/13
1250	Purge Well	--	--	--	--	--	Mild Chemical Odor
1308	158	--	14.9	--	--	--	07/22/13
1310	162	29.35	19.7	28.25	6.44	6796	Clear
1315	166	28.07	12.6	28.06	6.40	6726	
1320	170	30.25	6.04	28.50	6.40	6733	
1325	174	30.37	4.80	28.00	6.43	6727	
1330	178	30.45	3.69	27.88	6.47	6734	
1335	182	30.45	4.04	27.79	6.52	6734	Heavy Rain
1340	186	30.45	2.83	27.87	6.54	6736	
1345	190	30.45	2.36	27.91	6.56	6738	9 rounds of surging total

Sampler Signature: T. Horn Date: 06/28/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	SHEET 2 OF 2
	433193.FI.FK.20	EPI04-MW24	

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 07/22/13

NOTES

SOP(s) used (refer to SOP Log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Sampler Signature: T. Horn Date: 07/22/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	MW 24D	Sheet 1 of 1

WELL DEVELOPMENT LOG

WELL INFORMATION

PROJECT: **Remedial Investigation of VNTR Vieques, PR** Location: **SWMU 20** Date: **9/24/2014**

DEVELOPMENT CONTRACTOR: **CH2M HILL**

DEVELOPMENT METHOD AND EQUIPMENT USED: **surge - purge/2" surge block/SS Huricane Pump/Turbidimeter/YSI**

START WATER LEVELS: 30.15' BTOC Start: **1245** End: **1530** Logger: **R. Fields**

MAXIMUM DRAWDOWN DURING PUMPING: **≈61.1' BTOC**

RANGE AND AVERAGE DISCHARGE RATE: **0.6 gal./min. (0.4 - 1.6 gpm)**

TOTAL QUANTITY OF WATER DISCHARGED: **49 gal.**

DISPOSITION OF DISCHARGE WATER: **cloudy to clear, no odor**

TOTAL DEPTH OF WELL: **≈71' BGS**

FIELD PARAMETERS

Time	≈ Water Volume Discharged (gal)	≈ Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Cond. ms/cm	Comments
1315	5	43.3	306.0	29.95	6.34	7.567	flow rate ≈ 1.6 gpm
1325	15	57.0	shut pump off - pump rate fluctuating - well draining down				
1330	surge well						
1350	15	46.0	resume pumping				flow rate ≈ 1.4 gpm
1355	22	well drawing down - let recharge					
1400	22	52.9					
1405	resume pumping at lower rate						0.4 gpm
1410	27	52.0	19.2	30.02	6.77	8.132	flow rate ≈ 0.4 gpm
1415	29	52.4	8.3	29.54	6.81	7.939	
1420	31	52.8	14.6	29.62	6.75	7.935	
1430	35	53.2	90.2	29.24	6.75	7.786	
	stop purging - resume surging						
1450	35	62.0	80.1	29.22	6.80	7.800	flow rate ≈ 0.4 gpm
1455	37	62.0	17.3	29.20	6.80	7.735	
1500	39	61.8	31.6	29.10	6.80	7.738	
1505	41	61.9	2.0	29.10	6.80	7.735	flow rate ≈ 0.4 gpm
1510	43	61.6	4.7	29.09	6.79	7.741	
1515	45	61.4	3.5	29.10	6.79	7.742	
1520	47	61.1	2.5	29.10	6.79	7.742	
1525	49	61.1	0.1	29.10	6.79	7.743	
	well development complete						

SOP(s) used (refer to SOP Log)? **Yes, D-2 monitor well development**

Were all requirements of the SAP, Pls and above-mentioned SOP(s) met? **Yes**

Explanation of exceptions to SAP, PI(s) and SOP(s), including why, under what conditions, who authorized exception, anything considered in the decision:

Signature: **R. Fields** Date: **09/24/14**

CH2MHILL	PROJECT NUMBER	WELL NUMBER	
	433193.FI.FK.20	EPI04-MW25	SHEET 1 of 2

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 9/9/13

DEVELOPMENT CONTRACTOR : CH2M Hill

DEVELOPMENT METHOD AND EQUIPMENT USED : Monsoon Pump, Surge Block

START WATER LEVEL : 20.68 ft bTOC START : 9/9/13 1359 END : 9/10/13 0820 LOGGER : S. Brand

MAXIMUM DRAWDOWN DURING PUMPING : Bottom of well

RANGE AND AVERAGE DISCHARGE RATE : 7.6 LPM max, pumped 450 mL/min to stabilized

TOTAL QUANTITY OF WATER DISCHARGED : >9 gal

DISPOSITION OF DISCHARGE WATER : Drummed at site

TOTAL DEPTH OF WELL:32.78 from TOC, TOC = 2.56

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm) mS/cm	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	ORP (mV)
1415	0	20.7	Surge with pipe						
1426	~7.14 gal	Surged with pump							
1427	~25 gal	Surged with pump							
1429	~30 gal	Will pull pump and surge							
1439	pump off, surged with pipe	Surged with pipe							
1447	~45 Gal								
1481	Clearing, Pulled pump surged with pipe								
1483	Pump on								
1503	~55 Gal	Clearing, pulled pump							
1524	Left Site								
0720	Surged with pipe swab								
0721	Pump on, moderate turbidity								
0737	7 gallons clearing								
0742	Pumping at 450 mL/min								
0748		21.4	8.44	28.39	6.74	8.967	55.0	4.15	124.9
0755	~76	21.2	7.60	28.46	6.74	8.959	30.9	2.31	106.2
0812	~78	21.14	3.45	28.56	6.75	8.869	18.4	1.46	93.5
0815	~78.5	21.12	2.93	28.65	6.75	8.851	18.0	1.35	93.8
0820	~79	21.12	3.07	28.70	6.75	8.815	17.1	1.29	87.7
	Developed								

Sampler Signature: Stephen Brand Date: 09/10/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	SHEET 2 OF 2
	433193.FI.FK.20	EPI04-MW25	

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 9/10/2013

NOTES

SOP(s) used (refer to SOP Log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Sampler Signature: Stephen Brand Date: 06/13/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	MW 25D	Sheet 1 of 1

WELL DEVELOPMENT LOG

WELL INFORMATION

PROJECT: **Remedial Investigation of VNTR Vieques, PR** Location: **SWMU 20** Date: **9/18/2014**

DEVELOPMENT CONTRACTOR: **CH2M HILL**

DEVELOPMENT METHOD AND EQUIPMENT USED: **Monsoon Pump, Surge Block**

START WATER LEVELS: 25.00 Start: **1345** End: **1600** Logger: **G. Kiffe**

MAXIMUM DRAWDOWN DURING PUMPING: **26.08'**

RANGE AND AVERAGE DISCHARGE RATE: **500 ml/min - 1.5 gal./min.**

TOTAL QUANTITY OF WATER DISCHARGED: **82 gal.**

DISPOSITION OF DISCHARGE WATER: **cloudy to clear**

TOTAL DEPTH OF WELL: **74'**

FIELD PARAMETERS

Time	≈ Water Volume Discharged (gal)	≈ Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Cond. ms/cm	Comments
1355	start surging						
1410	stop surge - pump on						dark brown, sandy water
1415		43.65					
1424	20	45.70	53.70	30.22	7.21	8.214	
1428	stop pump; start surging						
1441	surge; pump on						light brown, sandy water
1454	40	50.71	68.80	30.08	7.02	4.364	light gray-brown, slightly cloudy
1459	45	51.08	69.10	28.89	6.92	8.100	clearing up
1504	48	44.20	9.82	28.94	6.96	8.254	clear
1512	55	44.25	5.60	29.56	7.13	8.141	
1520	60	45.29	6.60	29.75	6.91	8.121	
1530	70	46.22	5.42	29.41	6.94	8.159	
1535	75	45.84	4.76	28.82	6.90	8.235	
1540	78	45.28	4.05	28.77	6.91	8.164	
1545	82	45.34	3.29	28.68	6.91	8.151	
1550	end purge - development complete						

SOP(s) used (refer to SOP Log)? **Yes, D-2 well development**

Were all requirements of the SAP, PIs and above-mentioned SOP(s) met? **Yes**

Explanation of exceptions to SAP, PI(s) and SOP(s), including why, under what conditions, who authorized exception, anything considered in the decision:

Signature: **G. Kiffe** Date: **9/18/2014**

CH2MHILL	PROJECT NUMBER	WELL NUMBER	
	433193.FI.FK.20	EPI04-MW26	SHEET 1 of 2

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 9/9/2013

DEVELOPMENT CONTRACTOR : CH2M Hill

DEVELOPMENT METHOD AND EQUIPMENT USED : Hurricane Pump, Surge Block

START WATER LEVEL : 21.63 ft bTOC START : 9/9/13 0856 END : 9/9/13 1200 LOGGER : S. Brand

MAXIMUM DRAWDOWN DURING PUMPING : Bottom of well ~7LPM

RANGE AND AVERAGE DISCHARGE RATE : Full rate of Pump max to stable at 400 mL/min

TOTAL QUANTITY OF WATER DISCHARGED: 110 Gal

DISPOSITION OF DISCHARGE WATER: Drummed at location

TOTAL DEPTH OF WELL: 32.18 ft bTOC 2.47 tOC

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm) mS/cm	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	ORP (mV)
0856			High						
0905	10 gal								
0910	15 gal		High						
0922	Surged with pvc								
0923	pumping								
0930	Clearing, surged with pump on		High						
0940	Clearing surged with PVC								
0952	40 gal								
1000	55 Gal surged with pump								
1015	80 Gal	21.71							
1022	80 Gal 400 mL/min			28.45	6.41	21.82	72.0	5.11	124.8
1029		21.68	3.31	29.64		21.79	31.3	2.20	106.6
1036	91 Gal	21..66	19.7	30.08	6.43	21.87	17.0	1.90	99.3
1043	92 Gal	21.69	10.7	29.86	6.44	21.82	22.6	1.59	87.2
1053	93 Gal	21.09	13.1	29.75	6.45	21.75	20.8	1.47	92.4
1100	93.5 Gal	21.69	7.92	29.83	6.44	21.75	19.5	1.37	63.6
1109	94 Gal	21.69	4.86	29.78	6.44	21.70	18.4	1.30	78.5
1115	Developed								
	Placed pump to bottom to remove fines.								
1200	Left								

Sampler Signature: Stephen Brand Date: 09/09/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	SHEET 2 OF 2
	433193.FI.FK.20	EPI04-MW26	

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 9/9/13

NOTES

SOP(s) used (refer to SOP Log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Sampler Signature: Stephen Brand Date: 09/09/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	
	433193.FI.FK.20	EPI04-MW27	SHEET 1 of 3

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 9/10/13

DEVELOPMENT CONTRACTOR : CH2M HILL

DEVELOPMENT METHOD AND EQUIPMENT USED : Monsoon Pump, Surge Block

START WATER LEVEL : 10.39 ft bTOC START : 09/10/2013 1310 END : 9/11/2013 1235 LOGGER : S. Brand

MAXIMUM DRAWDOWN DURING PUMPING : Bottom of well

RANGE AND AVERAGE DISCHARGE RATE : ~7 Liters per minute, stabilized at ~0.1 Gal/min

TOTAL QUANTITY OF WATER DISCHARGED : ~190 gal

DISPOSITION OF DISCHARGE WATER : Drummed at site

TOTAL DEPTH OF WELL :

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm) mS/cm	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	ORP (mV)
1110	Surged entire screen with pipe andsure block								
1126	Pumping on		High						
1131	Pumped dry								
1134	Pump on								
1138	Pump off								
1145	~12 Gal								
1201	Pulled and cleanned pump								
1202	Pump on								
1209	18 Gallons								
1213	Pump off and pulled								
1223	Surged with surge block and pipe								
1224	Pump on								
1224	25 Gal								
1238	37 Gal	Pump off, pulled pump							
1245	Surged with surge block and pipe								
1248	Pump on								
1251	38 Gal								
1320	Sugred with pipe and surge block								
1321	Pump On								
1322	55 Gal								
1328	73 Gal								
1335	Surged with pipe and surge Block								
1335	Pump on								
1345	88 gal								
1348	91 Gal	Switched to lowflow							
1352	91 Gal	10.66							
1407	500ml/min	10.90	34.90	28.93	6.49	26.40			84.10
1414		10.87	36.90	29.01	6.47	25.97			
1422		10.87	50.60	28.94	6.47	25.98			
1433	Stopped low flow		31.70						
1440	110 Gall	Pulled pump							
0750	Surge	Thorn and Murphey take overdevelopment							
0820	pump on								
0905	147.00	11.21	Clearing	Switched to low flow.					
0910	148.00	11.15	921.00	28.48	6.49	26.58	41.0	2.88	204.7
0915	148.50	11.08	532.00	28.85	6.50	26.79	32.2	2.26	147.9

Sampler Signature: Stephen Brand Date: 09/11/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	
	433193.FI.FK.20	EPI04-MW27	SHEET 2 of 3

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 9/10/13

DEVELOPMENT CONTRACTOR : CH2M HILL

DEVELOPMENT METHOD AND EQUIPMENT USED : Monsoon Pump, Surge Block

START WATER LEVEL : 10.39 ft bTOC START : 09/10/2013 1310 END : 9/11/2013 1235 LOGGER : S. Brand

MAXIMUM DRAWDOWN DURING PUMPING : Bottom of well

RANGE AND AVERAGE DISCHARGE RATE : ~7 Liters per minute, stabilized at ~0.1 Gal/min

TOTAL QUANTITY OF WATER DISCHARGED : ~190 gal

DISPOSITION OF DISCHARGE WATER : Drummed at site

TOTAL DEPTH OF WELL :

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm) mS/cm	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	ORP (mV)
0920	149.00	10.85	340	28.98	6.52	26.6	24.50	1.72	194.1
0925	149.30	10.85	276	29.54	6.53	26.5	24.30	1.70	143.6
0930	149.80	10.85	386	29.64	6.52	26.4	21.10	1.48	119.3

Sampler Signature: Stephen Brand Date: 09/11/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	SHEET 3 OF 3
	433193.FI.FK.20	EPI04-MW27	

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 9/10/13

NOTES

SOP(s) used (refer to SOP Log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes with exception of low flow

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Control box having issues maintaining low flow- either <1 gal/min or losing the flow of water altogether. Well had limited draw down.

Sampler Signature: Stephen Brand Date: 09/10/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	
	433193.FI.FK.20	EPI04-MW28	SHEET 1 of 2

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 9/26/13

DEVELOPMENT CONTRACTOR : CH2M HILL

DEVELOPMENT METHOD AND EQUIPMENT USED : Monsoon Pump, Surge Block

START WATER LEVEL : START : 9/26/2013 0850 END : 06-21-13/ 1145 LOGGER :

MAXIMUM DRAWDOWN DURING PUMPING :

RANGE AND AVERAGE DISCHARGE RATE :

TOTAL QUANTITY OF WATER DISCHARGED :

DISPOSITION OF DISCHARGE WATER :

TOTAL DEPTH OF WELL :

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm) mS/cm	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	ORP (mV)
1250	Surge with block								
1300	Pump on								
1315	~25 Gal	Cleared up surged with pump							
1330	~35 gal	9.11	Surge with block						
1340	Pump On								
1400	~55 Gal	Pump Off							

Sampler Signature: _____ Date: 09/26/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	SHEET 2 OF 2
	433193.FI.FK.20	EPI04-MW28	

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 9/26/13

NOTES

SOP(s) used (refer to SOP Log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes with exception of low flow

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Control box having issues maintaining low flow- either <1 gal/min or losing the flow of water altogether. Well had limited draw down.

Sampler Signature: _____ Date: 09/26/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	MW 28D	Sheet 1 of 1

WELL DEVELOPMENT LOG

WELL INFORMATION

PROJECT: **Remedial Investigation of VNTR Vieques, PR** Location: **SWMU 20** Date: **9/23/2014**

DEVELOPMENT CONTRACTOR: **CH2M HILL**

DEVELOPMENT METHOD AND EQUIPMENT USED: **SS Hurrican Pump/2" surge block/Turbidimeter/YSI 650 MDS**

START WATER LEVELS: 8.5' BTOC Start: **1230** End: Logger: **R. Fields**

MAXIMUM DRAWDOWN DURING PUMPING: **dtw ≈ 20.8 BTOC (20.8 - 8.5 ≈ 12.3'**

RANGE AND AVERAGE DISCHARGE RATE: **0.5 - 2.2 gpm (≈1.1 gpm), pump # C-102495**

TOTAL QUANTITY OF WATER DISCHARGED: **120 gal.**

DISPOSITION OF DISCHARGE WATER: **cloudy to clear - no odor**

TOTAL DEPTH OF WELL: **55' BGS**

FIELD PARAMETERS

Time	≈ Water Volume Discharged (gal)	≈ Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Cond. ms/cm	Comments
1310	5	8.50	>999	29.76	6.84	22.020	flow rate ≈ 0.5 gpm
1325	13	14.50	49.30	28.90	6.79	20.400	flow rate ≈ 1.0 gpm
1335	23	17.30	1000.00	28.82	6.76	20.060	flow rate ≈ 1.4 gpm
1345	37	19.40	29.70	28.64	6.76	20.320	flow rate ≈ 1.4 gpm
	stop purging and surge						
1400	resume purging, flow rate ≈ 2.2 gpm						
1405	48	20.50	247.00	29.35	6.77	30.320	flow rate ≈ 2.2 gpm
1410	59	20.80	10.20	28.62	6.78	20.510	
1415	stop purging and begin surging						
1440	stop surging - handling water, dtw ≈ 8.9' BTOC						
1455	64	14.85	152.00	29.30	6.72	20.450	flow rate ≈ 1.25 gpm
1505	77	15.10	15.70	28.32	6.81	20.670	
1515	89	15.50	1.10	28.29	6.80	20.700	
1525	102	15.54	0.82	28.27	6.83	20.790	
1535	114	15.60	0.86	28.25	6.80	20.740	flow rate ≈ 1.25 gpm
1540	120	15.62	0.84	28.24	6.80	20.770	
1545							

SOP(s) used (refer to SOP Log)? **Yes, D-2 monitor well development**

Were all requirements of the SAP, Pls and above-mentioned SOP(s) met? **Yes**

Explanation of exceptions to SAP, PI(s) and SOP(s), including why, under what conditions, who authorized exception, anything considered in the decision:

Signature: **R. Fields** Date: **9/23/2014**

CH2MHILL	PROJECT NUMBER	WELL NUMBER	
	433193.FI.FK.20	EPI04-MW29	SHEET 1 of 3

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 9/25/2013

DEVELOPMENT CONTRACTOR : CH2M HILL

DEVELOPMENT METHOD AND EQUIPMENT USED : Monsoon Pump and Surge Block

START WATER LEVEL : 15.85 ft bTOC START : 9/25/13 0837 END : 9/25/13 1617 LOGGER :

MAXIMUM DRAWDOWN DURING PUMPING : Bottom of well

RANGE AND AVERAGE DISCHARGE RATE : Full Rate of Pump Max ~7L/min

TOTAL QUANTITY OF WATER DISCHARGED : 9/25/13 110 gal

DISPOSITION OF DISCHARGE WATER : Drummed at site

TOTAL DEPTH OF WELL :

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm) mS/cm	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	ORP (mV)
0830	Surged with block								
0840	Pump on	17.2	High						
0855	Surged with pump								
0905	~10 Gal	Clearing							
0915	Surged with pump								
0930	20 Gal	24.01	clearing						
0935	Surged with pump								
0945		25.21	Pump Off						
0948	Surge with surge block								
1000		16.80	Pump On						
1015	~35 gal								
1020	Surged with pump								
1030	~40 Gal	Surge with pump							
1107	~50 Gal	27.85	Pump Off						
1117	Pump on	16.81	Surge with Pump						
1130	Clearing up	27.89	Pump off						
1140	~75 gal	Pump on, surge with pump							
1200	~90 gal	28.21	Pump Off						
1210		17.95	Surge with Pump						
1220	Pump on								
1230	~110	28.48	Pump Off						
1245		17.01	Pull pump and surge with block						
1254	Pump on								
1305	Pump off	27.84							
1312	~120 gal	Pump on, very cloudy							
1320	Clearing, switching to low flow								
1325	125.50	16.85	50.00	27.94	6.58	17.54			113.80
1330	126.00	16.87	50.90	27.80	6.51	17.56			115.40
1335	126.30	16.84	47.70	27.91	6.57	17.65			117.80
1340	126.70	16.84	50.60	28.40	6.57	17.77			119.40
1350	127.10	16.88	58.10	28.6/8	6.57	17.91	52.40	3.83	122.90
1355	127.50	16.75	60.70	29.01	6.57	18.06	46.60	3.34	124.70
1400	127.90	16.18	40.60	30.20	6.58	18.45	46.50	3.30	127.40
1405	128.30	16.18	29.40	30.98	6.58	18.64	47.90	3.37	126.90
1410	128.70	16.16	20.20	30.63	6.58	18.65	45.50	3.23	122.90
1415	129.10	16.16	13.20	30.04	6.58	18.38	44.40	3.24	121.80
1420	129.5	16.18	9.33	29.90	6.57	18.38	44.20	3.16	123.20

Sampler Signature: Stephen Brand Date: 09/25/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	
	433193.FI.FK.20	EPI04-MW29	SHEET 2 of 3

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 9/25/2013

DEVELOPMENT CONTRACTOR : CH2M HILL

DEVELOPMENT METHOD AND EQUIPMENT USED : Monsoon Pump and Surge Block

START WATER LEVEL : 15.85 ft bTOC START : 9/25/13 0837 END : 9/25/13 1617 LOGGER :

MAXIMUM DRAWDOWN DURING PUMPING : Bottom of well

RANGE AND AVERAGE DISCHARGE RATE : Full Rate of Pump Max ~7L/min

TOTAL QUANTITY OF WATER DISCHARGED : 9/25/13 110 gal

DISPOSITION OF DISCHARGE WATER : Drummed at site

TOTAL DEPTH OF WELL :

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm) mS/cm	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	ORP (mV)
1425	129.90	16.17	8.78	31.01	6.57	18.64	43.5	3.07	123.8
1430	120.30	16.17	8.25	31.25	6.58	18.77	45.2	3.17	122.9
1432	Developed								

Sampler Signature: Stephen Brand Date: 09/25/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	
	433193.FI.FK.20	EPI04-MW29	SHEET 3 OF 3

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 9/25/13

NOTES

SOP(s) used (refer to SOP Log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Sampler Signature: Stephen Brand Date: 09/25/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	
	433193.FI.FK.20	EPI04-MW30	SHEET 1 of 2

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 09/04/13

DEVELOPMENT CONTRACTOR : CH2M Hill

DEVELOPMENT METHOD AND EQUIPMENT USED : Hurricane Pump and Surge Block

START WATER LEVEL : 22.60 ft bTOC START : 9/4/13 1406 END : 9/6/13 1310 LOGGER : S. Brand

MAXIMUM DRAWDOWN DURING PUMPING : To bottom of well

RANGE AND AVERAGE DISCHARGE RATE : Full on Pump Max, Maintained 400 mL/min aterd

TOTAL QUANTITY OF WATER DISCHARGED : 125 gal

DISPOSITION OF DISCHARGE WATER : Water drummed at southern Decon Pad

TOTAL DEPTH OF WELL : 32.81 ft bTOC TOC=2.46 above concrete pad

Time	Water Volume Discharged (gal)	Water Level (ft BTOC)	Turbidity (NTU)	Temperature (°C)	pH	Conductivity (µmhos/cm) mS/cm	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	ORP (mV)
1406-9/4		22.60	Lightning hold						
0721-9/5		22.58							
0745	Pumping								
0754	Pump failed								
0815	Pump on								
0835	Pumped dry ~2.5 gal								
0850	Pump on								
0901	~8.5 gal		Still Turbid						
0908	Pump dry/Failed								
0930	Pump on								
0934	Pump off 20gal								
1007	Pump On								
1015	Pump off 26gal								
1320	Pump on								
1045	Pump off, 34gal								
0756-9/06		22.51	Surged with surge block						
0800	Pump on		very turbid						
0813	Pum off, 45gal								
0816	48gal	Pump On, Surge with pump							
0834	Pump on, Surged w/pump								
0847	56 gal		High						
1002	90 gal		High						
1115	Pump on, Surged w/pump								
1130	114 gal		High	Pump on surged with pump					
1229	116.00	22.65	112	29.04	6.25	18.64	47.1	3.43	80.7
1241	120.00	22.65	28.9	29.25	6.25	18.72	39.2	2.82	87.7
1250	121.00	22.67	22.7	28.90	6.25	18.58	32.4	2.32	92.0
1301	123.50	22.67	8.30	28.98	6.25	18.61	28.9	2.11	94.1
1308	125.00	22.67	7.06	29.02	6.25	18.63	29.1	2.12	94.3
1310	Developed								

Sampler Signature: Stephen Brand Date: 09/04/13

CH2MHILL	PROJECT NUMBER	WELL NUMBER	
	433193.FI.FK.20	EPI04-MW30	SHEET 2 OF 2

WELL DEVELOPMENT LOG

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 9/4/13

NOTES

SOP(s) used (refer to SOP Log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

Sampler Signature: Stephen Brand Date: 09/04/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	MW 31	Sheet 1 of 2

WELL DEVELOPMENT LOG

SAMPLE INFORMATION

PROJECT: **Remedial Investigation of VNTR Vieques, PR** Location: **SWMU 20** Date: **9/22/2014**

DEVELOPMENT CONTRACTOR: **CH2M HILL**

DEVELOPMENT METHOD AND EQUIPMENT USED: **surge block and hurricane pump**

START WATER LEVELS: 11.61' Start: **0900** End: **1550** Logger: **G. Kiffe**

MAXIMUM DRAWDOWN DURING PUMPING: **17.39'**

RANGE AND AVERAGE DISCHARGE RATE: **17.39'**

TOTAL QUANTITY OF WATER DISCHARGED: **90 gal.**

DISPOSITION OF DISCHARGE WATER: **brown, sandy discharge, but clear at end**

TOTAL DEPTH OF WELL: **31.00'**

FIELD PARAMETERS

Time	≈ Water Volume Discharged (gal)	≈ Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Cond. ms/cm	Comments
905	begin surging						very turbid, brown sandy discharge
915	stop surge; pump on						(clearing up at end)
955	15	29.00					
1010	well recharged; begin sur						very sandy, brown discharge
1020	stop surge; pump on						
1045	35	28.20					
1105	well recharged; begin surging						sandy brown discharge
1115	stop surge; pump on						(clearing up at end)
1150	45	29.00					
1205	well recharged; begin surging						light brow, sandy discharge
1215	stop surge; pump on						(clearing up at end)
1245	well ran dry; allow to recharge						
	55	29.00					
1305	wll recharged; begin surging						light brown discharge
1315	stop surge; pump on						(clearing up at end)
1320	65	21.15	>1000	35.60	6.90	20.230	start low flow purge
1325	70	20.05	>1000	31.80	6.98	21.670	clearing up
1330	72	18.48	167.00	30.24	7.04	21.240	
1335	74	18.48	119.00	29.76	7.07	21.150	
1340	76	18.48	92.40	29.60	7.09	20.770	clear
1345	77	17.95	80.90	29.54	7.10	20.890	
1350	78	17.95	84.60	29.66	7.06	21.150	
1355	79	17.95	64.00	29.88	7.12	20.920	water is brown and turbid
1400	water starting to appear very turbid again						
1415	well ran dry; allow to recharge						
	well recharged; begin surging						
1450	stop surge; pump on						

SOP(s) used (refer to SOP Log)? **See page 2**

Explanation of exceptions to SAP, PI(s) and SOP(s), including why, under what conditions, who authorized exception, anything considered in the decision:

Signature: Date:

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	MW 31	Sheet 2 of 2

WELL DEVELOPMENT LOG

SAMPLE INFORMATION

PROJECT: **Remedial Investigation of VNTR Vieques, PR** Location: **SWMU 20** Date: **9/22/2014**

DEVELOPMENT CONTRACTOR: **CH2M HILL**

DEVELOPMENT METHOD AND EQUIPMENT USED: **surge block and hurricane pump**

START WATER LEVELS: 11.61' Start: **0900** End: **1550** Logger: **G. Kiffe**

MAXIMUM DRAWDOWN DURING PUMPING: **17.39'**

RANGE AND AVERAGE DISCHARGE RATE: **17.39'**

TOTAL QUANTITY OF WATER DISCHARGED: **90 gal.**

DISPOSITION OF DISCHARGE WATER: **brown, sandy discharge, but clear at end**

TOTAL DEPTH OF WELL: **31.00'**

WELL INFORMATION

Time	≈ Water Volume Discharged (gal)	≈ Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Cond. ms/cm	Comments
1455	**82**	**19.00**	**863.00**	**31.50**	**7.18**	**22.020**	
1500	**83**	**18.50**	**264.00**	**29.80**	**7.11**	**22.010**	**clearing up**
1505	**84**	**17.55**	**145.00**	**29.50**	**7.08**	**21.760**	
1510	**85**	**17.50**	**88.10**	**29.07**	**7.12**	**21.370**	
1515	**86**	**17.15**	**77.40**	**29.38**	**7.11**	**21.480**	**clear**
1520	**87**	**16.80**	**58.90**	**29.26**	**7.14**	**21.240**	
1525	**88**	**16.80**	**48.60**	**29.20**	**7.13**	**21.080**	
1530	**89**	**16.80**	**51.30**	**29.11**	**7.15**	**21.150**	
1535	**90**	**16.80**	**42.10**	**29.28**	**7.12**	**21.080**	
1540	**stop purge**						

SOP(s) used (refer to SOP Log)?

Were all requirements of the SAP, Pls and above-mentioned SOP(s) met?

Explanation of exceptions to SAP, PI(s) and SOP(s), including why, under what conditions, who authorized exception, anything considered in the decision:

Signature: **G. Kiffe** Date: **9/22/2014**

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	MW 32	Sheet 1 of 1

WELL DEVELOPMENT LOG

WELL INFORMATION

PROJECT: **Remedial Investigation of VNTR Vieques, PR** Location: **SWMU 20** Date: **9/19/2014**

DEVELOPMENT CONTRACTOR: **CH2M HILL**

DEVELOPMENT METHOD AND EQUIPMENT USED: **Hurrican Pump and Surge Block**

START WATER LEVELS: 4.65 Start: **1030** End: Logger: **G. Kiffe**

MAXIMUM DRAWDOWN DURING PUMPING: **18.85'**

RANGE AND AVERAGE DISCHARGE RATE: **500 ml/min to 1 gal./min.**

TOTAL QUANTITY OF WATER DISCHARGED: **46 gal.**

DISPOSITION OF DISCHARGE WATER: **brown, milky discharge to clear**

TOTAL DEPTH OF WELL: **23.5'**

FIELD PARAMETERS

Time	≈ Water Volume Discharged (gal)	≈ Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Cond. ms/cm	Comments
1035	start surging		>1000				
1045	stop surge; pump on		>1000				very turbid, brown discharge
1110	15	21.00	>1000				
1115	start surging and allow well to recharge						
1200	well recharged; start surging						
1210	stop surge; pump on						brown, cloudy discharge
1245	25	21.50					
1315	well recharged; start surging						
1325	stop surge; pump on						brown, cloudy discharge
1330	27	15.50	>1000	34.64	6.44	55.16	
1340	30	20.90	>1000	31.78	6.84	45.19	
1350	32	21.70	>1000	30.72	7.04	33.01	
1400	34	21.45	337.00	31.00	7.01	30.73	clearing up
1405	36	21.00	90.60	31.42	6.92	31.52	start low-flow purge
1410	38	20.65	70.10	31.41	6.98	30.58	clearing up
1415	40	20.35	48.60	30.99	7.00	29.90	
1425	41	20.15	24.50	30.59	7.01	29.30	clear
1430	42	19.50	20.20	30.99	6.95	29.21	
1435	43	18.20	14.20	31.38	6.93	29.10	
1440	44	18.18	7.73	30.62	6.86	30.00	
1445	45	17.80	6.31	30.59	6.95	30.40	
1450	46	17.25	5.00	30.97	6.99	30.90	
	well development complete						

SOP(s) used (refer to SOP Log)? **Yes, D-2**

Were all requirements of the SAP, PIs and above-mentioned SOP(s) met? **Yes**

Explanation of exceptions to SAP, PI(s) and SOP(s), including why, under what conditions, who authorized exception, anything considered in the decision:

Signature: **G. Kiffe** Date: **9/19/2014**

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	MW 33	Sheet 1 of 1

WELL DEVELOPMENT LOG

WELL INFORMATION

PROJECT: **Remedial Investigation of VNTR Vieques, PR** Location: **SWMU 20** Date: **9/23/2014**

DEVELOPMENT CONTRACTOR: **CH2M HILL**

DEVELOPMENT METHOD AND EQUIPMENT USED: **surge - purge/2" surge block/SS Huricane Pump/Turbidimeter/YSI**

START WATER LEVELS: 4.8' BTOC Start: **0800** End: **1130** Logger: **R. Fields**

MAXIMUM DRAWDOWN DURING PUMPING: **11.5'**

RANGE AND AVERAGE DISCHARGE RATE: **0.6 - 2 gpm (0.8 gpm average) - pump # C-102495**

TOTAL QUANTITY OF WATER DISCHARGED: **≈104 gal.**

DISPOSITION OF DISCHARGE WATER: **cloudy, turbid at start - final clear with no odor**

TOTAL DEPTH OF WELL: **≈15' BGS**

FIELD PARAMETERS

Time	≈ Water Volume Discharged (gal)	≈ Water Level (ft BTOC)	Turbidity (NTU)	Temp. (°C)	pH	Cond. ms/cm	Comments
0820	5	8.20	>999	29.47	6.19	93.580	flow rate ≈
0835	10	11.30	>999	29.00	6.25	92.750	flow rate ≈ 2 gpm
0845	15	12.43	>999	29.02	6.25	92.700	flow rate ≈ 2 gpm
0850	stop purging, dtw ≈ 13.4' BTOC, let recharge and surge						
0855	resume purging, flow rate ≈ 2 gpm						
0900	25	9.80					
0910	40	11.75	stop purging - let recharge to static				
0913		6.21	surging				
0920	resume pumping, 2 gpm, dtw ≈ 10.8 BTOC						
0925	50	11.75	>999	29.01	6.23	92.650	
0930	stop purging;surge - begin surge						
0945	stop surge - let equilibrate						
1000	resume purging, dtw ≈ 4.9' BTOC						
1005	56	6.60	>999	29.97	6.30	99.010	flow rate ≈ 0.6 gpm
1010	59	7.20	263.00	29.62	6.27	96.900	flow rate ≈ 0.6 gpm
1015	62	7.20	56.70	29.65	6.32	96.760	
1020	65	7.20	64.10	29.59	6.30	96.510	
1030	71	7.05	17.50	29.69	6.25	96.630	
1040	77	7.05	5.48	29.68	6.28	96.390	flow rate ≈ 0.6 gpm
1050	83	7.05	3.54	29.69	6.24	96.510	flow rate ≈ 0.6 gpm
1100	89	7.05	5.42	29.66	6.23	96.100	
1110	95	7.05	2.14	29.70	6.22	96.410	
1115	98	7.05	2.26	29.67	6.23	96.390	flow rate ≈ 0.6 gpm
1120	101	7.05	1.98	29.70	6.21	96.390	
1125	104	7.05	1.63	29.70	6.21	96.400	
1130	stop purging - complete R. Fields						

SOP(s) used (refer to SOP Log)? **Yes, D-2 well development**

Were all requirements of the SAP, Pls and above-mentioned SOP(s) met? **Yes**

Explanation of exceptions to SAP, PI(s) and SOP(s), including why, under what conditions, who authorized exception, anything considered in the decision:

Signature: **R. Fields** Date: **9/23/2014**

Appendix F
Groundwater Sampling Logs

CH2MHILL	PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 1
	404422.FI.FK.47	EPI04-MW01	

GROUNDWATER SAMPLING DATA SHEET

PROJECT : Expanded SI/ESI Former VNTR LOCATION : SMWU-20 (Former PI4) DATE: 7/28/2010

Weather: Mostly Sunny, breezy, hot ~90°F

Sample Team: Jake Crostic/MGM
Dia Whitaker/PHL

Total Depth: 50.66 FT.(BTOC) Measured

Depth to Water: (-) 39.74 FT.(BTOC) Measured

Water Column(h): (=) 10.92 FT. _____ IN.

Water Volume in Well 1.78 GAL

Pump Depth: 45.00 FT.(BTOC) Measured

Purge Device/Equip: Monsoon Pump

'Measuring Device/Equipment: Solinst Water Level Meter

Date and Time On Well: 7/28/2010 1430

Pump Start Date and Time: 7/28/2010 1446

Pump Finish Date and Time: 7/28/2010 1700

Date and Time Off Well: 7/28/2010 1703

Air Monitoring Readings: 0.0 ppm

Total Purge Volume: 5.00 **GAL.**

SAMPLE INFORMATION

Sample ID: VEP04-GW01-0710

Parameters Colleced for: VOC's, TCL_VOC's, 8260, 8260_SIM

Sample Date/Time: 7/28/2010 1630

Field Dup: YES/NO ID: _____

Parameters Colleced for: (FD)

FD Sample Date/Time:

MS/MSD: YES / NO

Sample Appearance: CLEAR/COLORLESS

Were samples filtered? YES / NO (circle one)

Field Test Kit Details:

If YES, Which samples?

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1452	0.10	39.95	123	29.08	26.98	1.38	44.6	3.40	7.08	182.5	15.8	
1458	0.50	39.95	200	29.50	27.03	1.39	43.9	3.32	7.07	162.0	60.9	lots of susp. Sed.
1503	0.75	38.90	200	30.23	27.06	1.39	41	3.05	7.07	152.2	53.7	
1508	1.00	33.95	250	30.48	27.09	1.39	40	2.97	7.06	138.2	63.4	
1513	1.25	39.95	190	30.68	27.11	1.39	41.3	3.05	7.06	135.6	60.1	
1518	1.50	39.90	190	31.48	27.17	1.39	37.7	2.85	7.07	132.3	54.0	
1523	1.75	39.89	190	31.78	27.2	1.39	37.7	2.75	7.07	130.1	47.4	
1528	2.00	39.89	190	31.99	27.21	1.39	37.9	2.74	7.07	128.7	41.7	
1533	2.23	39.89	190	32.32	27.21	1.39	37.9	2.73	7.07	173.0	34.1	
1538	2.30	39.89	190	33.06	27.27	1.39	38.2	2.72	7.07	164.5	30.7	
1543	2.75	39.90	190	33.16	27.28	1.39	38.1	2.71	7.07	150.0	24.0	
1548	3.00	39.90	190	33.14	27.26	1.39	35.8	2.55	7.07	141.7	20.9	
1553	3.25	39.90	190	33.11	27.26	1.39	36.1	2.57	7.07	130.5	19.9	
1558	3.50	39.90	190	33.30	27.27	1.39	37.3	2.43	7.07	119.8	17.6	
1603	3.75	39.90	190	33.39	27.27	1.39	34.7	2.46	7.07	113.8	14.7	
1608	4.00	39.90	190	33.46	27.24	1.39	33.7	2.38	7.07	109.7	13.1	
1313	4.25	39.90	190	33.47	27.24	1.39	35.1	2.49	7.07	111.7	11.1	
1318	4.50	39.90	190	33.49	27.23	1.39	32.9	2.33	7.07	105.3	9.59	
1323	4.75	39.90	190	33.52	27.23	1.39	32.2	2.28	7.07	104.2	9.39	
1328	5.00	39.90	190	33.71	27.22	1.39	32.4	2.30	7.07	104.3	8.07	

Signature: Jake Crostic/Dia Whitaker Date: 7/28/2010

CH2MHILL	PROJECT NUMBER 404422.FI.FK.47	WELL NUMBER EPI04-MW02	SHEET 1 OF 1

GROUNDWATER SAMPLING DATA SHEET

PROJECT : Expanded SI/ESI Former VNTR LOCATION : SMWU-20 (Former PI4) DATE: 07/29/2010

Weather: Partly cloudy, breezy, hot and humid, ~90°F

Sample Team: Jake Crostic/MGM
Dia Whitaker/PHL

Total Depth: 48.69 FT.(BTOC) Measured

Depth to Water: (-) 44.68 FT.(BTOC) Measured

Water Column(h): (=) 4.01 FT. _____ IN.

Water Volume in Well 0.65 GAL

Pump Depth: 46.00 FT.(BTOC) Measured

Purge Device/Equip: Monsoon Pump

'Measuring Device/Equipment: Solinst Water Level Meter

Date and Time On Well: 7/29/2010 0800

Pump Start Date and Time: 7/29/2010 0834

Pump Finish Date and Time: 7/29/2010 0945

Date and Time Off Well: 7/29/2010 0950

Air Monitoring Readings: 0.0 ppm

Total Purge Volume: 1.85 **GAL.**

SAMPLE INFORMATION

Sample ID: VEP04-GW02-0710

Parameters Colleced for: 8260B, 8260B_SIM

Sample Date/Time: 7/29/2010 0935

Field Dup: YES/NO ID: _____

Parameters Colleced for: (FD)

FD Sample Date/Time:

MS/MSD: YES / NO

Sample Appearance: CLEAR, COLORLESS

Were samples filtered? YES / NO (circle one)

Field Test Kit Details:

If YES, Which samples?

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
837	0.10	44.85	100	28.69	3299	1.71	381.7	28.41	6.70	171.6	24.9	
842	0.35	44.85	100	28.83	3289	1.71	576.3	44.18	6.69	168.5	23.1	
847	0.50	44.85	100	29.00	3301	1.72	870.12	57.18	6.70	162.7	18.70	
852	0.60	44.85	100	29.47	3327	1.73	970.13	65.74	6.71	159.4	15.40	
857	0.75	44.85	100	30.03	3300	1.73	959.8	72.93	6.72	158.3	5.47	
902	1.00	44.85	100	30.66	3340	1.73	999.9	80.99	6.72	153.0	4.31	
907	1.15	44.85	100	30.98	3348	1.73	999.9	83.64	6.73	150.7	3.81	
912	1.25	44.85	100	31.34	3364	1.74	999.9	83.85	6.72	145.6	4.17	
917	1.40	44.85	100	31.48	3372	1.75	999.9	84.86	6.72	142.4	4.34	
922	1.50	44.85	100	31.68	3382	1.75	999.9	86.56	6.72	142.4	3.91	
927	1.70	44.85	100	31.60	3388	1.75	999.9	86.78	6.72	140.4	4.21	
932	1.85	44.85	100	31.70	3389	1.75	999.9	86.63	6.72	141.3	3.81	Clear/None

Signature: Jake Crostic/Dia Whitaker Date: 7/29/2010

CH2MHILL	PROJECT NUMBER 404422.FI.FK.47	WELL NUMBER EPI04-MW03	SHEET 1 OF 1

GROUNDWATER SAMPLING DATA SHEET

PROJECT : Expanded SI/ESI Former VNTR LOCATION : SMWU-20 (Former PI4) DATE: 07/29/2010

Weather: Partly cloudy, breezy, hot and humid, ~90°F

Sample Team: Jake Crostic/MGM
Dia Whitaker/PHL

Total Depth: 50.31 FT.(BTOC) Measured

Depth to Water: (-) 46.35 FT.(BTOC) Measured

Water Column(h): (=) 3.96 FT. _____ IN.

Water Volume in Well 0.65 GAL

Pump Depth: 48.00 FT.(BTOC) Measured

Purge Device/Equip: Monsoon Pump

'Measuring Device/Equipment: Solinst Water Level Meter

Date and Time On Well: 7/29/2010 1010

Pump Start Date and Time: 7/29/2010 1025

Pump Finish Date and Time: 7/29/2010 1150

Date and Time Off Well: 7/29/2010 1155

Air Monitoring Readings: 0.0 ppm

Total Purge Volume: 4 **GAL.**

SAMPLE INFORMATION

Sample ID: VEP04-GW03-0710

Parameters Colleced for: VOC's, VOC_SIM

Sample Date/Time: 7/29/2010 1140

Field Dup: YES/NO ID: _____

Parameters Colleced for: (FD)

FD Sample Date/Time:

MS/MSD: YES / NO

Sample Appearance: CLEAR/COLORLESS

Were samples filtered? YES / NO (circle one)

Field Test Kit Details:

If YES, Which samples?

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1028	0.10	46.37	250	28.98	1985	1.00	54.4	4.16	6.84	3.30	979	Amber/None
1033	0.75	46.37	250	29.84	1984	1.00	40.5	3.05	6.86	3.80	710	
1038	1.00	46.37	250	30.38	1981	1.00	36.2	2.70	6.86	10.0	418	
1043	1.25	46.37	250	31.72	1974	1.00	31.1	2.29	6.86	25.6	220	
1048	1.50	46.37	250	32.15	1975	0.99	28.2	2.04	6.87	27.1	135	
1053	1.75	46.37	250	32.61	1971	0.99	24.3	1.74	6.87	31.9	97.8	
1058	2.00	46.37	250	33.19	1976	0.99	22.2	1.58	6.87	28.7	43.7	
1103	2.25	46.37	250	33.17	1975	0.99	21.1	1.50	6.87	31.9	25.0	
1108	2.50	46.37	250	33.21	1975	0.99	18.9	1.34	6.86	34.7	14.7	
1113	2.75	46.37	250	33.44	1981	0.99	16.9	1.20	6.86	37.0	9.36	
1118	3.00	46.37	250	33.56	1981	0.99	15.9	1.12	6.86	35.1	8.52	
1123	3.25	46.37	250	33.74	1982	0.99	14.7	1.03	6.86	38.0	4.74	
1128	3.50	46.37	250	33.98	1986	0.99	13.2	0.93	6.86	40.6	1.24	
1133	3.75	46.37	250	34.02	1986	0.99	13.0	0.91	6.86	40.8	0.86	
1138	4.00	46.37	250	33.96	1985	0.99	12.5	0.91	6.86	38.5	1.42	Clear

Signature: Jake Crostic/Dia Whitaker Date: 7/29/2010

CH2MHILL	PROJECT NUMBER 404422.FI.FK.47	WELL NUMBER EPI04-MW04	SHEET 1 OF 1

GROUNDWATER SAMPLING DATA SHEET

PROJECT : Expanded SI/ESI Former VNTR LOCATION : SMWU-20 (Former PI4) DATE: 7/29/2010

Weather: Partly cloudy, breezy, hot and humid, ~90°F

Sample Team: Jake Crostic/MGM
Dia Whitaker/PHL

Total Depth: 49.5 FT.(BTOC) Measured

Depth to Water: (-) 43.43 FT.(BTOC) Measured

Water Column(h): (=) 0.82 FT. _____ IN.

Water Volume in Well 0.13 GAL

Pump Depth: 46.5 FT.(BTOC) Measured

Purge Device/Equip: Monsoon Pump

'Measuring Device/Equipment: Solinst Water Level Meter

Date and Time On Well: 7/29/2010 1320

Pump Start Date and Time: 7/29/2010 1422

Pump Finish Date and Time: 7/29/2010

Date and Time Off Well: 7/29/2010

Air Monitoring Readings:

Total Purge Volume: 2.05 **GAL.**

SAMPLE INFORMATION

Sample ID: VEP04-MW04-GW01

Parameters Colleced for: VOC's 8260B, 8260B_SIM

Sample Date/Time: 7/29/2010 1550

Field Dup: YES/NO ID:

Parameters Colleced for: (FD)

FD Sample Date/Time:

MS/MSD: YES / NO

Sample Appearance: CLEAR, COLORLESS

Were samples filtered? YES / NO (circle one)

Field Test Kit Details:

If YES, Which samples?

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1344	0.10	44.43	40	29.63	3386	1.76	29.4	2.21	6..87	152.8	216	Stop, Pump stopped
1425	0.25	44.84	40	29.46	3383	1.76	18	1.34	6.12	46	154	see log book
1430	0.40	44.30	40	30.37	3386	1.76	14.3	1.08	6.82	44.7	80.6	
1435	0.50	44.31	40	30.58	3385	1.76	14.6	1.08	6.82	48.6	73.2	
1440	0.55	44.34	40	30.71	3383	1.75	15.5	1.15	6.82	55.2	56.4	
1445	0.60	44.36	40	30.77	3382	1.75	15.3	1.13	6.83	57.6	41.5	
1450	0.56	44.38	40	30.89	3385	1.75	16.1	1.19	6.83	62.7	36.9	
1455	0.70	44.38	40	30.95	3379	1.75	15.4	1.14	6.83	66.9	35.5	
1500	0.75	44.4	40	30.87	3372	1.75	16.1	1.19	6.83	75.4	26.8	
1505	0.80	44.42	40	30.86	3370	1.75	16.4	1.21	6.83	77.2	17.2	
1510	0.85	44.41	40	31.91	3371	1.75	20.4	1.5	6.84	82.2	20.0	
1515	0.95	44.41	40	30.94	3367	1.75	19.6	1.44	6.85	83.5	19.4	
1520	1.15	44.41	40	30.93	3361	1.74	16.7	1.23	6.84	85.7	13.7	
1525	1.35	44.41	40	30.91	3358	1.74	18.1	1.33	6.84	85.7	11.2	
1530	1.35	44.41	40	30.99	3355	1.74	19.4	1.43	6.84	85.8	10.7	
1535	1.70	44.41	40	31.01	3356	1.74	19.8	1.46	6.85	85.6	9.64	
1540	1.95	44.41	40	31.05	3353	1.74	18.9	1.39	6.85	85.8	9.12	
1545	2.05	44.41	40	31.10	3351	1.74	19.5	1.43	6.85	86	8.00	

Signature: Dia Whitaker Date: 7/29/2010

CH2MHILL	PROJECT NUMBER 404422.FI.FK.47	WELL NUMBER EPI04-MW05	SHEET 1 OF 1

GROUNDWATER SAMPLING DATA SHEET

PROJECT : Expanded SI/ESI Former VNTR | LOCATION : SMWU-20 (Former PI4) | DATE: 07/13/2010

Weather: Partly Cloudy, Breezy, 92 °F

Sample Team: Jake Crostic/MGM
Dia Whitaker/PHL

Total Depth: 37.86 FT.(BTOC) Measured

Depth to Water: (-) 37.11 FT.(BTOC) Measured

Water Column(h): (=) _____ FT. _____ IN.

Water Volume in Well _____ GAL

Pump Depth: 37.50 FT.(BTOC) Measured

Purge Device/Equip: Monsoon Pump

'Measuring Device/Equipment: Solinst Water Level Meter

Date and Time On Well: 07/13/10 1405

Pump Start Date and Time: 07/13/10 1428

Pump Finish Date and Time: 07/13/10 1555

Date and Time Off Well: 07/13/10 1610

Air Monitoring Readings: 0.0 ppm

Total Purge Volume: _____ **GAL.**

SAMPLE INFORMATION

Sample ID: VEP04-GW05-0710

Parameters Colleced for: VOC's, VOC_SIM

Sample Date/Time: 07/13/10 1550

Field Dup: YES / (NO) ID: _____

Parameters Colleced for: (FD)

FD Sample Date / Time: _____

MS/MSD: YES / (NO) (circle one)

Sample Appearance: CLEAR/COLORLESS

Were samples filtered? YES / (NO) (circle one)

Field Test Kit Details: _____

If YES, Which samples? _____

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1442	< 1.0	37.21	125	30.24	5509	6062	41.0	3.02	6.71	75.9	240	
1447	< 1.0	37.27	125	30.51	5506	6087	32.6	2.36	6.71	64.8	110	
1452	< 1.0	37.25	125	30.88	5519	6140	29.2	2.14	6.71	17.3	54.6	
1457	< 1.0	37.26	125	31.09	5529	6172	24.2	1.77	6.72	31.6	31.5	
1502	~1.0	37.25	125	31.41	5562	6245	23.1	1.67	6.71	36.0	14.8	
1507	1.00	37.27	125	31.79	5584	6310	20.9	1.50	6.71	87.9	9.24	
1512	> 1.0	37.25	125	31.82	5627	6360	19.1	1.37	6.69	170.9	5.53	
1517	1.25	37.26	125	31.72	5652	6378	15.1	1.08	6.68	167.4	3.65	
1522	1.25	37.24	140	31.73	5673	6404	14.2	1.02	6.68	165.3	7.71	
1527	1.50	37.40	140	32.13	5737	6519	10.8	0.77	6.68	164.3	2.91	
1533	2.00	37.10	140	31.87	5795	6556	9.30	0.67	6.66	157.7	2.41	
1540	2.00	37.20	140	31.69	5813	6589	7.90	0.57	6.65	147.2	2.38	

Signature: Jake Crostic/Dia Whitaker Date: 7/13/2010

CH2MHILL	PROJECT NUMBER 404422.FI.FK.47	WELL NUMBER EPI04-MW06	SHEET 1 OF 1

GROUNDWATER SAMPLING DATA SHEET

PROJECT : Expanded SI/ESI Former VNTR LOCATION : SMWU-20 (Former PI4) DATE: 7/14/10

Weather: Rainy ~88°F

Sample Team: Jake Crostic/MGM
Dia Whitaker/PHL

Total Depth: 52.74 FT.(BTOC) Measured

Depth to Water: (-) 42.71 FT.(BTOC) Measured

Water Column(h): (=) _____ FT. _____ IN.

Water Volume in Well _____ GAL

Pump Depth: 48.00 FT.(BTOC) Measured

Purge Device/Equip: Monsoon Pump

'Measuring Device/Equipment: Solinst Water Level Meter

Date and Time On Well: 7/14/2010

Pump Start Date and Time: 7/14/2010 0905

Pump Finish Date and Time: 7/14/2010

Date and Time Off Well: 7/14/2010

Air Monitoring Readings:

Total Purge Volume: _____ **GAL.**

SAMPLE INFORMATION

Sample ID: VEP04-GW06-0710

Parameters Colleced for: VOC's, VOC_SIM

Sample Date/Time: 7/14/2010

Field Dup: YES/NO ID:

Parameters Colleced for: (FD)

FD Sample Date/Time:

MS/MSD: YES / NO

Sample Appearance:

Were samples filtered? YES / NO (circle one)

Field Test Kit Details:

If YES, Which samples?

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
910	< 1.0	42.95	400	28.85	3182	3.414	18.5	1.41	6.86	151.6	240	adjusted pump
915	< 1.0	42.94	100	29.43	3147	3.413	18.4	1.38	6.89	100.6	200	
920	< 1.0	42.92	150	30.37	3170	3.498	3.9	0.29	6.87	-61.2	--	turbidity meter
925	1.00	42.95	150	30.66	3161	3.503	5.0	0.37	6.87	-63.9	--	not working
930	1.25	42.96	150	30.57	3122	3.454	2.4	0.18	6.88	-286	--	
935	< 1.5	42.95	150	30.71	3120	3.460	1.7	0.13	6.89	-46018	947	
940	1.50	42.92	150	31.32	3102	3.476	1.6	0.11	6.89	-4705	>1000	
945	~1.75	42.93	150	31.29	3096	3.467	1.4	0.11	6.89	-324.2	4222	
950	2.00	92.95	150	31.18	3094	3.459	1.4	0.10	6.89	-294.7	225	
955	2.25	42.96	150	31.28	3098	3.495	1.5	0.11	6.89	-101.5	148	
1000	<2.50	42.96	150	31.40	3095	3.456	1.2	0.12	6.90	-80.2	100	
1005	2.50	42.94	150	31.77	3092	3.493	17.2	0.98	6.91	-60.2	984	Emptied YSI
1015	2.75	42.96	150	31.62	3030	3.481	13.8	1.00	6.94	-42.8	104	
1020	< 3.00	42.96	150	31.44	3088	3.469	1.5	0.33	6.87	-162.8	37.9	
1025	3.00	42.95	150	31.51	3089	3.473	3.5	0.26	6.87	-179.3	40.9	
1030	< 3.25	42.95	150	31.55	3090	3.477	2.9	0.21	6.87	-181.9	52.4	
1035	3.25	42.95	150	31.87	3092	3.498	2.2	0.18	6.87	-261.0	66.4	
1040	< 3.5	42.95	150	32.44	3097	3.538	1.8	0.13	6.88	-264.7	60.8	
1045	3.50	42.95	150	32.84	3098	3.565	2.0	0.14	6.88	-256.0	62.9	

Signature: Jake Crostic/Dia Whitaker Date: 7/14/2010

CH2MHILL	PROJECT NUMBER 404422.FI.FK.47	WELL NUMBER EPI04-MW07	SHEET 1 OF 1

GROUNDWATER SAMPLING DATA SHEET

PROJECT : Expanded SI/ESI Former VNTR LOCATION : SMWU-20 (Former PI4) DATE: 7/13/2010

Weather: Sunny with some clouds, 86°F

Sample Team: Jake Crostic/MGM
Dia Whitaker/PHL

Total Depth: 42.43 FT.(BTOC) Measured

Depth to Water: (-) 31.82 FT.(BTOC) Measured

Water Column(h): (=) _____ FT. _____ IN.

Water Volume in Well _____ GAL

Pump Depth: 36.50 FT.(BTOC) Measured

Purge Device/Equip: Monsoon Pump

'Measuring Device/Equipment: Solinst Water Level Meter

Date and Time On Well: 7/13/2010 1155

Pump Start Date and Time: 7/13/2010 1208

Pump Finish Date and Time: 7/13/2010 1345

Date and Time Off Well: 7/13/2010 1355

Air Monitoring Readings: 0.0 ppm

Total Purge Volume: _____ **GAL.**

SAMPLE INFORMATION

Sample ID: VEP04-GW07-0710

Parameters Colleced for: VOC's, VOC_SIM

Sample Date/Time: 7/13/2010 1300

Field Dup: YES/NO ID: VEP04-GW07-0710

Parameters Colleced for: (FD) VOC's, VOC_SIM

FD Sample Date/Time: 7/13/10 1335

MS/MSD: YES / NO

Sample Appearance: CLEAR/COLORLESS

Were samples filtered? YES / NO (circle one)

Field Test Kit Details:

If YES, Which samples?

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1213	< 1.00	32.10	500	22.03	9677	10.62	16.5	8.76	6.61	194.0	--	Slowed flow rate
1223	< 1.00	31.95	250	31.27	9669	10.83	27.9	2.00	6.64	181.7	878	
1228	< 1.00	31.96	250	31.15	9721	10.87	28.0	2.01	6.65	171.3	503	
1233	1.00	31.96	200	31.84	9690	10.96	21.9	1.56	6.65	146.6	483	
1238	~1.50	31.99	200	30.59	9656	10.69	19.1	1.35	6.66	138.2	102	
1243	<2.00	31.97	200	31.31	9374	10.5	15.1	1.08	6.67	126.6	539	
1248	2.00	31.96	200	31.29	9377	10.52	14.3	1.03	6.67	116.0	314	
1253	~2.50	31.97	200	31.58	9381	10.57	12.4	0.89	6.66	104.6	174	
1258	2.75	31.94	200	31.31	9408	10.57	10.6	0.76	6.67	103.6	76.6	
1303	3.00	31.98	200	31.54	9375	10.54	8.7	0.63	6.66	96.5	76.6	
1308	3.50	31.96	250	31.14	9361	10.46	6.7	0.48	6.66	92.1	22.4	
1313	3.75	31.96	250	31.18	9438	10.55	6.7	0.44	6.65	91.4	16.0	
1318	4.25	31.97	250	30.83	9456	10.51	5.3	0.38	6.65	89.3	15.9	
1323	4.50	31.96	250	31.40	9456	10.61	4.5	0.33	6.65	88.6	17.7	
1328	5.00	31.90	250	31.35	9464	10.65	4.1	0.29	6.65	85.0	16.9	

Signature: Jake Crostic/Dia Whitaker Date: 7/13/2010

CH2MHILL	PROJECT NUMBER	WELL NUMBER	SHEET 1 OF 1
	403743.FI.FK.P4	EPI04-MW05	

GROUNDWATER SAMPLING DATA SHEET

PROJECT : PI-4 Supplimental Expanded Site Inspection, VNTR Vieques Puerto Rico LOCATION : SMWU-20 (Former PI4) DATE: 11/18/2011

Weather: Mostly sunny, breezy, 90's

Sample Team: C. Cisneros
K. Butler

Total Depth: 46.50 FT.(BTOC) Measured

Depth to Water: (-) 32.13 FT.(BTOC) Measured

Water Column(h): (=) 14.37 FT. _____ IN.

Water Volume in Well _____ GAL

Pump Depth: 41.50 FT.(BTOC) Measured

Purge Device/Equip: Monsoon Pump

'Measuring Device/Equipment: YSI

Date and Time On Well: 11/18/2011 0855

Pump Start Date and Time: 11/18/2011 0900

Pump Finish Date and Time: 11/18/2011 1110

Date and Time Off Well: 11/18/2011 1115

Air Monitoring Readings: 0.0 ppm

Total Purge Volume: _____ **GAL.**

SAMPLE INFORMATION

Sample ID: VEP04-GW05-1111

Parameters Colleced for: SW846, 8060C, 9PCR, BF-MB-009, 9060, 300.Di

Sample Date/Time: 11/18/2010 0955

SM2540C, RSK-125 CC, 8260

Field Dup: YES/NO ID: Same name noted on COC

Parameters Colleced for: (FD)

FD Sample Date/Time: 11/18/2011 1000

MS/MSD: YES / NO

Sample Appearance: Clear, Odorless

Were samples filtered? YES / NO (circle one)

Field Test Kit Details: Mn=0.0ppm, Fe^{2+} = 0.0ppm, Total Fe = 0.0ppm

If YES, Which samples?

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
905	0.00	0.15	200	31.7	83.3	0.05	26.3	1.97	7.24	194.6	343	Clear Odorless
910	0.25	32.16	200	28.2	6305	3.42	19.1	1.44	6.57	201.3	274	Clear Odorless
915	0.50	32.16	200	28.5	6470	3.51	20.1	1.52	6.52	203.0	117	Clear Odorless
920	0.75	32.16	200	28.7	6649	3.56	18.3	1.38	6.80	203.4	87.6	Clear Odorless
925	1.00	32.17	200	28.7	6581	3.57	18.6	1.42	6.49	203.5	58.3	Clear Odorless
930	1.25	32.17	200	28.7	6593	3.58	19.1	1.44	6.48	203.6	48.3	Clear Odorless
935	1.50	32.17	200	28.7	6609	3.59	19.8	1.51	6.48	203.6	39.1	Clear Odorless
940	1.75	32.17	200	28.7	6620	3.60	19.6	1.48	6.47	203.1	25.3	Clear Odorless
945	2.00	32.16	200	28.9	6629	3.60	19.5	1.40	6.47	202.6	24.4	Clear Odorless
950	2.25	32.16	200	29.1	6646	3.61	20.0	1.51	6.47	201.6	21.3	Clear Odorless
955	Collect Sample VE04-GW-05-1111											

Signature: C. Cisneros Date: 11/18/2011

CH2MHILL	PROJECT NUMBER 404422.FI.FK.47	WELL NUMBER EPI04-MW06	SHEET 1 OF 1

GROUNDWATER SAMPLING DATA SHEET

PROJECT : PI-4 Supplimental Expanded Site Inspection, VNTR Vieques Puerto Rico LOCATION : SMWU-20 (Former PI4) DATE: 11/17/2011

Weather: 90's Calm, Mostly Cloudy

Sample Team: Charlote Cisneros/BAO
Kenji Butler/VBO

Total Depth: 53.00 FT.(BTOC) Measured

Depth to Water: (-) 36.87 FT.(BTOC) Measured

Water Column(h): (=) 16.13 FT. _____ IN.

Water Volume in Well _____ GAL

Pump Depth: 48.00 FT.(BTOC) Measured

Purge Device/Equip: Monsoon Pum[p

'Measuring Device/Equipment: YSI

Date and Time On Well: 11/17/11 0720

Pump Start Date and Time: 11/17/11 0734

Pump Finish Date and Time: 11/17/11 0845

Date and Time Off Well: 11/17/11 0850

Air Monitoring Readings: 0.0 ppm

Total Purge Volume: 1.5 **GAL.**

SAMPLE INFORMATION

Sample ID: VEP4-GW06-1111

Parameters Colleced for: SW846, 8260C

Sample Date/Time: 11/17/11 0825

Field Dup: YES/NO ID: _____

Parameters Colleced for: (FD)

FD Sample Date/Time:

MS/MSD: YES / NO

Sample Appearance: CLEAR/ODORLESS

Were samples filtered? YES / NO (circle one)

Field Test Kit Details: Mn=0.0ppm, Fe^{2+} = 0.0ppm, Total Fe = 0.0ppm

If YES, Which samples? _____

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
745	0.00	37.12	150	27	3439	1.79	21.5	1.67	7.06	207.2	14.4	CLEAR/NONE
750	0.20	37.08	150	27.2	3434	1.79	14.1	1.11	6.84	205.5	17.9	CLEAR/NONE
755	0.40	37.08	150	27.5	3422	1.79	14.5	1.14	6.83	203.3	11.1	CLEAR/NONE
800	0.60	37.08	150	27.9	3418	1.79	13.4	1.05	6.82	201.2	7.37	CLEAR/NONE
805	0.80	37.11	150	28.2	3427	1.79	13.1	1.00	6.83	198.2	6.79	CLEAR/NONE
810	0.90	37.09	150	28.3	3438	1.79	12.2	0.93	6.83	193.4	5.72	CLEAR/NONE
815	1.00	37.08	150	28.2	3461	1.80	11.2	0.86	6.83	191.2	5.70	CLEAR/NONE
820	1.25	37.09	150	28.0	3454	1.80	11.2	0.86	6.83	189.6	3.86	CLEAR/NONE
825	Collect sample VEP4-GW06-1111 with MS/MSD											

Signature: C. Cisneros Date: 11/17/2011

CH2MHILL	PROJECT NUMBER 404422.FI.FK.47	WELL NUMBER EPI04-MW07	SHEET 1 OF 1

GROUNDWATER SAMPLING DATA SHEET

PROJECT : PI-4 Supplimental Expanded Site Inspection, VNTR Vieques Puerto Rico LOCATION : SMWU-20 (Former PI4) DATE: 11/17/11

Weather: 90's, mostly clear, calm

Sample Team: C. Cisneros/BAO
K. Butler/VBO

Total Depth: 42.49 FT.(BTOC) Measured

Depth to Water: (-) 27.03 FT.(BTOC) Measured

Water Column(h): (=) 15.46 FT. _____ IN.

Water Volume in Well _____ GAL

Pump Depth: 37.49 FT.(BTOC) Measured

Purge Device/Equip: Monsoon Pump

'Measuring Device/Equipment: YSI

Date and Time On Well: 11/17/11 0930

Pump Start Date and Time: 11/17/11 0948

Pump Finish Date and Time: 11/17/11 1110

Date and Time Off Well: 11/17/11 1115

Air Monitoring Readings: 0.0 ppm

Total Purge Volume: _____ **GAL.**

SAMPLE INFORMATION

Sample ID: VEP04-GW07-1111

Parameters Colleced for: SW846. 8260c

Sample Date/Time: 11/17/11 1055

Field Dup: YES/NO ID: _____

Parameters Colleced for: (FD)

FD Sample Date/Time:

MS/MSD: YES / NO

Sample Appearance: CLEAR, ODORLESS

Were samples filtered? YES / NO (circle one)

Field Test Kit Details: Mn=0.6ppm, Fe^{2+} = 0.0ppm, Total Fe = 0.0ppm

If YES, Which samples? _____

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1010	0.00	27.13	150	28.0	10195	5.74	28.1	2.12	6.69	179.7	38.9	Clear/odorless
1015	0.25	27.15	200	28.4	10716	6.03	20.3	1.47	6.69	164.4	39.1	Clear/odorless
1020	0.50	27.15	200	28.7	10650	5.99	17.3	1.26	6.59	156.8	31.4	Clear/odorless
1025	0.75	27.16	200	28.8	10549	5.93	17.6	1.22	6.59	152.1	23.0	Clear/odorless
1030	1.00	27.18	200	28.8	10473	5.88	6.0	0.45	6.59	150.7	12.9	Clear/odorless
1035	1.25	27.13	200	29.0	10380	5.83	6.3	0.46	6.69	150.2	8.29	Clear/odorless
1040	1.50	27.13	200	28.7	10464	5.85	6.8	0.51	6.69	150.9	7.46	Clear/odorless
1015	1.75	27.13	200	28.6	10492	5.88	7.2	0.54	6.69	151.4	7.41	Clear/odorless
1050	2.00	27.13	200	28.8	10435	5.96	7.8	0.54	6.69	152.3	4.23	Clear/odorless
1055	Collect VEP4-GW07-1111											

Signature: C. Cisneros Date: 11/17/2011

CH2MHILL	PROJECT NUMBER 404422.FI.FK.47	WELL NUMBER EPI04-MW08	SHEET 1 OF 1

GROUNDWATER SAMPLING DATA SHEET

PROJECT : PI-4 Supplimental Expanded Site Inspection, VNTR Vieques Puerto Rico LOCATION : SMWU-20 (Former PI4) DATE: 11/15/11

Weather: Partly cloudy, mid 80's, wind from the SE

Sample Team: K. Butler

Total Depth: 46.85 FT.(BTOC) Measured

Depth to Water: (-) 32.20 FT.(BTOC) Measured

Water Column(h): (=) 14.65 FT. _____ IN.

Water Volume in Well _____ GAL

Pump Depth: 41.85 FT.(BTOC) Measured

Purge Device/Equip: Monsoon Pump

'Measuring Device/Equipment: YSI Pro Plus/LaMotte 2020c

Date and Time On Well: 11/15/11 0640

Pump Start Date and Time: 11/15/11 0715

Pump Finish Date and Time: 11/15/11 0910

Date and Time Off Well: 11/15/11 0925

Air Monitoring Readings: 0.0 ppm

Total Purge Volume: 6.25 **GAL.**

SAMPLE INFORMATION

Sample ID: VEP04-GW08-1111

Parameters Colleced for: Select VOC's

Sample Date/Time: 11/15/11 0900

Field Dup: YES/NO ID: _____

Parameters Colleced for: (FD)

FD Sample Date/Time:

MS/MSD: YES / NO

Sample Appearance:

Were samples filtered? YES / NO (circle one)

Field Test Kit Details: Mn=0.0ppm, Fe^{2+} = 0.0ppm, Total Fe = 0.0ppm

If YES, Which samples? _____

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
720	0.00	32.29	215	28.1	6172	2.58	175.2	15.21	6.79	241.7	--	Brown
725	0.25	32.29	215	28.1	4852	2.58	138.6	10.66	6.76	221.0	--	
730	0.50	32.29	215	28.1	4843	2.58	93.9	7.10	6.77	219.3	318	
735	0.80	32.29	215	28.4	4834	2.57	15.6	1.18	6.76	212.7	176	Clear
740	1.10	32.29	215	28.5	4842	2.58	13.3	1.00	6.77	208.0	106.4	
745	1.35	32.29	215	28.6	4850	2.58	12.1	0.93	6.77	203.6	75.9	
750	1.65	32.29	215	28.7	4860	2.59	11.2	0.85	6.77	197.8	52.1	
755	1.95	32.29	215	28.7	4874	2.59	10.4	0.78	6.77	191.7	27.9	
500	2.25	32.29	215	28.8	4883	2.60	10.2	0.77	6.77	186.7	27.0	
505	2.55	32.29	215	28.8	4943	2.63	9.3	0.71	6.76	174.3	24.9	
510	2.75	32.29	215	28.9	4952	2.64	9.2	0.70	6.76	169.1	20.8	
815	3.00	32.29	215	29.1	4986	2.66	9.1	0.67	6.76	156.5	15.5	
820	3.25	32.29	215	29.1	5004	2.67	8.5	0.66	6.76	150.3	13.4	
825	3.50	32.29	215	29.2	5047	2.69	8.1	0.62	6.76	135.7	11.5	
530	3.15	32.29	215	29.1	5086	2.71	8.2	0.63	6.76	125.7	10.75	
835	4.00	32.29	215	29.2	5140	2.74	7.6	0.58	6.76	115.4	8.28	
835	4.25	32.30	215	29.2	5180	2.76	7.8	0.57	6.76	109.4	8.69	
840	4.50	32.30	215	29.2	5256	2.81	7.0	0.55	6.75	98.4	8.73	
845	4.75	32.30	215	29.1	5350	2.85	7.7	0.58	6.75	90.1	7.89	
850	5.00	32.30	215	29.1	5339	2.85	7.5	0.57	6.75	89.7	7.65	
855	5.25	32.30	215	29.1	5357	2.86	7.5	0.57	6.75	86.5	7.51	

Signature: Kenji Butler

Date: 11/15/2011

CH2MHILL	PROJECT NUMBER 404422.FI.FK.47	WELL NUMBER EPI04-MW09	SHEET 1 OF 1

GROUNDWATER SAMPLING DATA SHEET

PROJECT : PI-4 Supplimental Expanded Site Inspection, VNTR Vieques Puerto Rico LOCATION : SMWU-20 (Former PI4) DATE: 11/18/11

Weather: 90's mostly clear, chance of rain

Sample Team: C. Cisneros
K. Butler

Total Depth: 42.80 FT.(BTOC) Measured

Depth to Water: (-) 31.16 FT.(BTOC) Measured

Water Column(h): (=) 11.64 FT. _____ IN.

Water Volume in Well _____ GAL

Pump Depth: 37.80 FT.(BTOC) Measured

Purge Device/Equip: Monsoon Pump

'Measuring Device/Equipment: YSI

Date and Time On Well: 11/18/11 0700

Pump Start Date and Time: 11/18/11 0715

Pump Finish Date and Time: 11/18/2011

Date and Time Off Well: 11/18/2011

Air Monitoring Readings: 0.0 ppm

Total Purge Volume: _____ **GAL.**

SAMPLE INFORMATION

Sample ID: VEP4-GW09-1111

Parameters Colleced for: 8260C

Sample Date/Time: 11/18/11 0820

Field Dup: YES/NO ID: _____

Parameters Colleced for: (FD)

FD Sample Date/Time:

MS/MSD: YES / NO

Sample Appearance: CLEAR, ODORLESS

Were samples filtered? YES / NO (circle one)

Field Test Kit Details: Mn=0.0ppm, Fe^{2+} = 0.0ppm, Total Fe = 0.0ppm

If YES, Which samples? _____

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
716	0.00	31.22	220	27.6	9515	5.50	44.0	3.34	6.59	231.7	228	clear brown tinge
720	0.25	31.18	220	27.8	9780	5.48	41.0	3.07	6.39	221.9	197	clear, odorless
725	0.50	31.19	220	28.0	9711	5.43	41.4	3.13	6.39	218.7	126	clear, odorless
730	0.75	31.18	220	28.5	9605	5.30	41.2	2.96	6.39	242.4	57.3	clear, odorless
735	1.00	31.18	220	28.4	9466	5.28	38.6	2.93	6.39	201.6	39.4	clear, odorless
740	1.25	31.19	200	28.8	10093	5.28	40.8	3.15	6.39	194.3	22.6	clear, odorless
745	1.50	31.19	200	28.9	10143	5.26	44.0	3.27	6.39	191.8	66.6	clear, odorless
750	1.75	31.19	210	28.9	10149	5.27	43.3	3.20	6.39	190.1	10.4	clear, odorless
755	2.00	31.19	210	28.9	10152	5.27	42.2	3.18	6.39	190.1	7.35	clear, odorless
800	2.25	31.19	210	28.9	10158	5.27	42.8	3.20	6.39	189.9	5.74	clear, odorless
805	2.50	31.20	210	28.9	10185	5.29	48.8	3.67	6.45	191.0	3.61	clear, odorless
810	2.75	31.20	210	28.9	10205	5.30	47.9	3.60	6.39	191.0	2.58	clear, odorless
815	3.00	31.20	210	28.9	10208	5.30	48.2	3.61	6.39	191.1	1.60	clear, odorless
820	Collect VEP4-GW09-1111											

Signature: C. Cisneros Date: 11/18/2011

CH2MHILL	PROJECT NUMBER 404422.FI.FK.47	WELL NUMBER EPI04-MW10	SHEET 1 OF 1

GROUNDWATER SAMPLING DATA SHEET

PROJECT : PI-4 Supplimental Expanded Site Inspection, VNTR Vieques Puerto Rico LOCATION : SMWU-20 (Former PI4) DATE: 11/29/11

Weather: Partly Cloudy, High humidity, mid 80's, wind from the east

Sample Team: Kenji Butler/HNL
Stephen Brand/VBO

Total Depth: 45.12 FT.(BTOC) Measured

Depth to Water: (-) 31.91 FT.(BTOC) Measured

Water Column(h): (=) 13.21 FT. _____ IN.

Water Volume in Well _____ GAL

Pump Depth: 40.12 FT.(BTOC) Measured

Purge Device/Equip: Monsoon Pump

'Measuring Device/Equipment: YSI, Heron WLM, Lang Hack 2020e

Date and Time On Well: 11/20/11 1520

Pump Start Date and Time: 11/20/11 1552

Pump Finish Date and Time: 11/20/11 1715

Date and Time Off Well: 11/20/11 1738

Air Monitoring Readings: 0.0 ppm

Total Purge Volume: 3.5 **GAL.**

SAMPLE INFORMATION

Sample ID: VEP4-GW10-1111

Parameters Colleced for: VOC's

Sample Date/Time: 11/20/11 1707

Field Dup: YES/NO ID: _____

Parameters Colleced for: (FD)

FD Sample Date/Time:

MS/MSD: YES / NO

Sample Appearance: CLEAR

Were samples filtered? YES / NO (circle one)

Field Test Kit Details: Mn=2.4 ppm, Fe^{+2} = 0.1ppm, Total Fe = 0.2ppm

If YES, Which samples? _____

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1600	0.00	32.08	200	29.7	8944	4.96	86.2	6.33	6.73	113.1	179	
1605	0.25	32.09	200	29.6	9104	5.06	46.5	3.44	6.74	75.5	216	
1610	0.52	32.70	200	29.8	9163	5.09	35.0	2.58	6.74	61.4	154	
1615	0.75	32.09	200	30.0	9259	5.15	27.1	1.98	6.47	53.4	88.7	
1620	1.00	32.09	200	29.9	9488	5.28	16.2	1.19	6.74	45.3	46.2	
1625	1.25	32.09	200	29.9	9741	5.44	10.3	0.75	6.72	41.9	27.9	
1630	1.50	32.10	200	30.0	9987	5.59	8.2	0.6	6.71	39.9	22.6	
1635	1.75	32.11	200	30.0	10496	5.86	7.0	0.51	6.68	38.3	15.8	
1640	2.00	32.11	200	29.8	10629	6.00	6.0	0.44	6.67	37.6	13.4	Ran
1645	2.25	32.15	200	29.6	11125	6.28	5.0	0.37	6.63	37.3	8.89	Rain stopped
1650	2.50	32.14	200	29.6	11264	6.36	4.7	0.35	6.62	37.7	7.56	
1655	2.75	32.14	200	29.6	11455	6.48	4.2	0.31	6.61	37.7	5.84	
1700	3.00	32.14	200	29.6	11511	6.54	3.8	0.28	6.60	36.4	5.18	
1705	3.25	32.14	200	29.7	11658	6.59	3.4	0.25	6.59	35.2	4.44	

Signature: Kenji Butler Date: 11/29/2011

CH2MHILL	PROJECT NUMBER 404422.FI.FK.47	WELL NUMBER EPI04-MW11	SHEET 1 OF 1

GROUNDWATER SAMPLING DATA SHEET

PROJECT : PI-4 Supplimental Expanded Site Inspection, VNTR Vieques Puerto Rico LOCATION : SMWU-20 (Former PI4) DATE: 11/21/11

Weather: Partly cloudy, mid 80's, some drissle, wind from the east
humid

Sample Team: Kenji Butler/HNL
Stephen Brand/VBO

Total Depth: 47.03 FT.(BTOC) Measured

Depth to Water: (-) 32.25 FT.(BTOC) Measured

Water Column(h): (=) 14.78 FT. _____ IN.

Water Volume in Well _____ GAL

Pump Depth: 42.00 FT.(BTOC) Measured

Purge Device/Equip: Monsoon Pump

'Measuring Device/Equipment: YSI

Date and Time On Well: 11/21/11 0705

Pump Start Date and Time: 11/21/11 0741

Pump Finish Date and Time: 11/21/11 0935

Date and Time Off Well: 11/21/2011

Air Monitoring Readings: 0.0 ppm

Total Purge Volume: 5.25 **GAL.**

SAMPLE INFORMATION

Sample ID: VEP4-GW11-1111

Parameters Colleced for: Select VOC's

Sample Date/Time: 11/21/11 0930

Field Dup: YES/NO ID: _____

Parameters Colleced for: (FD)

FD Sample Date/Time:

MS/MSD: YES / NO

Sample Appearance:

Were samples filtered? YES / NO (circle one)

Field Test Kit Details: Mn=1.2 ppm, Fe^{2+} = 0.0ppm, Total Fe = 0.0ppm

If YES, Which samples?

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
748	0.00	32.44	200	29.3	8824	4.89	38.6	2.86	6.62	218.0	432	
753	0.25	32.45	200	29.4	8873	4.42	24.4	1.82	6.61	206.2	151	
758	0.50	32.45	200	29.5	8887	4.95	21.8	1.61	6.61	193.9	145	
803	0.75	32.44	200	29.8	8881	4.92	20.0	1.47	6.61	183.0	135	
808	1.00	32.45	200	29.9	8888	4.92	19.1	1.47	6.60	171.0	104.9	
813	1.25	32.45	200	30.1	8881	4.92	18.1	1.32	6.60	161.5	71.0	
818	1.50	32.44	200	30.2	8886	4.92	17.3	1.27	6.60	149.5	58.1	
823	1.75	32.45	200	30.2	8901	4.93	16.3	1.19	6.59	138.3	16.9	
828	2.00	32.45	200	30.2	8930	4.95	14.9	1.09	6.59	127.0	38.1	
833	2.25	32.43	200	30.1	8939	4.95	13.4	0.98	6.59	117.5	34.5	
838	2.50	32.45	200	30.2	8965	4.97	11.3	0.83	6.58	109.5	32.9	
843	2.75	32.44	200	30.1	9000	4.99	9.9	0.73	6.58	101.0	29.6	
848	3.00	32.44	200	30.1	9034	5.01	9.9	0.73	6.58	100.9	33.3	Taken out of line
853	3.25	32.44	200	30.2	9054	5.02	9.3	0.68	6.58	96.1	20.0	
858	3.50	32.45	200	30.4	9056	5.02	8.6	0.63	6.57	91.9	20.8	
903	3.75	32.43	200	30.3	9097	5.05	7.9	0.58	6.57	89.3	19.2	
908	4.00	32.43	200	30.5	9122	5.06	6.9	0.51	6.57	83.7	15.0	
913	4.25	32.45	200	30.4	9142	5.07	6.4	0.47	6.57	74.2	15.7	
918	4.50	32.44	200	30.5	9170	5.09	6.2	0.45	6.57	76.0	13.4	
923	4.75	32.44	200	30.6	9790	5.10	6.1	0.44	6.57	74.4	11.3	
928	5.00	32.44	200	30.5	9221	5.11	6.1	0.44	6.57	72.4	8.91	Purge complete

Signature: Kenji Butler Date: 11/21/2011

CH2MHILL	PROJECT NUMBER 404422.FI.FK.47	WELL NUMBER EPI04-MW12	SHEET 1 OF 1

GROUNDWATER SAMPLING DATA SHEET

PROJECT : PI-4 Supplimental Expanded Site Inspection, VNTR Vieques Puerto Rico LOCATION : SMWU-20 (Former PI4) DATE: 11/21/11

Weather: Partly cloudy, mid to high 80's, wind from the east, humid

Sample Team: Kenji Butler/HNL
Stephen Brand/VBO

Total Depth: 47.13 FT.(BTOC) Measured

Depth to Water: (-) 32.20 FT.(BTOC) Measured

Water Column(h): (=) 14.93 FT. _____ IN.

Water Volume in Well _____ GAL

Pump Depth: 42.00 FT.(BTOC) Measured

Purge Device/Equip: Monsoon pump

'Measuring Device/Equipment:

Date and Time On Well: 11/21/11 1003

Pump Start Date and Time: 11/21/11 1016

Pump Finish Date and Time: 11/21/2011

Date and Time Off Well: 11/21/2011

Air Monitoring Readings: 0.0 ppm

Total Purge Volume: _____ **GAL.**

SAMPLE INFORMATION

Sample ID: VEP04-GW12-1111

Parameters Colleced for: Select VOC's

Sample Date/Time: 11/21/11 1155

Field Dup: YES/NO ID:

Parameters Colleced for: (FD)

FD Sample Date/Time:

MS/MSD: YES / NO

Sample Appearance: Clear

Were samples filtered? YES / NO (circle one)

Field Test Kit Details: Mn=1.0ppm, Fe^{2+} = 0.0ppm, Total Fe = 0.1ppm

If YES, Which samples?

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1016	0.00	Pump on										
1020	0.25	33.36	200	30.0	5359	2.86	52.2	3.66	6.83	59.7	1163	
1025	0.50	32.37	200	29.5	5347	2.86	37.2	2.46	6.75	54.2	1408	
1030	0.75	32.35		30.0	5344	2.86	27.8	1.84	6.74	52.8	1153	
1035	1.00		200									
1040	1.25	32.39	200	30.3	5341	2.58	12.9	0.91	6.73	46.1	1206	
1045	1.50	32.38		30.5	5343	2.85	12.0	0.88	6.73	45.2	548	
1050	1.75	32.38	200	30.5	5345	2.85	10.7	0.79	6.73	42.8	289	
1055	2.00	32.37	200	30.7	5351	2.86	10.4	0.77	6.73	40.3	200	
1100	2.25	32.37	200	30.3	5357	2.86	10.8	0.8	6.73	38.5	142	
1105	2.50	32.36	200	30.9	5364	2.86	10.2	0.75	6.73	35.9	86.3	
1110	2.75	32.38	200	30.6	5365	2.87	10.7	0.78	6.73	33.7	56.3	
1115	3.00	32.42	200	30.5	5379	2.87	9.0	0.65	6.73	33.6	46.7	
1120	3.25	32.41	200	30.4	5396	2.88	8.4	0.62	6.72	33.4	39.5	
1125	3.50	32.39	200	30.5	5410	2.89	7.4	0.54	6.72	32.7	24.9	
1130	3.75	32.37	200	30.6	5718	2.90	7.5	0.56	6.72	29.3	21.7	
1135	4.00	32.37	200	30.7	5422	2.90	8.1	0.59	6.72	28.2	14.7	
1140	4.25	32.37	200	30.8	5427	2.90	7.4	0.54	6.73	18.2	14.8	
1145	4.50	32.39	200	30.7	5733	2.90	7.9	0.56	6.73	15.9	13.6	
1150	4.75	32.38	200	30.8	5449	2.91	7.3	0.53	6.74	12.2	10.22	Purge complete

Signature: Kenji Butler Date: 11/21/2011

CH2MHILL	PROJECT NUMBER 404422.FI.FK.47	WELL NUMBER EPI04-MW13	SHEET 1 OF 1

GROUNDWATER SAMPLING DATA SHEET

PROJECT : PI-4 Supplimental Expanded Site Inspection, VNTR Vieques Puerto Rico LOCATION : SMWU-20 (Former PI4) DATE: 12/7/11

Weather: Partly Cloudy, 78 F, Strong breeze

Sample Team: Kenji Butler/HNL
L. Hill/MGM

Total Depth: 47.25 FT.(BTOC) Measured

Depth to Water: (-) 32.63 FT.(BTOC) Measured

Water Column(h): (=) 14.62 FT. _____ IN.

Water Volume in Well _____ GAL

Pump Depth: 42.25 FT.(BTOC) Measured

Purge Device/Equip: Monsoon Pump

'Measuring Device/Equipment: YSI Pro Plus/LeMont 2020e

Date and Time On Well: 12/7/11 0620

Pump Start Date and Time: 12/7/11 0655

Pump Finish Date and Time: 12/7/11 0840

Date and Time Off Well: 12/7/11 0850

Air Monitoring Readings: 0.0 ppm

Total Purge Volume: 2.25 **GAL.**

SAMPLE INFORMATION

Sample ID: VEP4-GW13-1211

Parameters Colleced for: Select VOCs

Sample Date/Time: 12/7/11 0825

Field Dup: YES/NO ID: _____

Parameters Colleced for: (FD)

FD Sample Date/Time:

MS/MSD: YES / NO

Sample Appearance: Clear

Were samples filtered? YES / NO (circle one)

Field Test Kit Details: Mn=0.0ppm, Fe^{2+} = 0.0ppm, Total Fe = 0.2ppm

If YES, Which samples? _____

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
708	0.00	32.83	100	27.6	5849	3.16	2.14	2.08	6.39	140.6	155	Slightly Cloudy
710	0.13	32.83	100	27.8	5907	3.19	26.2	2.02	6.36	135.1	190	
715	0.25	32.82	100	28.2	5920	3.19	27.5	2.10	6.36	130.3	215	
720	0.50	32.83	100	28.5	5905	3.18	24.5	1.85	6.36	126.6	180	
725	0.75	32.83	100	28.7	5892	3.17	23.3	1.77	6.37	123.2	145	
730	0.88	32.82	100	28.8	5880	3.17	23.3	1.76	6.37	120.6	136	
735	1.00	32.82	100	28.7	5866	3.16	21.3	1.61	6.37	117.9	117	
740	1.13	32.82	100	28.4	5852	3.15	21.0	1.60	6.37	116.0	96.4	
745	1.25	32.82	100	28.6	5842	3.15	21.7	1.65	6.37	113.8	64.1	
750	1.32	32.82	100	28.8	5849	3.15	21.0	1.59	6.37	111.9	55.6	
755	1.38	32.82	100	29.0	5852	3.15	20.5	1.55	6.37	110.1	43.5	
800	1.42	32.82	100	29.0	5850	3.15	19.9	1.50	6.37	108.2	36.0	
805	1.50	32.82	100	29.1	5854	3.15	19.9	1.52	6.37	106.5	31.5	
810	1.60	32.82	100	29.2	5859	3.15	19.7	1.48	6.37	104.7	20.9	Clear
815	1.70	32.82	100	29.0	5868	3.16	18.6	1.41	6.37	103.0	20.9	
820	1.75	32.82	100	28.8	5867	3.16	18.9	1.43	6.37	101.9	20.1	

Signature: Kenji Butler Date: 12/7/2011

CH2MHILL	PROJECT NUMBER 404422.FI.FK.47	WELL NUMBER EPI04-MW14	SHEET 1 OF 1

GROUNDWATER SAMPLING DATA SHEET

PROJECT : PI-4 Supplimental Expanded Site Inspection, VNTR Vieques Puerto Rico LOCATION : SMWU-20 (Former PI4) DATE: 12/07/11

Weather: Partly Cloudy, Mid 80's, Humid,

Sample Team: K. Butler/HNL
L. Hill/MGM

Total Depth: 44.78 FT.(BTOC) Measured

Depth to Water: (-) 30.25 FT.(BTOC) Measured

Water Column(h): (=) 14.53 FT. _____ IN.

Water Volume in Well _____ GAL

Pump Depth: 39.78 FT.(BTOC) Measured

Purge Device/Equip: Monsoon Pump

'Measuring Device/Equipment: YSI/LeMottle 2720c

Date and Time On Well: 12/07/11 0900

Pump Start Date and Time: 12/07/11 0915

Pump Finish Date and Time: 12/07/11 1058

Date and Time Off Well: 12/07/11 1108

Air Monitoring Readings: 0.0 ppm

Total Purge Volume: 5.00 **GAL.**

SAMPLE INFORMATION

Sample ID: VEP04-GW14-1211

Parameters Colleced for: VOC's

Sample Date/Time: 12/07/11 1038

Field Dup: YES/NO ID: _____

Parameters Colleced for: (FD)

FD Sample Date/Time:

MS/MSD: YES / NO

Sample Appearance: Clear

Were samples filtered? YES / NO (circle one)

Field Test Kit Details: Mn=0.6ppm, Fe^{2+} = 0.0ppm, Total Fe = 0.1ppm

If YES, Which samples? _____

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
918	0.00	30.30	125	28.8	10021	5.63	15.2	1.10	6.52	111.4	167	
923	0.25	30.30	200	29.1	10203	5.72	9.8	0.70	6.31	94.4	778	Brown/Cloudy
928	0.50	30.29	200	29.4	10043	5.64	11.0	0.81	6.26	90.4	1342	
933	0.60	30.30	200	29.6	9989	5.58	9.9	0.73	6.25	87.7	1267	
938	0.70	30.30	200	29.7	9881	5.52	7.4	0.55	6.24	84.4	1143	
943	1.15	30.30	200	30.3	9712	5.41	5.5	0.39	6.23	79.9	705	
948	1.50	30.30	200	30.3	9637	5.39	6.7	0.47	6.22	75.3	466	
953	1.75	30.31	200	30.1	9638	5.37	5.4	0.39	6.22	70.5	328	
958	2.00	30.31	200	30.5	9621	5.36	3.9	0.28	6.21	64.3	185	
1003	2.40	30.31	200	30.5	9620	5.36	3.5	0.25	6.21	59.4	105.3	
1008	2.75	30.32	200	30.4	9612	5.35	3.3	0.25	6.20	55.7	84.9	
1013	3.00	30.32	200	30.5	9617	5.36	3.0	0.22	6.20	52.6	54.0	
1018	3.25	30.32	200	30.5	9617	5.36	2.7	0.20	6.20	49.6	40.4	
1023	3.75	30.32	200	30.5	9630	5.36	2.7	0.17	6.20	46.2	39.8	
1028	4.00	30.31	200	30.4	9634	5.37	2.5	0.18	6.20	43.5	34.7	
1033	4.50	30.31	200	30.4	9622	5.36	2.3	0.16	6.20	41.9	28.5	
1038	4.75	30.30	200	30.6	9629	5.36	2.3	0.16	6.20	40.0	27.5	Clear
1043	5.00	30.30	200	30.6	9637	5.36	2.3	0.17	6.20	37.4	25.6	
1048		Sampled										

Signature: Kenji Butler Date: 12/7/2011

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW01	SHEET 1 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/14/13

Weather:	Sunny, Cloudy, Hot, Humid	Sample Team:	Troy Horn, Maria Danois
Total Depth:	52.70 FT.(BTOC) Measured		
Depth to Water: (-)	36.40 FT.(BTOC) Measured	Date and Time On Well:	05/14/13 0734
Water Column(h): (=)	16.30 FT.	Pump Start Date and Time:	05/14/13 0840
Water Volume in Well	2.65 GAL.	Pump Finish Date and Time:	05/14/13 0943
Pump Depth:	47.0 FT.(BTOC) Measured	Date and Time Off Well:	05/14/13 1012
Purge Device/Equip:	Monsoon Pump	Air Monitoring Readings:	0.0 ppm
'Measuring Device/Equipment:	YSI 556 MPS, Hach 2100Q	**Total Purge Volume:**	**3.70 GAL.**

SAMPLE INFORMATION

Sample ID:	VEP4-GW01-0513	Parameters Collected for:	Select VOCs and Select SVOCs
Sample Date/Time:	05/14/13 0935		
Field Dup: YES/NO ID:	NO	Parameters Collected for:	(FD) N/A
FD Sample Date/Time:	N/A		
MS/MSD: YES / NO	NO	Sample Appearance:	Clear
Were samples filtered?	NO	Field Test Kit Details:	Mn= 0.0; Fe= 0.0; Fe 2+= 0.0 (mg/L)
If YES, Which samples?	N/A		

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0850	0.60	36.53	150	28.96	2341	--	42.6	3.23	6.98	177.5	22.3	
0855	0.80	36.53	150	29.18	2342	--	35.0	2.66	6.97	174.4	13.9	
0900	1.20	36.53	150	29.32	2340	--	31.5	2.40	6.97	172.6	8.22	
0905	1.50	36.56	150	29.32	2335	--	27.7	2.10	6.97	170.1	4.99	
0910	2.00	36.63	150	29.27	2322	--	25.2	1.90	6.97	166.8	3.74	
0915	2.50	36.63	150	29.47	2312	--	24.4	1.76	6.98	165.6	1.85	
0920	2.70	36.63	150	29.61	2310	--	21.6	1.63	6.98	165.5	1.76	
0925	3.20	36.63	150	29.73	2305	--	20.9	1.58	6.98	163.4	1.64	
0930	3.70	36.63	150	29.18	2304	--	19.6	1.49	6.97	162.7	1.38	

Signature: Troy Horn, Maria Danois Date: 05/14/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW01	SHEET 2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 05/14/13

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Troy Horn, Maria Danois Date: 05/14/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW02	SHEET 1 OF 2

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/16/13

Weather:	Very Humid, Sunny	Sample Team:	Troy Horn, Maria Danois
Total Depth:	48.85 FT.(BTOC) Measured		
Depth to Water: (-)	40.08 FT.(BTOC) Measured	Date and Time On Well:	05/16/13 1018
Water Column(h): (=)	8.77 FT.	Pump Start Date and Time:	05/16/13 1032
Water Volume in Well	1.43 GAL.	Pump Finish Date and Time:	05/16/13 1145
Pump Depth:	45.0 FT.(BTOC) Measured	Date and Time Off Well:	05/16/13 1153
Purge Device/Equip:	Monsoon Pump	Air Monitoring Readings:	0.0 ppm
'Measuring Device/Equipment:	YSI 556 MPS/ Hach 2100Q	**Total Purge Volume:**	**3.00 GAL.**

SAMPLE INFORMATION

Sample ID:	VEP4-GW02-0513	Parameters Collected for:	Select VOCs and Select SVOCs
Sample Date/Time:	05/16/13 1130		
Field Dup: YES/NO ID:	NO	Parameters Collected for:	(FD) N/A
FD Sample Date/Time:	N/A		
MS/MSD: YES / NO	NO	Sample Appearance:	Clear
Were samples filtered?	NO	Field Test Kit Details:	Mn= 0.0; Fe= 0.0; Fe 2+= 0.0 (mg/L)
If YES, Which samples?	N/A		

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1032	0.00	40.35	180	--	--	--	--	--	--	--	--	
1047	0.40	--	180	30.56	2820	--	33.5	2.49	6.77	162.7	--	
1050	0.70	40.35	180	31.20	2823	--	36.8	2.69	6.77	162.7	166	
1055	0.80	40.35	180	31.59	2840	--	30.8	2.25	6.76	161.0	106	
1100	1.10	40.35	180	31.24	2848	--	26.8	2.00	6.76	159.5	52.6	
1105	1.40	40.35	180	31.05	2843	--	23.0	1.69	6.76	159.9	30.6	
1110	1.60	40.35	180	31.36	2846	--	22.7	1.66	6.77	160.5	24.0	
1115	1.75	40.35	180	31.23	2852	--	21.4	1.57	6.77	159.2	14.5	
1120	2.10	40.35	180	30.46	2850	--	20.4	1.51	6.76	157.7	10.0	
1125	2.45	40.35	180	30.56	2848	--	18.9	1.40	6.76	158.5	7.14	
1130	2.60	40.35	180	30.54	2846	--	18.8	1.38	6.76	158.5	5.36	

Signature: Troy Horn, Maria Danois Date: 05/16/13

CH2MHILL	PROJECT NUMBER 433191.FI.FK.20	WELL NUMBER EPI04-MW02	SHEET 2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 05/16/13

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Troy Horn, Maria Danois Date: 05/16/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW03	SHEET 1 OF 3

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/16/13

Weather:	Partly Cloudy, humid, 80° F	Sample Team:	Troy Horn
			Maria Danois
Total Depth:	50.32 FT.(BTOC) Measured		
Depth to Water: (-)	43.00 FT.(BTOC) Measured	Date and Time On Well:	05/16/13 0707
Water Column(h): (=)	7.32 FT.	Pump Start Date and Time:	05/16/13 0733
Water Volume in Well	1.19 GAL.	Pump Finish Date and Time:	05/16/13 0950
Pump Depth:	47.5 FT.(BTOC) Measured	Date and Time Off Well:	05/16/13 1000
Purge Device/Equip:	Monsoon Pump	Air Monitoring Readings:	0.0 ppm
'Measuring Device/Equipment:	YSI 556 MPS/ Hach 2100Q	**Total Purge Volume:**	**5.70 GAL.**

SAMPLE INFORMATION

Sample ID:	VEP4-GW03-0513	Parameters Collected for:	Select VOCs and Select SVOCs
Sample Date/Time:	05/16/13 0935		
Field Dup: YES/NO ID:	NO	Parameters Collected for:	(FD) N/A
FD Sample Date/Time:	N/A		
MS/MSD: YES / NO	NO	Sample Appearance:	Clear
Were samples filtered?	NO	Field Test Kit Details:	Mn= 0.0; Fe= 0.0; Fe 2+= 0.0 (mg/L)
If YES, Which samples?	N/A		

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0733	0.00	43.17	175	--	--	--	--	--	--	--	--	
0745	0.85	43.13	175	29.01	2627	--	31.5	2.40	6.82	63.2	> 1000	orange tint
0750	1.15	43.13	175	29.14	2623	--	29.2	2.23	6.79	69.7	766	
0755	1.40	43.13	175	29.15	2618	--	25.6	1.95	6.79	72.8	314	yellow tint
0800	1.50	43.13	175	29.22	2613	--	23.4	1.78	6.79	74.3	192	
0805	1.80	43.13	175	29.30	2611	--	22.1	1.68	6.79	74.9	90	slight yellow tint
0810	2.00	43.13	175	29.28	2610	--	19.4	1.47	6.79	75.8	54.6	
0815	2.25	43.13	200	29.39	2606	--	17.8	1.35	6.79	76.8	34.4	
0820	2.60	43.13	200	29.52	2609	--	17.4	1.32	6.79	78.0	22.7	Clear
0825	2.75	43.13	175	29.69	2600	--	16.3	1.23	6.79	79.9	18.2	Clear
0830	3.00	43.13	175	29.70	2597	--	16.0	1.21	6.80	82.2	15.6	Clear
0835	3.25	43.14	175	29.70	2593	--	14.8	1.11	6.79	84.6	12.8	Clear
0840	3.50	43.14	175	29.76	2590	--	13.9	1.05	6.80	89.0	10.9	Clear
0845	3.70	43.14	175	29.89	2583	--	13.4	1.01	6.80	91.9	145	Cloudy
0850	4.10	43.14	175	29.79	2583	--	12.1	0.91	6.79	91.3	131	Cloudy
0855	1.30	43.14	175	29.76	2582	--	11.7	0.88	6.80	92.6	89.4	Cloudy
0900	1.50	43.14	175	30.12	2578	--	11.4	0.85	6.80	96.9	47.4	
0905	4.65	43.14	175	30.08	2580	--	11.2	0.84	6.80	99.6	29.0	
0910	4.80	43.13	175	30.24	2571	--	10.8	0.81	6.80	99.9	14.1	
0915	4.95	43.13	175	30.62	2569	--	10.7	0.80	6.80	101.2	8.53	
0920	5.00	43.13	175	30.90	2566	--	10.7	0.79	6.81	104.5	7.06	Clear

Signature: Maria Danois, Troy Horn Date: 05/16/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW-03	SHEET 2 OF 3

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 05/16/13

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0925	5.25	43.13	175	31.18	2568	--	10.7	0.79	6.81	107.7	7.13	
0930	5.40	43.13	175	31.32	2566	--	10.6	0.78	6.81	109.5	6.02	
0935	5.65	43.13	175	31.53	2566	--	10.5	0.77	6.81	110.3	4.07	Clear

Signature: Troy Horn, Maria Danois Date: 05/16/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW-03	SHEET 3 OF 3

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 05/16/13

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Troy Horn, Maria Danois Date: 05/16/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW04	SHEET 1 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/20/13

Weather:	85° F and humid	Sample Team:	Michael Zamboni
			Taylor Salzburg
Total Depth:	48.00 FT.(BTOC) Measured		
Depth to Water: (-)	40.75 FT.(BTOC) Measured	Date and Time On Well:	05/20/13 0705
Water Column(h): (=)	9.25 FT.	Pump Start Date and Time:	05/20/13 0725
Water Volume in Well	3.66 GAL.	Pump Finish Date and Time:	05/20/13 0955
Pump Depth:	47.0 FT.(BTOC) Measured	Date and Time Off Well:	05/20/13 1005
Purge Device/Equip:	Monsoon Pump	Air Monitoring Readings:	0.0 ppm
'Measuring Device/Equipment:	YSI 556 MPS/ Hach 2100Q	**Total Purge Volume:**	**3.75 GAL.**

SAMPLE INFORMATION

Sample ID:	VEP4-GW04-0513	Parameters Collected for:	Select VOCs and Select SVOCs
Sample Date/Time:	05/20/13 0905		
Field Dup: YES/NO ID:	NO	Parameters Collected for:	(FD) N/A
FD Sample Date/Time:	N/A		
MS/MSD: YES / NO	NO	Sample Appearance:	Clear
Were samples filtered?	NO	Field Test Kit Details:	Mn= 0.0; Fe= 0.0; Fe 2+= 0.0 (mg/L)
If YES, Which samples?	N/A		

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
--	--	40.67	Prior to purging									
0730	0.00	41.25	Without seeing water in tubing already 3 ft drawdown									
0740	0.00	41.29	100	27.72	2721	1.40	63.2	4.93	7.07	229.0	39.8	
0745	0.25	41.18	100	28.02	2897	1.39	58.0	4.50	7.05	227.1	32.8	
0750	0.50	41.60	100	28.89	2685	1.38	53.1	4.10	7.03	227.1	25.8	
0755	0.75	41.75	100	28.51	2677	1.37	48.7	3.76	7.02	224.0	21.8	
0800	1.00	41.84	100	28.69	2672	1.37	46.3	3.54	7.02	223.5	21.1	
0805	1.25	41.95	100	28.86	2670	1.37	42.9	3.27	7.02	228.3	18.0	
0810	1.50	42.05	100	28.99	2666	1.37	40.4	3.12	7.02	235.8	14.5	
0815	1.50	42.23	100	29.14	2664	1.37	38.4	2.92	7.01	244.5	12.3	
0820	1.50	42.48	100	29.49	2662	1.36	35.6	2.70	6.99	223.6	10.7	
0825	1.50	42.72	100	29.88	2661	1.36	32.2	2.42	6.99	228.3	12.6	
0830	1.75	42.90	100	30.13	2661	1.36	29.4	2.20	6.99	231.6	10.4	
0835	2.00	42.93	90	30.22	2661	1.36	26.8	2.00	7.00	235.2	10.8	
0840	2.25	42.92	85	30.09	2659	1.36	25.9	1.94	6.98	236.4	7.67	
0845	2.50	42.86	85	30.13	2657	1.36	24.9	1.87	6.98	234.3	7.81	
0850	2.50	42.79	60	30.19	2657	1.36	24.2	1.81	6.98	231.3	5.74	
0855	2.50	42.73	60	30.21	2657	1.36	24.1	1.80	6.98	228.0	4.12	
0900	2.75	42.68	60	30.92	2666	1.37	24.3	1.83	6.98	227.1	4.66	

Signature: Mike Zamboni, Taylor Salzburg Date: 05/20/13

CH2MHILL	PROJECT NUMBER 433191.FI.FK.20	WELL NUMBER EPI04-MW04	SHEET 2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 05/20/13

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*****:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Mike Zamboni, Taylor Salzburg Date: 05/20/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW05	SHEET 1 OF 2

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/15/13

Weather:	Hot, Humid, 86 ° F	Sample Team:	Troy Horn
			Maria Danois
Total Depth:	46.40 FT.(BTOC) Measured		
Depth to Water: (-)	34.75 FT.(BTOC) Measured	Date and Time On Well:	05/15/13 0942
Water Column(h): (=)	11.65 FT.	Pump Start Date and Time:	05/15/13 1000
Water Volume in Well	1.89 GAL.	Pump Finish Date and Time:	05/15/13 1130
Pump Depth:	40.0 FT.(BTOC) Measured	Date and Time Off Well:	05/15/13 1150
Purge Device/Equip:	Monsoon Pump	Air Monitoring Readings:	0.0 ppm
'Measuring Device/Equipment:	YSI 556 MPS/ Hach 2100Q	**Total Purge Volume:**	**3.60 GAL.**

SAMPLE INFORMATION

Sample ID:	VEP4-GW05-0513	Parameters Collected for:	Select VOCs and Select SVOCs
Sample Date/Time:	05/15/13 1120		
Field Dup: YES/NO ID:	YES	Parameters Collected for:	(FD) N/A
FD Sample Date/Time:	VEP4-GW05P-0513; 05/15/13 1125		
MS/MSD: YES / NO	NO	Sample Appearance:	Clear
Were samples filtered?	NO	Field Test Kit Details:	Mn= 0.0; Fe= 0.0; Fe 2+= 0.0 (mg/L)
If YES, Which samples?	N/A		

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1012	--	34.85	150	--	--	--	--	--	--	--	--	Hazey yellow
1015	1.00	34.85	150	30.11	12950	--	24.3	1.78	6.43	70.1	169	Clearing up
1020	1.25	34.82	165	30.64	12940	--	19.2	1.38	6.44	65.7	95.3	
1025	1.45	34.82	165	30.62	12920	--	17.8	1.28	6.44	63.9	51.8	Clear
1030	1.55	34.83	150	30.62	12920	--	15.9	1.14	6.44	62.6	28.9	Clear
1035	1.75	34.83	150	30.84	12910	--	15.0	1.07	6.44	61.2	20.8	Clear
1040	2.00	34.83	150	30.93	12920	--	13.2	0.94	6.44	59.2	13.7	Clear
1045	2.25	34.83	150	31.02	12910	--	--	0.84	6.44	58.3	9.60	
1050	2.50	34.83	150	30.92	12930	--	--	0.77	6.44	56.9	9.01	
1055	2.70	34.90	150	30.92	12910	--	9.2	0.68	6.44	55.2	6.63	
1100	2.80	34.90	150	30.49	12880	--	5.9	0.43	6.43	53.4	25.2	Pump fluctuating
1105	3.05	34.85	150	30.27	12900	--	6.0	0.43	6.43	52.4	17.3	
1110	3.25	34.85	150	30.16	12900	--	6.1	0.44	6.43	52.9	6.12	
1115	3.40	34.85	150	30.42	12900	--	6.0	0.43	6.44	53.2	4.65	
1120	3.60	34.85	150	30.79	12890	--	5.8	0.41	6.44	54.9	4.85	

Signature: Troy Horn, Maria Danois Date: 05/15/13

CH2MHILL	PROJECT NUMBER 433191.FI.FK.20	WELL NUMBER EPI04-MW05	SHEET 2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 05/15/13

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Troy Horn, Maria Danois Date: 05/15/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW06	SHEET 1 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/15/13

Weather:	Sunny, humid, 84 ° F	Sample Team:	Troy Horn
			Maria Danois
Total Depth:	52.91 FT.(BTOC) Measured		
Depth to Water: (-)	39.51 FT.(BTOC) Measured	Date and Time On Well:	05/15/13 0655
Water Column(h): (=)	13.40 FT.	Pump Start Date and Time:	05/15/13 0715
Water Volume in Well	2.18 GAL.	Pump Finish Date and Time:	05/15/13 0913
Pump Depth:	47.0 FT.(BTOC) Measured	Date and Time Off Well:	05/15/13 0935
Purge Device/Equip:	Monsoon Pump	Air Monitoring Readings:	0.0 ppm
'Measuring Device/Equipment:	YSI 556 MPS/ Hach 2100Q	**Total Purge Volume:**	**5.50 GAL.**

SAMPLE INFORMATION

Sample ID:	VEP4-GW06-0513	Parameters Collected for:	Select VOCs and Select SVOCs
Sample Date/Time:	05/15/13 0905		
Field Dup: YES/NO ID:	NO	Parameters Collected for:	(FD) N/A
FD Sample Date/Time:	N/A		
MS/MSD: YES / NO	NO	Sample Appearance:	Clear
Were samples filtered?	NO	Field Test Kit Details:	Mn= 0.0; Fe= 0.0; Fe 2+= 0.0 (mg/L)
If YES, Which samples?	N/A		

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0725	0.60	39.78	190	27.94	3182	--	40.3	3.09	6.88	128.5	70.5	
0730	0.75	39.78	190	28.15	3183	--	37.6	2.89	6.88	134.8	64.5	
0735	1.00	39.78	190	28.44	3188	--	32.4	2.49	6.87	140.3	45.4	
0740	1.50	39.78	190	28.59	3190	--	30.9	2.35	6.87	144.3	44.2	
0745	1.70	39.78	190	28.96	3193	--	26.5	2.02	6.86	144.2	47.6	
0750	1.90	39.85	190	29.04	3199	--	24.4	1.86	6.86	144.8	65.7	
0755	2.40	39.85	190	29.09	3201	--	21.8	1.66	6.86	143.1	59.3	
0800	2.60	39.85	190	29.10	3202	--	20.8	1.58	6.86	144.1	49.8	
0805	2.80	39.85	190	29.17	3203	--	19.7	1.50	6.86	143.3	49.4	
0810	3.40	39.85	190	29.45	3208	--	18.5	1.40	6.86	141.7	42.8	
0815	3.50	39.85	190	29.77	3202	--	18.1	1.36	6.87	140.0	39.2	
0820	3.70	39.85	190	29.81	3204	--	17.1	1.28	6.86	136.9	43.5	
0825	3.90	39.82	180	29.94	3204	--	16.0	1.21	6.87	133.8	27.1	
0830	4.10	39.76	180	30.11	3202	--	14.9	1.10	6.87	132.7	17.6	
0835	4.30	39.76	180	30.24	3204	--	14.8	1.12	6.87	131.6	17.0	
0840	4.50	39.76	175	30.44	3206	--	14.4	1.08	6.88	130.5	14.5	
0845	4.70	39.74	175	30.47	3208	--	15.5	1.15	6.87	129.3	12.5	
0850	4.80	39.72	175	30.48	3210	--	14.5	1.08	6.87	127.7	9.33	
0855	4.90	39.72	175	30.64	3206	--	14.4	1.07	6.87	124.0	8.35	
0900	5.00	39.72	175	30.65	3206	--	14.1	1.04	6.87	122.2	8.29	
0905	5.10	39.71	175	30.83	3208	--	14.5	1.08	6.87	122.0	7.90	

Signature: Troy Horn, Maria Danois Date: 05/15/13

CH2MHILL	PROJECT NUMBER 433191.FI.FK.20	WELL NUMBER EPI04-MW06	SHEET 2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 05/15/13

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*****:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Troy Horn, Maria Danois Date: 05/15/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW07	SHEET 1 OF 2

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/17/13

Weather:	81° F, Partly Sunny	Sample Team:	Taylor Salsburg
			Troy Horn
Total Depth:	42.42 FT.(BTOC) Measured		
Depth to Water: (-)	29.82 FT.(BTOC) Measured	Date and Time On Well:	05/17/13 0740
Water Column(h): (=)	12.60 FT.	Pump Start Date and Time:	05/17/13 0805
Water Volume in Well	2.05 GAL.	Pump Finish Date and Time:	05/17/13 9300
Pump Depth:	36.0 FT.(BTOC) Measured	Date and Time Off Well:	05/17/13 0955
Purge Device/Equip:	Monsoon Pump	Air Monitoring Readings:	0.0 ppm
'Measuring Device/Equipment:	YSI 556 MPS/ Hach 2100Q	**Total Purge Volume:**	**3.75 GAL.**

SAMPLE INFORMATION

Sample ID:	VEP4-GW07-0513	Parameters Collected for:	Select VOCs and Select SVOCs
Sample Date/Time:	05/17/13 0920		
Field Dup: YES/NO ID:	NO	Parameters Collected for:	(FD) N/A
FD Sample Date/Time:	N/A		
MS/MSD: YES / NO	NO	Sample Appearance:	Clear
Were samples filtered?	NO	Field Test Kit Details:	Mn= 0.0; Fe= 0.0; Fe 2+= 0.0 (mg/L)
If YES, Which samples?	N/A		

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0805	--	29.60	190	--	--	--	--	--	--	--	--	Begin Purging
0815	0.25	29.94	190	27.97	10680	--	43.3	3.21	6.61	210.7	36.9	Clear/ No Odor
0820	0.50	29.94	190	28.35	10880	--	38.4	2.85	6.62	219.2	21.1	Clear/ No Odor
0825	0.80	29.94	190	28.56	11130	--	31.1	2.31	6.62	226.4	14.7	Clear/ No Odor
0830	1.15	29.95	190	28.67	11280	--	25.5	1.90	6.61	229.0	10.4	Clear/ No Odor
0835	1.30	29.95	190	28.76	11360	--	21.6	1.61	6.61	235.2	10.0	Clear/ No Odor
0840	1.65	29.95	190	28.79	11430	--	19.0	1.40	6.61	235.5	10.7	Clear/ No Odor
0845	1.90	29.95	190	28.79	11480	--	16.5	1.22	6.61	235.0	9.02	Clear/ No Odor
0850	2.15	29.95	190	28.80	11570	--	14.4	1.07	6.61	235.9	9.04	Clear/ No Odor
0855	2.30	29.95	190	28.82	11520	--	12.7	0.94	6.61	238.9	7.91	Clear/ No Odor
0900	2.50	29.95	190	29.04	11540	--	11.0	0.82	6.61	250.8	6.42	Clear/ No Odor
0905	2.80	29.95	190	29.17	11590	--	9.8	0.71	6.61	249.7	5.27	Clear/ No Odor
0910	3.00	29.95	190	29.14	11600	--	9.0	0.65	6.61	239.7	5.06	Clear/ No Odor
0915	3.25	29.95	190	29.13	11610	--	7.8	0.58	6.61	235.8	4.69	Clear/ No Odor
0920	3.50	29.95	190	29.07	11610	--	7.3	0.59	6.61	231.2	4.23	Clear/ No Odor

Signature: Troy Horn, Taylor Salsburg Date: 05/17/13

CH2MHILL	PROJECT NUMBER 433191.FI.FK.20	WELL NUMBER EPI04-MW07	SHEET 2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 05/17/13

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Troy Horn, Taylor Salsburg Date: 05/17/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW08	SHEET 1 OF 3

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/20/13

Weather:	85° F, Humid	Sample Team:	Michael Zamboni
			Taylor Salsburg
Total Depth:	46.80 FT.(BTOC) Measured		
Depth to Water: (-)	34.85 FT.(BTOC) Measured	Date and Time On Well:	05/20/13 1015
Water Column(h): (=)	11.95 FT.	Pump Start Date and Time:	05/20/13 1040
Water Volume in Well	1.96 GAL.	Pump Finish Date and Time:	05/20/13 1340
Pump Depth:	42.0 FT.(BTOC) Measured	Date and Time Off Well:	05/20/13 1345
Purge Device/Equip:	Monsoon Pump	Air Monitoring Readings:	0.0 ppm
'Measuring Device/Equipment:	YSI 556 MPS/ Hach 2100Q	**Total Purge Volume:**	**7.00 GAL.**

SAMPLE INFORMATION

Sample ID:	VEP4-GW08-0513	Parameters Collected for:	Select VOCs and Select SVOCs
Sample Date/Time:	05/20/13 1255		
Field Dup: YES/NO ID:	YES	Parameters Collected for:	(FD) Select VOCs and Select SVOCs
FD Sample Date/Time:	VEP4-GW08P-0513; 05/20/13 1300		
MS/MSD: YES / NO	NO	Sample Appearance:	Clear
Were samples filtered?	NO	Field Test Kit Details:	Mn= 0.0; Fe= 0.0; Fe 2+= 0.0 (mg/L)
If YES, Which samples?	N/A		

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1050	0.00	34.97	300	--	--	--	--	--	--	--	--	
1055	1.00	34.95	300	29.61	11541	6.52	14.0	1.02	6.53	180.2	426	Light Brown/ No Odor
1100	1.25	34.95	300	29.63	11243	6.34	10.3	0.76	6.56	171.1	412	Light Brown/ No Odor
1105	1.50	34.94	300	29.67	11081	6.25	8.4	0.61	6.56	166.6	412	Light Brown/ No Odor
1110	1.75	34.95	300	29.75	11014	6.21	7.0	0.52	6.56	164.0	91.5	Clear/ No Odor
1115	2.00	34.95	300	29.78	11002	6.20	6.3	0.46	6.56	165.5	64.4	Clear/ No Odor
1120	2.40	34.95	300	29.97	10975	6.18	6.3	0.46	6.57	178.2	41.0	Clear/ No Odor
1125	2.50	34.95	300	29.98	10945	6.16	5.5	0.40	6.56	171.6	39.6	Clear/ No Odor
1130	2.70	34.94	200	30.05	10932	6.15	4.7	0.34	6.55	153.7	599	Light Brown/ No Odor
1135			Flushed the flow through cell (NTU Spike)									
1140	3.25	34.95	200	30.10	10966	6.17	12.1	0.87	6.56	182.3	380	Light Brown/ No Odor
1145	3.50	34.95	200	30.12	10983	6.18	8.9	0.64	6.55	172.1	173	Clear/ No Odor
1150	3.75	34.95	200	30.54	11006	6.19	6.4	0.46	6.56	172.2	101	Clear/ No Odor
1155	4.00	34.95	200	30.17	11027	6.21	5.0	0.36	6.56	158.6	56.8	Clear/ No Odor
1200	4.25	34.95	200	30.16	11003	6.20	4.8	0.34	6.56	170.5	39.3	Clear/ No Odor
1205	4.40	34.95	200	30.31	10968	6.17	4.0	0.29	6.56	174.8	26.0	Clear/ No Odor
1210	4.60	34.95	200	30.30	10956	6.17	3.4	0.28	6.56	170.5	20.7	Clear/ No Odor
1215	4.75	34.95	200	30.46	10932	6.15	3.3	0.24	6.56	172.9	17.0	Clear/ No Odor
1220	5.00	34.95	200	30.46	10928	6.15	3.2	0.23	6.56	167.6	16.6	
1225	5.25	34.95	200	30.32	10936	6.15	3.3	0.24	6.56	160.0	12.9	
1230	5.40	34.95	200	30.52	10947	6.16	3.4	0.25	6.55	172.0	11.8	

Signature: Michael Zamboni, Taylor Salsburg Date: 05/20/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW-08	SHEET 2 OF 3

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 05/20/13

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1235	5.75	34.95	200	30.68	10969	6.17	3.1	0.23	6.55	170.3	9.88	Clear/ No Odor
1240	5.90	34.95	200	30.74	10988	6.18	3.0	0.22	6.55	167.9	9.92	Clear/ No Odor
1245	6.20	34.95	200	30.51	10984	6.18	3.0	0.22	6.55	159.3	8.89	Clear/ No Odor
1250	6.40	34.95	200	30.50	11005	6.20	3.1	0.23	6.55	158.8	7.30	Clear/ No Odor

Signature: Michael Zamboni, Taylor Salsburg Date: 05/20/13

CH2MHILL	PROJECT NUMBER 433191.FI.FK.20	WELL NUMBER EPI04-MW-08	SHEET 3 OF 3

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 05/20/13

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? **Yes**

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Michael Zamboni, Taylor Salsburg Date: 05/20/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW09	SHEET 1 OF 2

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/22/13

Weather:	85° F, humid, thunderstorms	Sample Team:	Michael Zamboni
			Maria Danois
Total Depth:	42.78 FT.(BTOC) Measured		
Depth to Water: (-)	33.88 FT.(BTOC) Measured	Date and Time On Well:	05/22/13 0635
Water Column(h): (=)	8.90 FT.	Pump Start Date and Time:	05/22/13 0700
Water Volume in Well	1.45 GAL.	Pump Finish Date and Time:	05/22/13 0910
Pump Depth:	38.0 FT.(BTOC) Measured	Date and Time Off Well:	05/22/13 0915
Purge Device/Equip:	Monsoon Pump	Air Monitoring Readings:	0.0 ppm
'Measuring Device/Equipment:	YSI 556 MPS/ Hach 2100Q	**Total Purge Volume:**	**6.00 GAL.**

SAMPLE INFORMATION

Sample ID:	VEP4-GW09-0513	Parameters Collected for:	Select VOCs and Select SVOCs
Sample Date/Time:	05/22/13 0815		
Field Dup: YES/NO ID:	NO	Parameters Collected for:	(FD) N/A
FD Sample Date/Time:	N/A		
MS/MSD: YES / NO	NO	Sample Appearance:	Clear
Were samples filtered?	NO	Field Test Kit Details:	Mn= 0.0; Fe= 2.0; Fe 2+= 0.2 (mg/L)
If YES, Which samples?	N/A		

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0715	0.75	33.92	250	29.40	10877	6.12	18.3	1.35	6.48	182.8	32.4	
0720	1.00	33.93	250	29.51	10600	5.96	12.5	0.92	6.48	177.8	13.8	
0725	1.30	33.93	250	29.57	10438	5.86	9.4	0.64	6.49	172.5	6.73	
0730	1.70	33.93	250	29.57	10331	5.79	7.4	0.54	6.49	169.0	3.51	
0735	2.00	33.93	250	29.57	10262	5.75	6.1	0.45	6.49	164.0	1.85	
0740	2.30	33.93	250	29.56	10243	5.74	5.5	0.40	6.50	162.6	1.51	
0745	2.70	33.93	250	29.65	10222	5.73	5.1	0.37	6.50	162.2	1.04	
0750	3.00	33.93	250	29.74	10208	5.72	4.7	0.37	6.50	163.6	1.04	
0755	3.30	33.93	250	29.84	10195	5.71	4.5	0.32	6.50	164.1	0.90	
0800	3.60	33.93	250	29.87	10187	5.70	4.2	0.31	6.50	163.5	0.83	
0805	3.90	33.93	250	29.93	10184	5.70	3.9	0.28	6.50	165.4	0.68	
0810	4.20	33.93	250	29.97	10182	5.70	3.7	0.28	6.50	167.5	0.65	

Signature: Michael Zamboni, Maria Danois Date: 05/22/13

CH2MHILL	PROJECT NUMBER 433191.FI.FK.20	WELL NUMBER EPI04-MW09	SHEET 2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 05/22/13

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Michael Zamboni, Maria Danois Date: 05/22/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW10	SHEET 1 OF 3

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/21/13

Weather:	85° F, Humid, Possible thunderstorms	Sample Team:	Michael Zamboni
			Maria Danois
Total Depth:	44.60 FT.(BTOC) Measured		
Depth to Water: (-)	34.58 FT.(BTOC) Measured	Date and Time On Well:	05/21/13 0700
Water Column(h): (=)	10.02 FT.	Pump Start Date and Time:	05/21/13 0720
Water Volume in Well	1.62 GAL.	Pump Finish Date and Time:	05/21/13 1040
Pump Depth:	39.0 FT.(BTOC) Measured	Date and Time Off Well:	05/21/13 1045
Purge Device/Equip:	Monsoon Pump	Air Monitoring Readings:	0.0 ppm
'Measuring Device/Equipment:	YSI 556 MPS/ Hach 2100Q	**Total Purge Volume:**	**7 GAL.**

SAMPLE INFORMATION

Sample ID:	VEP4-GW10-0513	Parameters Collected for:	Select VOCs and Select SVOCs
Sample Date/Time:	05/21/13 1015		
Field Dup: YES/NO ID:	NO	Parameters Collected for:	(FD) N/A
FD Sample Date/Time:	N/A		
MS/MSD: YES / NO	NO	Sample Appearance:	Clear
Were samples filtered?	NO	Field Test Kit Details:	Mn= 0.0; Fe= 0.0; Fe 2+= 0.0 (mg/L)
If YES, Which samples?	N/A		

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0720	Exceed 0.3' drawdown limit before seeing groundwater in tubing at ground surface. Purging as slowly as possible.											
0720	--	34.84	180	--	--	--	--	--	--	--	--	
0735	0.20	34.87	180	28.55	16640	--	56.3	4.11	6.43	220.0	>1000	
0740	0.40	34.87	180	28.92	16428	--	51.1	3.72	6.43	221.5	>1000	
0745	0.65	34.88	180	29.17	16409	--	42.3	3.07	6.43	211.0	891	
0750	0.75	34.89	180	29.39	16366	--	37.7	2.73	6.44	202.5	543	
0755	1.00	34.89	180	29.55	16310	--	33.7	2.43	6.44	193.6	293	
0800	1.25	34.89	180	29.72	16276	--	30.8	2.22	6.45	186.0	168	
0805	1.40	34.89	180	29.84	16267	--	27.9	2.01	6.44	179.4	105	
0810	1.60	34.90	180	29.89	16272	--	26.1	1.88	6.44	174.3	68.2	
0815	1.75	34.90	180	29.90	16316	--	24.1	1.73	6.43	170.1	53.9	
0820	2.00	34.90	180	29.84	16351	9.52	21.5	1.55	6.43	166.0	27.9	
0825	2.20	34.90	180	29.87	16385	9.54	19.9	1.43	6.42	162.9	31.3	
0830	2.40	34.90	180	30.04	16399	9.54	18.1	1.29	6.42	160.0	20.5	
0835	2.60	34.91	180	30.12	16419	9.56	16.4	1.17	6.42	156.5	12.3	
0840	2.75	34.91	180	30.15	16427	9.56	14.5	1.04	6.42	153.0	10.3	
0845	3.00	34.91	180	30.13	16437	9.57	13.0	0.93	6.42	150.7	7.93	
0850	3.25	34.92	180	30.14	16450	9.58	11.6	0.83	6.42	147.5	7.03	
0855	3.40	34.92	180	30.15	16465	9.58	10.5	0.75	6.41	145.3	5.65	
0900	3.60	34.92	180	30.20	16479	9.59	9.6	0.68	6.41	143.7	5.03	
0905	3.70	34.92	180	30.22	16475	9.60	8.6	0.61	6.41	140.8	6.14	

Signature: Michael Zamboni, Maria Danois Date: 05/21/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW-10	SHEET 2 OF 3

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 5/21/13

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0910	3.90	34.92	180	30.18	16493	9.60	7.9	0.56	6.41	138.4	4.31	
0915	4.10	34.92	180	30.35	16492	9.60	7.2	0.51	6.41	138.6	3.43	
0920	4.30	34.92	180	30.34	16495	9.60	6.7	0.48	6.41	137.6	3.54	
0925	4.50	34.90	180	30.46	16495	9.60	6.1	0.44	6.41	134.5	4.04	
0930	4.70	34.90	180	30.72	16496	9.60	5.9	0.42	6.41	115.6	4.48	
0935	4.90	34.90	180	30.86	16509	9.60	5.6	0.39	6.41	83.2	5.79	
0940	5.10	34.90	180	30.61	16521	9.61	5.1	0.37	6.41	37.2	4.67	
0945	5.30	34.90	180	30.63	16508	9.61	4.7	0.33	6.41	13.9	2.86	
0950	5.50	34.90	180	31.01	16509	9.60	4.2	0.31	6.42	42.6	2.19	
0955	5.70	34.90	180	30.89	16532	9.62	4.3	0.30	6.41	28.0	2.30	
1000	5.90	34.90	180	30.70	16511	9.61	4.1	0.29	6.41	-0.80	2.26	
1005	6.00	34.91	180	30.59	16495	9.60	3.9	0.28	6.41	-17.4	2.28	
1010	6.30	34.90	180	30.76	16483	9.59	3.5	0.26	6.41	4.3	2.06	

Signature: Michael Zamboni, Maria Danois Date: 05/21/13

CH2MHILL	PROJECT NUMBER 433191.FI.FK.20	WELL NUMBER EPI04-MW-10	SHEET 3 OF 3

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 5/21/13

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? No

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*****:**

The groundwater quality parameters have been stable for some time and then the ORP began to plummet. This is likely an instrument (YSI) issue- the ORP is likely not changing but stable; thus, the well will be sampled.

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Michael Zamboni, Maria Danois Date: 05/21/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW-11	SHEET 1 OF 3

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/23/13

Weather:	Humid, Chance of thunderstorms	Sample Team:	Maria Danois
			Michael Zamboni
Total Depth:	47.60 FT.(BTOC) Measured		
Depth to Water: (-)	35.05 FT.(BTOC) Measured	Date and Time On Well:	05/23/13 0630
Water Column(h): (=)	12.55 FT.	Pump Start Date and Time:	05/23/13 0645
Water Volume in Well	2.05 GAL.	Pump Finish Date and Time:	05/23/13 0935
Pump Depth:	43.0 FT.(BTOC) Measured	Date and Time Off Well:	05/23/13 0950
Purge Device/Equip:	Monsoon Pump	Air Monitoring Readings:	0.0 ppm
'Measuring Device/Equipment:	YSI 556 MPS/ Hach 2100Q	**Total Purge Volume:**	**7.00 GAL.**

SAMPLE INFORMATION

Sample ID:	VEP4-GW11-0513	Parameters Collected for:	Select VOCs and Select SVOCs
Sample Date/Time:	05/23/13 0915		
Field Dup: YES/NO ID:	NO	Parameters Collected for:	(FD) N/A
FD Sample Date/Time:	N/A		
MS/MSD: YES / NO	NO	Sample Appearance:	Clear
Were samples filtered?	NO	Field Test Kit Details:	Mn= 0.0; Fe= 0.0; Fe 2+= 0.0 (mg/L)
If YES, Which samples?	N/A		

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0655	0.30	35.29	200	27.91	5761	3.11	36.8	2.79	6.70	231.3	281	
0700	0.50	35.26	200	28.40	5776	3.11	28.0	2.13	6.68	227.8	203	
0705	0.70	35.27	200	28.54	5766	3.10	24.3	1.83	6.69	223.1	188	
0710	0.90	35.26	200	28.77	5751	3.09	20.3	1.53	6.70	219.2	147	
0715	1.10	35.26	200	28.87	5741	3.09	16.8	1.27	6.69	211.1	135	
0720	1.30	35.27	200	29.02	5736	3.08	14.8	1.12	6.70	206.0	97.6	
0725	1.50	35.26	200	29.17	5729	3.08	13.0	0.98	6.69	200.8	88.4	
0730	1.75	35.26	200	29.20	5717	3.07	10.9	0.82	6.69	203.2	79.2	
0735	1.95	35.26	200	29.21	5698	3.06	10.0	0.75	6.69	199.3	58.8	
0740	2.20	35.27	200	29.25	5657	3.04	9.2	0.69	6.70	191.7	53.1	
0745	2.40	35.26	200	29.37	5625	3.02	8.2	0.61	6.71	189.7	36.2	
0750	2.60	35.26	200	29.28	5596	3.00	7.5	0.57	6.69	185.2	27.5	
0755	2.80	35.26	200	29.42	5579	2.99	7.0	0.52	6.70	177.0	24.3	
0800	3.00	35.26	200	29.58	5565	2.98	6.5	0.48	6.71	175.3	21.0	
0805	3.20	35.26	200	29.60	5547	2.98	6.2	0.46	6.70	173.1	18.4	
0810	3.40	35.26	200	29.45	5532	2.97	5.9	0.44	6.70	167.3	17.2	
0815	3.60	35.26	200	29.47	5524	2.96	5.7	0.42	6.70	164.3	12.8	
0820	3.80	35.26	200	29.70	5506	2.95	5.4	0.41	6.70	160.1	13.1	
0825	4.00	35.26	200	29.67	5495	2.94	5.2	0.39	6.69	154.7	10.1	
0830	4.20	35.26	200	29.78	5489	2.94	4.8	0.36	6.70	149.1	8.59	
0835	4.40	35.26	200	29.76	5480	2.94	4.7	0.35	6.69	143.5	7.84	

Signature: Michael Zamboni, Maria Danois Date: 05/23/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW11	SHEET 2 OF 3

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 05/23/13

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0840	4.60	35.26	200	29.93	5470	2.93	4.6	0.34	6.70	136.4	6.90	
0845	4.80	35.26	200	29.89	5468	2.93	4.4	0.33	6.69	130.0	6.90	
0850	5.00	35.26	200	29.75	5458	2.92	4.1	0.31	6.69	122.2	4.97	
0855	5.20	35.26	200	29.86	5455	2.92	4.0	0.30	6.69	120.2	4.64	
0900	5.40	35.26	200	29.86	5450	2.92	3.9	0.29	6.69	117.4	4.47	
0905	5.60	35.26	200	30.02	5440	2.91	3.7	0.28	6.69	113.2	3.80	
0910	5.80	35.26	200	29.99	5434	2.91	3.6	0.27	6.69	110.4	3.52	
0913	5.90	35.26	200	29.99	5434	2.91	3.5	0.27	6.69	108.6	4.21	

Signature: Michael Zamboni, Maria Danois Date: 05/23/13

CH2MHILL	PROJECT NUMBER 433191.FI.FK.20	WELL NUMBER EPI04-MW11	SHEET 3 OF 3

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 05/23/13

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Michael Zamboni, Maria Danois Date: 05/23/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW12	SHEET 1 OF 2

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/23/13

Weather:	85° and Humid, Chance of Thunderstorms	Sample Team:	Michael Zamboni
			Maria Danois
Total Depth:	46.50 FT.(BTOC) Measured		
Depth to Water: (-)	34.82 FT.(BTOC) Measured	Date and Time On Well:	05/23/13 0955
Water Column(h): (=)	11.68 FT.	Pump Start Date and Time:	05/23/13 1000
Water Volume in Well	1.91 GAL.	Pump Finish Date and Time:	05/23/13 1205
Pump Depth:	41.0 FT.(BTOC) Measured	Date and Time Off Well:	05/23/13 1215
Purge Device/Equip:	Monsoon Pump	Air Monitoring Readings:	0.0 ppm
'Measuring Device/Equipment:	YSI 556 MPS/ Hach 2100Q	**Total Purge Volume:**	**7.00 GAL.**

SAMPLE INFORMATION

Sample ID:	VEP4-GW12-0513	Parameters Collected:	Select VOCs and Select SVOCs
Sample Date/Time:	05/23/13 1150		
Field Dup: YES/NO ID:	No	Parameters Collected (FD):	(FD) N/A
FD Sample Date/Time:	N/A		
MS/MSD: YES / NO	No	Sample Appearance:	Clear
Were samples filtered?	No	Field Test Kit Details:	Mn= 0.0; Fe= 0.0; Fe 2+= 0.0 (mg/L)
If YES, Which samples?	N/A		

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1015	0.70	34.96	250	29.70	3412	1.77	30.1	2.22	6.78	131.9	> 1000	
1020	0.90	34.96	250	30.03	3421	1.78	22.7	1.69	6.78	132.4	> 1000	
1025	1.20	34.97	250	30.12	3436	1.79	19.7	1.47	6.78	132.4	> 1000	
1030	1.50	34.97	250	30.24	3437	1.79	16.8	1.24	6.78	132.7	282	
1035	1.80	34.98	250	30.26	3429	1.78	13.9	1.03	6.78	131.4	151	
1040	2.20	34.98	250	30.12	3421	1.78	11.9	0.89	6.78	129.9	84.6	
1045	2.50	34.98	250	30.11	3419	1.78	10.6	0.80	6.77	131.0	42	
1050	2.80	34.98	250	30.15	3417	1.77	8.5	0.63	6.78	131.0	27.2	
1055	3.10	34.98	250	30.15	3418	1.78	7.6	0.57	6.78	130.5	18.1	
1100	3.50	34.98	250	30.19	3417	1.78	6.3	0.47	6.78	130.6	13.8	
1105	3.80	34.98	250	30.19	3417	1.78	5.5	0.41	6.78	130.4	12.4	
1110	4.10	34.98	250	30.17	3417	1.78	5.0	0.37	6.78	129.6	12.4	
1115	4.40	34.98	250	30.20	3417	1.78	4.3	0.32	6.78	129.6	10.4	
1120	4.70	34.98	250	30.11	3416	1.77	4.0	0.30	6.78	128.6	8.1	
1125	5.00	34.98	250	30.18	3418	1.78	3.5	0.26	6.78	128.2	6.09	
1130	5.30	34.98	250	30.10	3417	1.78	3.2	0.24	6.78	127.2	7.6	
1135	5.50	34.98	250	30.19	3419	1.78	2.9	0.22	6.78	126.5	6.73	
1140	5.80	34.98	250	30.24	3417	1.78	2.7	0.20	6.78	125.9	6.96	
1145	6.00	34.98	250	30.01	3421	1.78	2.5	0.19	6.78	124.6	5.73	
1150	6.40	34.98	250	30.09	3419	1.78	2.4	0.19	6.78	123.9	5.04	

Signature: Maria Danois, Michael Zamboni Date: 05/23/13

CH2MHILL	PROJECT NUMBER 433191.FI.FK.20	WELL NUMBER EPI04-MW12	SHEET 2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 05/23/13

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Maria Danois, Michael Zamboni Date: 05/23/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW13	SHEET 1 OF 2

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | Date: 05/22/13

Weather: 85° and Humid, Chance of Thunderstorms

Sample Team: Michael Zamboni, Maria Danois

Total Depth:	46.00 FT.(BTOC) Measured		
Depth to Water: (-)	34.92 FT.(BTOC) Measured	Date and Time On Well:	05/22/13 1000
Water Column(h): (=)	11.08 FT.	Pump Start Date and Time:	05/22/13 1010
Water Volume in Well	1.81 GAL.	Pump Finish Date and Time:	05/22/13 1215
Pump Depth:	41.0 FT.(BTOC) Measured	Date and Time Off Well:	05/23/13 1220
Purge Device/Equip:	Monsoon Pump	Air Monitoring Readings:	0.0 ppm
'Measuring Device/Equipment:	YSI 556 MPS/ Hach 2100Q	**Total Purge Volume:**	**3.75 GAL.**

SAMPLE INFORMATION

Sample ID:	VEP4-GW13-0513	Parameters Collected:	Select VOCs and Select SVOCs
Sample Date/Time:	05/22/13 1140		
Field Dup: YES/NO ID:	VEP4-GW13P-0513	Parameters Collected (FD):	Select VOCs and Select SVOCs
FD Sample Date/Time:	05/22/13 1145		
MS/MSD: YES / NO	No	Sample Appearance:	Clear
Were samples filtered?	No	Field Test Kit Details:	Mn= 0.0; Fe= 0.0; Fe 2+= 0.0 (mg/L)
If YES, Which samples?	N/A		

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1020	0.50	35.19	200	29.73	9079	5.03	28.5	2.10	6.69	178.4	866	
1025	0.60	35.19	200	29.99	8938	4.95	24.5	1.79	6.69	174.7	488	
1030	0.75	35.19	200	30.56	8837	4.89	21.9	1.60	6.70	171.2	277	
1035	1.00	35.20	200	30.19	8730	4.83	21.4	1.57	6.71	166.3	155	
1040	1.25	35.06	200	29.97	8717	4.82	19.7	1.45	6.70	160.4	88	
1045	1.50	35.21	200	30.38	8737	4.83	19.4	1.43	6.70	155.6	70	
1050	1.75	35.21	200	30.67	8794	4.87	17.0	1.23	6.70	149.4	40	
1055	1.90	35.22	200	30.32	8839	4.89	15.9	1.16	6.70	142.0	24.9	
1100	2.15	35.22	200	30.26	8882	4.92	14.9	1.09	6.70	137.2	19.4	
1105	2.40	35.22	200	29.62	8935	4.96	14.6	1.08	6.70	131.3	13.9	
1110	2.60	35.24	200	29.26	8955	4.97	14.1	1.05	6.69	128.6	11.0	
1115	2.75	35.24	200	29.14	8988	4.99	13.9	1.04	6.68	127.4	7.92	
1120	3.00	35.24	200	26.58	9007	5.00	13.0	0.97	6.68	128.8	7.38	
1125	3.25	35.25	200	30.30	9060	5.03	12.6	0.92	6.69	128.0	7.31	
1130	3.50	35.25	200	30.41	9118	5.06	12.5	0.92	6.69	125.2	5.09	
1135	3.75	35.25	200	30.19	9170	5.09	12.1	0.89	6.68	120.1	4.56	

Signature: Michael Zamboni, Maria Danois Date: 05/22/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW13	SHEET 2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico Date: 05/22/13

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Michael Zamboni, Maria Danois Date: 05/22/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW13D	SHEET 1 OF 2

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 07/02/13

Weather: Sprinkling Rain, Frequent but short heavy rain, 80°F

Sample Team: Pat Murphy, Troy Horn

Total Depth: 76.20 FT.(BTOC) Measured

Depth to Water: (-) 33.85 FT.(BTOC) Measured

Water Column(h): (=) 42.37 FT.

Water Volume in Well 6.90 GAL.

Pump Depth: 36.0 FT.(BTOC) Measured

Purge Device/Equip: Hurricane Pump

'Measuring Device/Equipment: YSI 556 MPS/ Hach 2100Q

Date and Time On Well: 07/02/13 0820

Pump Start Date and Time: 07/02/13 0927

Pump Finish Date and Time: 07/02/13 1035

Date and Time Off Well: 07/02/13 1100

Air Monitoring Readings: 0.0 ppm

Total Purge Volume: 3.90 GAL.

SAMPLE INFORMATION

Sample ID: VEP4-GW13D-0713

Sample Date/Time: 07/02/13 1035

Field Dup: YES/NO ID: No

FD Sample Date/Time: N/A

MS/MSD: YES / NO No

Were samples filtered? No

If YES, Which samples? N/A

Parameters Collected: Select VOCs and Select SVOCs

Parameters Collected (FD): N/A

Sample Appearance: Clear

Field Test Kit Details: Mn= 0.0; Fe= 0.0; Fe 2+= 0.1 (mg/L)

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0930	0.50	38.50	450	28.39	8654	--	34.7	2.61	6.65	38.1	97.4	Hazy, Cloudy
0935	1.50	37.43	200	29.09	8508	--	35.0	2.61	6.63	59.9	93.0	Flow Adjustment
0940	1.60	36.15	200	29.26	8507	--	33.2	2.48	6.64	73.9	101	
0945	1.90	35.50	200	29.32	8521	--	32.3	2.41	6.67	82.9	115	
0950	2.10	36.27	200	29.05	8534	--	31.9	2.39	6.68	84.1	90.4	
0955	2.25	35.15	200	29.25	8540	--	30.9	2.31	6.72	79.1	75.7	
1000	2.50	35.10	200	29.33	8532	--	30.2	2.25	6.76	74.3	50.3	
1005	2.60	34.95	200	29.61	8525	--	28.9	2.14	6.81	70.2	31.3	
1010	2.90	34.80	200	29.85	8528	--	28.3	2.09	6.91	64.0	23.2	
1015	3.10	34.78	200	29.32	8535	--	28.5	2.12	6.97	63.8	17.0	
1020	3.30	34.75	200	29.25	8524	--	27.7	2.07	6.98	64.0	13.8	
1025	3.50	34.72	200	29.39	8510	--	27.1	2.02	6.99	63.3	11.6	
1030	3.70	34.70	200	29.42	8503	--	27.2	2.03	7.00	63.3	10.1	
1035	3.90	34.70	200	29.34	8495	--	27.1	2.02	7.01	64.0	7.60	

Signature: Pat Murphy, Troy Horn

Date: 07/02/13

CH2MHILL	PROJECT NUMBER 433191.FI.FK.20	WELL NUMBER EPI04-MW13D	SHEET 2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 07/02/13

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Pat Murphy, Troy Horn Date: 07/02/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW14	SHEET 1 OF 3

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 05/24/13

Weather:	85° and Humid, Chance of Thunderstorms	Sample Team:	Michael Zamboni
			Maria Danois
Total Depth:	44.00 FT.(BTOC) Measured		
Depth to Water: (-)	33.03 FT.(BTOC) Measured	Date and Time On Well:	05/24/13 0651
Water Column(h): (=)	10.97 FT.	Pump Start Date and Time:	05/24/13 0710
Water Volume in Well	1.79 GAL.	Pump Finish Date and Time:	05/24/13 0930
Pump Depth:	39.0 FT.(BTOC) Measured	Date and Time Off Well:	05/24/13 0950
Purge Device/Equip:	Monsoon Pump	Air Monitoring Readings:	0.0 ppm
'Measuring Device/Equipment:	YSI 556 MPS/ Hach 2100Q	**Total Purge Volume:**	**7.90 GAL.**

SAMPLE INFORMATION

Sample ID:	VEP4-GW14-0513	Parameters Colleced for:	VOCs, SVOCs, TOC, Alkalinity, TDS, CL/NO_3/NO_2/
Sample Date/Time:	05/24/13 0920		SO_4/S_2, MEE, VFAs
Field Dup: YES/NO ID:	No	Parameters Colleced for:	(FD) N/A
FD Sample Date/Time:	N/A		
MS/MSD: YES / NO	No	Sample Appearance:	Clear
Were samples filtered?	No	Field Test Kit Details:	Mn= 0.0; Fe= 0.0; Fe 2+= 0.0 (mg/L)
If YES, Which samples?	N/A		

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0730	0.40	33.22	250	28.53	6006	3.24	37.3	2.83	6.63	228.6	--	Cloudy
0735	0.80	33.23	250	28.84	5874	3.17	30.0	2.27	6.64	224.2	--	
0740	1.20	33.22	250	28.97	5810	3.13	24.5	1.85	6.65	221.4	> 1000	
0745	1.40	33.22	250	29.03	5691	3.06	19.5	1.47	6.66	218.4	472	
0750	1.80	33.22	250	29.05	5638	3.03	16.1	1.22	6.65	216.3	204	
0755	2.40	33.22	250	29.17	5610	3.01	13.2	0.99	6.65	213.6	98	
0800	2.70	33.22	250	29.30	5600	3.01	10.9	0.82	6.65	211.2	51.1	
0805	3.10	33.22	250	29.44	5597	3.00	9.2	0.69	6.65	207.8	29.1	
0810	3.50	33.22	250	29.43	5600	3.01	7.8	0.59	6.65	203.4	18.0	
0815	3.90	33.22	250	29.42	5603	3.01	6.2	0.47	6.65	197.7	12.4	
0820	4.30	33.22	250	29.43	5606	3.01	5.3	0.39	6.64	193.3	8.55	
0825	4.70	33.22	250	29.43	5613	3.01	4.4	0.33	6.64	189.0	7.70	
0830	5.10	33.22	250	29.45	5613	3.01	4.1	0.30	6.64	185.0	7.04	
0835	5.40	33.22	250	29.54	5623	3.02	3.6	0.27	6.65	181.0	5.14	
0840	5.70	33.23	250	29.51	5630	3.02	3.4	0.25	6.64	175.0	4.95	
0845	6.00	33.23	250	29.52	5634	3.02	3.0	0.23	6.64	172.0	4.44	
0850	6.40	33.23	250	29.59	5635	3.02	2.7	0.20	6.64	168.7	3.78	
0855	6.70	33.23	250	29.62	5641	3.03	2.6	0.20	6.64	164.8	3.28	
0900	7.00	33.23	250	29.65	5648	3.03	2.4	0.18	6.64	161.3	3.35	
0905	7.30	33.23	250	29.65	5652	3.03	2.3	0.17	6.64	157.9	3.17	

Signature: Michael Zamboni, Maria Danois Date: 05/24/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW14	SHEET 2 OF 3

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 05/24/13

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0910	7.60	33.23	250	29.76	5653	3.03	2.2	0.16	6.64	154.1	3.31	
0915	7.90	33.23	250	29.94	5656	3.04	2.1	0.16	6.64	151.2	2.99	

Signature: Michael Zamboni, Maria Danois Date: 05/24/13

CH2MHILL	PROJECT NUMBER 433191.FI.FK.20	WELL NUMBER EPI04-MW14	SHEET 3 OF 3

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 05/24/13

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Michael Zamboni, Maria Danois Date: 05/24/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW15	SHEET 1 OF 2

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 06/05/13

Weather:	79° F Sunny	Sample Team:	Juan Acaron
			Matt Anderson
Total Depth:	51.20 FT.(BTOC) Measured		
Depth to Water: (-)	39.10 FT.(BTOC) Measured	Date and Time On Well:	06/05/13 0800
Water Column(h): (=)	12.10 FT.	Pump Start Date and Time:	06/05/13 0837
Water Volume in Well	1.94 GAL.	Pump Finish Date and Time:	06/05/13 1145
Pump Depth:	45.6 FT.(BTOC) Measured	Date and Time Off Well:	06/05/13 1200
Purge Device/Equip:	Monsoon Pump	Air Monitoring Readings:	0.0 ppm
'Measuring Device/Equipment:	YSI 556 MPS/ Hach 2100Q	**Total Purge Volume:**	**4.00 GAL.**

SAMPLE INFORMATION

Sample ID:	VEP4-GW15-0613	Parameters Collected:	VOCs, SVOCs, TOC, Alkalinity, TDS, CL/NO_3/NO_2/
Sample Date/Time:	06/05/13 0940		SO_4/S_2, MEE, VFAs
Field Dup: YES/NO ID:	No	Parameters Collected:	(FD) N/A
FD Sample Date/Time:	N/A		
MS/MSD: YES / NO	No	Sample Appearance:	Clear, Odorless
Were samples filtered?	No	Field Test Kit Details:	Mn= 0.0; Fe= 0.0; Fe 2+= 0.0 (mg/L)
If YES, Which samples?	N/A		

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0846	0.75	39.13	300	29.46	4033	2.12	26.0	1.95	6.94	17.7	206	Milky White/ Odorless
0851	1.00	39.13	300	29.60	4036	2.12	26.2	1.96	6.94	15.2	180	
0856	1.50	39.13	250	30.07	4038	2.12	21.8	1.62	6.93	12.1	133	
0901	1.75	39.13	250	30.32	4041	2.12	20.8	1.55	6.94	10.7	91.2	
0906	2.00	39.13	250	30.54	4039	2.12	19.3	1.43	6.94	6.8	54.2	
0910	2.50	39.13	250	30.68	4028	2.11	20.1	1.49	6.94	5.1	35.5	
0916	3.00	39.13	250	30.81	4023	2.11	20.1	1.48	6.93	1.4	23.1	Slightly Cloudy
0921	3.25	39.13	250	30.79	4019	2.11	20.2	1.48	6.92	-1.4	21.1	Odorless
0926	3.50	39.13	250	30.91	4009	2.10	20.4	1.52	6.91	-1.0	12.4	
0931	3.75	39.13	250	30.91	4003	2.10	20.6	1.54	6.94	-1.2	9.58	
0936	4.00	39.13	250	30.92	4004	2.10	20.4	1.53	6.92	-0.6	11.3	

Signature: Juan Acaron, Matt Anderson Date: 06/05/13

CH2MHILL	PROJECT NUMBER 433191.FI.FK.20	WELL NUMBER EPI04-MW15	SHEET 2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 06/05/13

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Juan Acaron, Matt Anderson Date: 06/05/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW16	SHEET 1 OF 2

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Ric | DATE: 06/10/13

Weather: 85° F Partly Cloudy | Sample Team: Juan Acaron

Total Depth: 54.70 FT.(BTOC) Measured

Depth to Water: (-) 37.30 FT.(BTOC) Measured | Date and Time On Well: 06/10/13 0650

Water Column(h): (=) 17.40 FT. | Pump Start Date and Time: 06/10/13 0712

Water Volume in Well 2.78 GAL. | Pump Finish Date and Time: 06/10/13 0920

Pump Depth: 49.0 FT.(BTOC) Measured | Date and Time Off Well: 06/10/13 0930

Purge Device/Equip: Monsoon Pump | Air Monitoring Readings: 0.0 ppm

'Measuring Device/Equipment: YSI 556 MPS/ Hach 2100Q | **Total Purge Volume: 5.50 GAL.**

SAMPLE INFORMATION

Sample ID: VEP4-GW16-0613 | Parameters Collected: Select VOCs and Select SVOCs

Sample Date/Time: 06/10/13 0840

Field Dup: YES/NO ID: No | Parameters Collected: (FD) N/A

FD Sample Date/Time: N/A

MS/MSD: YES / NO No | Sample Appearance: Clear, Odorless

Were samples filtered? No | Field Test Kit Details: Mn= 0.0; Fe= 0.0; Fe 2+= 0.0 (mg/L)

If YES, Which samples? N/A

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0722	0.75	37.39	250	29.11	5215	2.79	20.0	1.51	6.69	57.7	>1000	Milky White, Odorless
0727	1.25	37.34	250	29.69	5226	2.79	20.3	1.52	6.69	42.3	>1000	
0732	1.50	37.34	250	39.95	5230	2.79	20.0	1.49	6.69	35.1	922	
0737	1.75	37.34	250	29.97	5240	2.79	19.9	1.48	6.69	29.9	684	
0742	2.00	37.34	250	29.99	5035	2.79	19.8	1.49	6.70	28.3	314	
0747	2.25	37.34	250	30.16	5235	2.79	18.9	1.41	6.71	24.3	138	
0752	2.75	37.34	250	30.29	5234	2.79	19.0	1.40	6.71	21.2	79.4	
0757	3.00	37.34	250	30.40	5235	2.79	19.0	1.40	6.69	19.3	53.7	
0802	3.25	37.34	250	30.47	5238	2.79	18.4	1.36	6.69	18.7	40.4	Cloudy, Odorless
0807	3.50	37.34	250	30.47	5236	2.79	18.3	1.35	6.69	17.0	31.8	
0812	4.00	37.34	250	30.55	5236	2.79	17.9	1.32	6.69	15.5	23.2	
0817	4.25	37.34	250	30.57	5231	2.79	17.7	1.31	6.69	11.3	18.7	
0822	4.50	37.34	250	30.61	5234	2.79	17.3	1.27	6.69	9.6	16.9	
0827	4.75	37.34	250	30.68	5235	2.79	17.4	1.28	6.69	8.7	15.1	Clear, Odorless
0833	5.25	37.34	250	30.59	5230	2.79	17.5	1.29	6.68	8.2	16.0	
0837	5.50	37.34	250	30.62	5233	2.79	17.4	1.28	6.68	8.8	15.4	

Signature: Juan Acaron | Date: 06/10/13

CH2MHILL	PROJECT NUMBER 433191.FI.FK.20	WELL NUMBER EPI04-MW16	SHEET 2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 06/10/13

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Juan Acaron Date: 06/10/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW17	SHEET 1 OF 2

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 06/10/13

Weather: 85° F, Partly Cloudy

Sample Team: Juan Acaron

Total Depth: 54.10 FT.(BTOC) Measured

Depth to Water: (-) 33.60 FT.(BTOC) Measured

Water Column(h): (=) 20.50 FT.

Water Volume in Well 3.28 GAL.

Pump Depth: 48.5 FT.(BTOC) Measured

Purge Device/Equip: Monsoon Pump

'Measuring Device/Equipment: YSI 556 MPS/ Hach 2100Q

Date and Time On Well: 06/10/13 1010

Pump Start Date and Time: 06/10/13 1023

Pump Finish Date and Time: 06/10/13 1155

Date and Time Off Well: 06/10/13 1210

Air Monitoring Readings: 0.0 ppm

Total Purge Volume: 5.00 GAL.

SAMPLE INFORMATION

Sample ID: VEP4-GW17-0613

Sample Date/Time: 06/10/13 1125

Field Dup: YES/NO ID: VEP4-GW17P-0613

FD Sample Date/Time: 06/10/13 1130

MS/MSD: YES / NO No

Were samples filtered? No

If YES, Which samples? N/A

Parameters Collected: Select VOCs and Select SVOCs

Parameters Collected (FD): Select VOCs and Select SVOCs

Sample Appearance: Clear, Odorless

Field Test Kit Details: Mn= 0.0; Fe= 0.4; Fe 2+= 0.0 (mg/L)

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1023	0.75	33.65	250	29.13	8451	4.67	39.5	2.94	6.69	-12.4	266	Milky White/Odorless
1028	1.00	33.65	250	29.55	8562	4.73	33.5	2.48	6.67	-13.1	164	
1033	1.50	33.65	250	29.74	8772	4.86	26.9	1.98	6.66	-10.6	119	
1038	1.75	33.65	250	29.87	8964	4.97	23.5	1.73	6.64	-7.5	101	
1043	2.25	33.65	250	30.04	9140	5.07	18.2	1.33	6.63	-6.4	79.7	
1048	2.50	33.65	250	30.07	9188	5.10	17.5	1.29	6.62	-6.9	52.4	Slightly Cloudy
1053	3.00	33.65	250	30.06	9236	5.13	17.2	1.26	6.61	-7.9	40.4	Odorless
1058	3.25	33.65	250	30.04	9286	5.16	16.8	1.23	6.61	-7.2	31.7	
1103	3.75	33.65	250	30.12	9310	5.18	16.1	1.18	6.61	-5.8	23.8	
1108	4.00	33.65	250	30.22	9330	5.19	16.0	1.17	6.61	-2.7	17.9	
1113	4.25	33.65	250	30.21	9338	5.19	15.8	1.16	6.61	-1.2	17.6	
1118	4.75	33.65	250	30.24	9350	5.20	15.9	1.16	6.61	-2.3	13.2	
1123	5.00	33.65	250	30.23	9341	5.20	15.9	1.16	6.61	-2.1	12.9	Clear/Odorless

Signature: Juan Acaron Date: 06/10/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW17	SHEET 2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Ricc DATE: 06/10/13

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Juan Acaron Date: 06/10/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW17D	SHEET 1 OF 3

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 07/01/13

Weather:	Partly Sunny, Windy	Sample Team:	Troy Horn
			Pat Murphy
Total Depth:	89.20 FT.(BTOC) Measured		
Depth to Water: (-)	33.48 FT.(BTOC) Measured	Date and Time On Well:	07/01/13 0720
Water Column(h): (=)	55.72 FT.	Pump Start Date and Time:	07/01/13 0735
Water Volume in Well	9.08 GAL.	Pump Finish Date and Time:	07/07/13 1020
Pump Depth:	87.5 FT.(BTOC) Measured	Date and Time Off Well:	07/07/13 1032
Purge Device/Equip:	Hurricane Pump	Air Monitoring Readings:	0.0 ppm
'Measuring Device/Equipment:	YSI 556 MPS/ Hach 2100Q	**Total Purge Volume:**	**9.60 GAL.**

SAMPLE INFORMATION

Sample ID:	VEP4-GW17D-0713	Parameters Collected for:	Select VOCs and Select SVOCs
Sample Date/Time:	07/01/13 1015		
Field Dup: YES/NO ID:	No	Parameters Collected for:	(FD) N/A
FD Sample Date/Time:	N/A		
MS/MSD: YES / NO	No	Sample Appearance:	Clear
Were samples filtered?	No	Field Test Kit Details:	Mn= 0.0; Fe= 0.0; Fe 2+= 0.1 (mg/L)
If YES, Which samples?	N/A		

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0742	1.00	35.87	350	--	--	--	--	--	--	--	--	
0745	1.40	35.76	350	28.74	20268	--	107.1	7.93	6.54	84.5	43.9	Clear
0750	2.00	36.86	350	29.03	20343	--	32.3	2.91	6.47	88.0	21.0	
0755	2.40	35.89	350	29.12	20333	--	23.9	1.71	6.47	82.0	14.3	
0800	3.10	35.94	350	29.04	20294	--	17.4	1.25	6.46	75.8	--	Flow Reduced
0805	3.50	35.54	150	29.40	20229	--	15.5	1.11	6.47	73.5	8.6	
0810	3.65	34.25	150	29.75	20234	--	14.6	1.03	6.48	65.8	4.76	
0815	3.75	34.23	150	29.58	20299	--	13.9	0.99	6.47	61.3	5.82	
0820	3.90	34.19	150	29.48	20330	--	13.4	0.96	6.46	58.1	4.42	
0825	4.00	34.19	150	29.58	20337	--	12.8	0.91	6.47	55.6	4.13	
0830	4.20	34.19	150	29.18	20279	--	12.4	0.88	6.46	51.7	3.62	
0835	4.50	34.19	150	29.56	20288	--	12.0	0.86	6.47	48.0	4.31	
0840	4.70	34.19	150	29.52	20306	--	11.5	0.82	6.47	45.6	5.64	
0845	4.90	34.19	150	29.78	20304	--	11.4	0.81	6.47	46.8	4.38	
0850	5.10	34.13	150	29.81	20313	--	11.3	0.80	6.47	42.9	5.73	
0855	5.30	34.15	150	29.44	20302	--	10.9	0.79	6.48	38.2	4.81	
0900	5.50	34.14	150	28.15	20299	--	10.6	0.76	6.46	37.0	4.33	
0905	5.70	34.15	150	28.78	20273	--	10.3	0.75	6.45	37.3	3.96	
0910	5.90	34.16	150	28.60	20246	--	10.0	0.73	6.44	40.3	3.91	
0915	6.10	34.15	150	28.92	20249	--	9.7	0.70	6.45	48.4	2.63	Pouring Rain
0925	Pump Flux	--	--	--	--	--	--	--	--	--	--	

Signature: Troy Horn, Pat Murphy Date: 07/01/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW17D	SHEET 2 OF 3

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 07/01/13

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0930	7.80	38.70	380	29.69	20190	--	5.9	0.42	6.40	6.0	4.24	Adjusting Flow
0935	8.00	--	--	29.37	20200	--	6.5	0.46	6.41	-25.4	--	
0940	8.20	34.68	150	30.04	20420	--	6.7	0.47	6.36	-36.4	5.20	
0945	8.40	34.49	150	29.99	20488	--	6.8	0.48	6.39	-36.8	4.39	
0950	8.60	34.39	150	30.06	20516	--	6.9	0.48	7.15	-32.1	4.36	
0955	8.80	34.37		30.28	20489	--	7.2	0.51	6.60	-27.0	3.46	
1000	9.00	34.37	150	30.24	20455	--	7.0	0.49	6.58	-32.8	3.51	
1005	9.20	34.39	150	30.08	20393	--	6.9	0.49	6.58	-41.4	3.28	
1010	9.40	34.38	150	30.19	20378	--	6.6	0.47	6.58	-48.4	3.19	
1015	9.60	34.39	150	29.98	20368	--	6.7	0.48	6.56	-50.9	--	

Signature: Troy Horn, Pat Murphy Date: 07/01/13

CH2MHILL	PROJECT NUMBER 433191.FI.FK.20	WELL NUMBER EPI04-MW17D	SHEET 3 OF 3

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 07/01/13

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Troy Horn, Pat Murphy Date: 07/01/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW18	SHEET 1 OF 2

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 06/07/13

Weather: Sunny 87°F

Sample Team: Dia Whitaker, Juan Acaron

Total Depth: 42.92 FT.(BTOC) Measured

Depth to Water: (-) 30.38 FT.(BTOC) Measured

Water Column(h): (=) 12.54 FT.

Water Volume in Well 2.01 GAL.

Pump Depth: 42.5 FT.(BTOC) Measured

Purge Device/Equip: Monsoon Pump

'Measuring Device/Equipment: YSI 556 MPS/ Hach 2100Q

Date and Time On Well: 06/07/13 0800

Pump Start Date and Time: 06/07/13 0817

Pump Finish Date and Time: 06/07/13 0955

Date and Time Off Well: 06/07/13 1010

Air Monitoring Readings: 0.0 ppm

Total Purge Volume: 5.25 GAL.

SAMPLE INFORMATION

Sample ID: VEP4-GW18-0513

Sample Date/Time: 06/07/13 0940

Field Dup: YES/NO ID: No

FD Sample Date/Time: N/A

MS/MSD: YES / NO No

Were samples filtered? No

If YES, Which samples? N/A

Parameters Collected for: VOCs, SVOCs, TOC, Alkalinity, TDS, CL/NO_3/NO_2/ SO_4/S_2, MEE, VFAs

Parameters Collected for: (FD) N/A

Sample Appearance: Clear, Odorless

Field Test Kit Details: Mn= 0.0; Fe= 0.0; Fe 2+= 0.0 (mg/L)

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0817	0.00	30.42	250	--	--	--	--	--	--	--	--	Start Purging
0824	0.75	30.41	250	29.16	8800	4.88	26.8	2.00	6.57	49.1	>1000	Light Brown/Odorless
0829	1.00	30.41	250	29.79	8837	4.90	22.1	1.57	6.58	62.2	587	
0834	1.25	30.41	250	29.94	8841	4.90	15.2	1.11	6.58	55.6	334	
0839	1.75	30.41	250	29.99	8849	4.90	11.2	0.82	6.57	45.0	202	
0844	2.00	30.41	250	30.05	8854	4.90	10.0	0.73	6.56	27.1	96.2	Cloudy/ Odorless
0849	2.50	30.41	250	30.10	8862	4.91	9.1	0.67	6.55	16.5	53.4	
0854	2.75	30.41	250	30.13	8866	4.91	9.5	0.68	6.55	13.4	36.1	
0859	3.00	30.41	250	30.24	8871	4.91	8.2	0.60	6.55	10.0	28.9	
0904	3.50	30.41	250	30.24	8878	4.92	8.1	0.59	6.54	9.2	20.4	
0909	3.75	30.41	250	30.26	8880	4.92	7.8	0.57	6.54	-2.9	19.3	
0914	4.00	30.41	250	30.30	8879	4.92	7.7	0.58	6.55	-5.4	18.5	
0919	4.50	30.41	250	30.29	8882	4.92	7.6	0.58	6.55	-11.9	16.9	Clear/ Odorless
0924	4.75	30.41	250	30.30	8891	4.92	7.4	0.54	6.55	-18.5	14.3	
0929	5.00	30.41	250	30.20	8898	4.92	8.0	0.59	6.55	-19.2	12.7	
0934	5.25	30.41	250	30.24	8888	4.92	7.4	0.54	6.55	-18.0	13.3	

Signature: Dia Whitaker, Juan Acaron Date: 06/07/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW18	SHEET 2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Ric DATE: 06/07/13

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Dia Whitaker, Juan Acaron Date: 06/07/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW19	SHEET 1 OF 2

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 06/06/13

Weather: 84°F, Partly Cloudy

Sample Team: Juan Acaron
Dia Whitaker

Total Depth: 42.00 FT.(BTOC) Measured

Depth to Water: (-) 29.85 FT.(BTOC) Measured

Water Column(h): (=) 12.15 FT.

Water Volume in Well 1.94 GAL.

Pump Depth: 36.5 FT.(BTOC) Measured

Purge Device/Equip: Monsoon Pump

'Measuring Device/Equipment: YSI 556 MPS/ Hach 2100Q

Date and Time On Well: 06/06/13 0815

Pump Start Date and Time: 06/06/13 0840

Pump Finish Date and Time: 06/06/13 1045

Date and Time Off Well: 06/06/13 1055

Air Monitoring Readings: 0.0 ppm

Total Purge Volume: 5.90 GAL.

SAMPLE INFORMATION

Sample ID: VEP4-GW19-0613

Parameters Collected for: Select VOCs and Select SVOCs

Sample Date/Time: 06/06/13 1025

Field Dup: YES/NO ID: No

Parameters Collected for: (FD) N/A

FD Sample Date/Time: N/A

MS/MSD: YES / NO No

Sample Appearance: Clear, Odorless

Were samples filtered? No

Field Test Kit Details: Mn= 0.0; Fe= 1.0; Fe 2+= 0.0 (mg/L)

If YES, Which samples? N/A

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0850	0.50	29.90	250	29.18	9384	5.23	8.6	0.65	6.57	47.9	>1000	Brown/ Odorless
0855	0.70	29.93	250	30.41	9402	5.23	9.3	0.68	6.57	14.5	>1000	
0900	0.90	29.93	250	30.61	9404	5.23	9.2	0.67	6.58	3.7	>1000	
0905	1.20	29.93	250	30.62	9391	5.22	8.7	0.63	6.57	2.6	>1000	
0910	1.50	29.93	250	30.70	9419	5.24	6.1	0.44	6.58	0.1	585	
0915	1.90	29.93	250	30.66	9430	5.25	5.3	0.39	6.58	-8.4	314	
0920	2.25	29.93	250	30.55	9455	5.26	5.3	0.38	6.58	-13.6	195	
0925	2.75	29.93	250	30.73	9472	5.27	5.9	0.43	6.57	-16.8	106	
0930	3.00	29.93	250	30.93	9480	5.27	6.1	0.44	6.57	-15.1	70.1	Cloudy/ Odorless
0935	3.25	29.93	250	30.90	9490	5.28	6.1	0.44	6.57	-10.1	63.9	
0940	3.60	29.93	250	30.99	9495	5.28	5.9	0.42	6.57	-8.9	70.2	
0945	3.80	29.93	250	30.99	9502	5.28	4.8	0.35	6.58	-7.3	58.1	
0950	4.10	29.93	250	30.95	9503	5.28	4.7	0.34	6.58	6.5	41.2	
0955	4.40	29.93	250	30.97	9503	5.28	4.7	0.34	6.58	-14.9	32.7	
1000	4.70	29.93	250	30.97	9500	5.28	4.3	0.31	6.59	-17.1	28.5	
1005	5.00	29.93	250	31.03	9508	5.28	4.2	0.30	6.59	-14.6	25.7	Slightly Cloudy
1010	5.30	29.93	250	31.06	9504	5.28	4.1	0.30	6.59	-17.5	19.8	
1015	5.60	29.93	250	31.12	9504	5.28	5.2	0.37	6.59	-21.2	15.9	
1020	5.90	29.93	250	31.08	9507	5.28	5.3	0.38	6.58	-22.8	17.9	Clear/ Odorless

Signature: Juan Acaron, Dia Whitaker Date: 06/06/13

CH2MHILL	PROJECT NUMBER 433191.FI.FK.20	WELL NUMBER EPI04-MW19	SHEET 2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Ric DATE: 06/06/13

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Juan Acaron, Dia Whitaker Date: 06/06/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW20	SHEET 1 OF 2

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Ricc | DATE: 06/17/13

Weather:	85°F, Partly Cloudy	Sample Team:	Juan Acaron
Total Depth:	52.25 FT.(BTOC) Measured		
Depth to Water: (-)	34.09 FT.(BTOC) Measured	Date and Time On Well:	06/17/13 0830
Water Column(h): (=)	18.16 FT.	Pump Start Date and Time:	06/17/13 0913
Water Volume in Well	2.91 GAL.	Pump Finish Date and Time:	06/17/13 1040
Pump Depth:	46.0 FT.(BTOC) Measured	Date and Time Off Well:	06/17/13 1100
Purge Device/Equip:	Monsoon Pump	Air Monitoring Readings:	0.0 ppm
'Measuring Device/Equipment:	YSI Quattro/ Hach 2100Q	**Total Purge Volume:**	**5.25 GAL.**

SAMPLE INFORMATION

Sample ID:	VEP4-GW20-0613	Parameters Collected for:	Select VOCs and Select SVOCs
Sample Date/Time:	06/17/13 1030		
Field Dup: YES/NO ID:	No	Parameters Collected for:	(FD) N/A
FD Sample Date/Time:	N/A		
MS/MSD: YES / NO	No	Sample Appearance:	Clear, Odorless
Were samples filtered?	No	Field Test Kit Details:	Mn= 0.0; Fe= 0.0; Fe 2+= 0.0 (mg/L)
If YES, Which samples?	N/A		

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0916	0.50	34.20	250	29.30	6027	3.25	22.4	1.69	6.78	215.7	799	Cloudy/ Odorless
0921	1.00	34.20	250	30.00	6176	3.33	12.8	0.99	6.80	177.8	601	
0926	1.25	34.20	250	30.80	6150	3.31	13.9	1.02	6.81	167.1	726	
0931	1.50	34.20	250	31.20	6123	3.30	11.6	0.84	6.82	146.2	443	
0936	2.00	34.20	250	31.20	6107	3.29	8.5	0.62	6.83	126.3	209	
0941	2.25	34.20	250	31.30	6090	3.28	7.5	0.55	6.83	117.8	116	
0946	2.75	34.20	250	31.50	6081	3.27	7.1	0.48	6.82	115.9	65.0	
0951	3.00	34.20	250	31.50	6071	3.26	6.8	0.50	6.81	115.8	34.7	
0956	3.25	34.20	250	31.50	6068	3.27	6.1	0.44	6.81	117.0	30.6	
1001	3.75	34.20	250	31.70	6086	3.27	7.3	0.53	6.80	116.2	28.4	
1006	4.00	34.20	250	31.60	6078	3.27	6.0	0.43	6.80	115.7	26.8	
1011	4.25	34.20	250	31.70	6072	3.27	5.4	0.39	6.80	114.7	23.1	
1016	4.50	34.20	250	31.80	6060	3.26	7.0	0.50	6.79	118.3	16.0	
1021	5.00	34.20	250	31.80	6050	3.25	5.9	0.44	6.79	118.3	14.2	
1026	5.25	34.20	250	31.90	6055	3.25	6.1	0.46	6.79	117.4	15.1	Clear/ Odorless

Signature: Juan Acaron Date: 06/17/13

CH2MHILL	PROJECT NUMBER 433191.FI.FK.20	WELL NUMBER EPI04-MW20	SHEET 2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Ricc DATE: 06/17/13

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Juan Acaron Date: 06/17/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW21	SHEET 1 OF 2

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Ric | DATE: 07/16/13

Weather:	Mostly sunny	Sample Team:	Pat Murphy
			Ronnie Fields
Total Depth:	63.17 FT.(BTOC) Measured		
Depth to Water: (-)	35.02 FT.(BTOC) Measured	Date and Time On Well:	07/16/13 1000
Water Column(h): (=)	28.15 FT.	Pump Start Date and Time:	07/16/13 10015
Water Volume in Well	4.60 GAL.	Pump Finish Date and Time:	07/16/13 1140
Pump Depth:	58.0 FT.(BTOC) Measured	Date and Time Off Well:	07/16/13 1200
Purge Device/Equip:	Monsoon Pump	Air Monitoring Readings:	0.0 ppm
'Measuring Device/Equipment:	YSI 556 MPS/ Hach 2100Q	**Total Purge Volume:**	**3.60 GAL.**

SAMPLE INFORMATION

Sample ID:	VEP4-GW21-0713	Parameters Collected for:	Select VOCs and Select SVOCs
Sample Date/Time:	07/16/13 1125		
Field Dup: YES/NO ID:	No	Parameters Collected for:	(FD) N/A
FD Sample Date/Time:	N/A		
MS/MSD: YES / NO	No	Sample Appearance:	Clear
Were samples filtered?	No	Field Test Kit Details:	Mn= 0.6; Fe= 0.0; Fe 2+= 0.0 (mg/L)
If YES, Which samples?	N/A		

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1035	1.50	35.40	300	30.00	4435	2.33	14.5	1.06	6.61	77.7	333	Cloudy
1040	1.80	35.36	300	30.61	4133	2.17	11.6	0.85	6.62	74.0	191	
1045	2.10	35.30	300	30.58	4043	2.12	10.4	0.77	6.62	71.7	171	
1050	2.40	35.35	300	30.80	4021	2.11	9.6	0.71	6.63	68.8	64.9	Clear
1055	2.70	35.35	300	30.73	4011	2.10	9.5	0.70	6.62	69.4	40.2	
1100	3.00	35.35	300	30.86	3998	2.09	9.3	0.67	6.64	66.9	28.3	
1105	3.30	35.35	300	30.90	3975	2.08	8.7	0.63	6.64	63.3	23.3	
1110	3.50	35.35	300	31.03	3949	2.07	8.4	0.62	6.69	59	14.0	
1115	3.80	35.35	300	31.14	3941	2.06	8.2	0.60	6.71	56.3	10.8	
1120	4.00	35.35	300	31.06	3925	2.05	8.2	0.59	6.70	55.4	8.3	

Signature: Pat Murphy, Ronnie Fields Date: 07/16/13

CH2MHILL	PROJECT NUMBER 433191.FI.FK.20	WELL NUMBER EPI04-MW21	SHEET 2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Ric DATE: 07/16/13

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Pat Murphy, Ronnie Fields Date: 07/16/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW22	SHEET 1 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Ricc | DATE: 07/17/13

Weather:	Hot, Humid, 86 ° F	Sample Team:	Pat Murphy
			Ronnie Fields
Total Depth:	42.21 FT.(BTOC) Measured		
Depth to Water: (-)	30.30 FT.(BTOC) Measured	Date and Time On Well:	07/17/13 0850
Water Column(h): (=)	10.91 FT.	Pump Start Date and Time:	07/17/13 0905
Water Volume in Well	1.78 GAL.	Pump Finish Date and Time:	07/17/13 1225
Pump Depth:	36.7 FT.(BTOC) Measured	Date and Time Off Well:	07/17/13 1230
Purge Device/Equip:	Monsoon Pump	Air Monitoring Readings:	0.0 ppm
'Measuring Device/Equipment:	YSI 556 MPS/ Hach 2100Q	**Total Purge Volume:**	**9.60 GAL.**

SAMPLE INFORMATION

Sample ID:	VEP4-GW22-0513	Parameters Collected for:	Select VOCs and Select SVOCs
Sample Date/Time:	07/17/13 1205		
Field Dup: YES/NO ID:	No	Parameters Collected for:	(FD) N/A
FD Sample Date/Time:	N/A		
MS/MSD: YES / NO	No	Sample Appearance:	Cloudy
Were samples filtered?	No	Field Test Kit Details:	Mn= 0.0; Fe= 0.0; Fe 2+= 0.0 (mg/L)
If YES, Which samples?	N/A		

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0940	2.50	30.40	300	29.94	3014	1.56	60.7	4.54	7.13	61.1	> 1000	Brown, Cloudy
0945	2.80	30.40	300	30.08	3030	1.56	45.8	3.32	6.78	78.2	> 1000	
0955	3.20	30.40	300	30.80	3080	1.59	17.3	1.28	6.88	85.5	> 1000	
1005	3.60	30.40	300	30.19	3075	1.59	14.7	1.10	7.17	64.9	607	
1015	4.00	30.40	300	30.30	3102	1.60	13.6	1.00	7.33	44.2	351	
1025	4.40	30.40	300	30.31	3121	1.61	14.1	1.04	7.50	27.8	190	
1035	4.80	30.40	300	30.63	3134	1.62	13.0	0.96	7.28	24.9	104	Clear
1040	5.00	30.40	300	30.40	3130	1.62	12.2	0.90	7.33	24.5	78.0	
1045	5.30	30.40	300	30.62	3136	1.62	12.5	0.93	7.30	24.5	81.3	
1050	5.50	30.40	300	31.17	3136	1.62	12.7	0.93	7.24	28.3	63.8	
1055	5.80	30.40	300	30.54	3136	1.62	12.4	0.92	7.29	29.6	--	
* SEE NOTE 2												
1130	8.00	30.40	300	30.26	3122	1.61	14.0	1.04	9.31	-48.9	> 1000	Cloudy
1135	8.30	30.40	300	30.23	3105	1.60	14.1	1.05	8.80	-67.7	979	
1140	8.60	30.40	300	27.78	3103	1.60	14.1	1.06	9.45	-91.8	816	
1145	8.90	30.40	300	30.15	3086	1.59	14.2	1.06	9.79	-118.9	649	
1150	9.10	30.40	300	30.33	3080	1.59	14.2	1.06	9.05	-115.2	427	
1155	9.30	30.40	300	30.08	3079	1.59	14.3	1.07	9.22	-124.9	328	
1200	9.60	30.40	300	29.71	3082	1.59	14.5	1.08	9.28	-132.3	204	

Signature: Pat Murphy, Ronnie Fields Date: 07/17/13

CH2MHILL	PROJECT NUMBER 433191.FI.FK.20	WELL NUMBER EPI04-MW22	SHEET 2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Ricc DATE: 07/17/13

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) *including why, under what conditions, who authorized exception, anything considered in the decision* :

Note: Time 0910 - Flow ~300 mL/min, water is very turbid with a dark brown color. Turbidity is above 1000 NTU so will wait to take readings until turbidity becomes lower.

Note 2: Time 1100- Due to silts/fines in tubing, had to detach tubing from the YSI flow-through cell in order to prevent silts/fines from moving through the flow-through cell

Note on Sample: Unable to get turbidity below 30 NTU. Purged more than 3x the well volume and purged more than 4 hours, and therefore, in accordance with the SOP.

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Pat Murphy, Ronnie Fields Date: 07/17/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW23	SHEET 1 OF 2

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Ricc | DATE: 07/23/13

Weather: Hot, Humid, Sunny

Sample Team: Troy Horn

Total Depth: 40.86 FT.(BTOC) Measured

Depth to Water: (-) 29.30 FT.(BTOC) Measured

Water Column(h): (=) 11.56 FT.

Water Volume in Well 1.88 GAL.

Pump Depth: 35.0 FT.(BTOC) Measured

Purge Device/Equip: Hurricane Pump

'Measuring Device/Equipment: YSI 556 MPS/ Hach 2100Q

Date and Time On Well: 07/23/13 0725

Pump Start Date and Time: 07/23/13 0805

Pump Finish Date and Time: 07/23/13 0955

Date and Time Off Well: 07/23/13 1005

Air Monitoring Readings: 0.0 ppm

Total Purge Volume: 33.75 GAL.

SAMPLE INFORMATION

Sample ID: VEP4-GW23-0713

Sample Date/Time: 07/23/13 0955

Field Dup: YES/NO ID: No

FD Sample Date/Time: N/A

MS/MSD: YES / NO No

Were samples filtered? No

If YES, Which samples? N/A

Parameters Collected for: Select VOCs and Select SVOCs

Parameters Collected for: (FD) N/A

Sample Appearance: Clear

Field Test Kit Details: Mn= 0.0; Fe= 0.0; Fe 2+= 0.0 (mg/L)

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0842	30.00	29.50	250	--	--	--	--	--	--	--	--	
0845	30.30	29.44	275	28.69	17234	--	29.0	2.11	5.78	37	157	Hazy
0850	30.70	29.43	300	29.15	17200	--	21.0	1.53	6.09	11.3	116	
0855	31.00	29.44	300	29.35	17212	--	16.2	1.17	6.50	-24.3	65.5	Clearing Up
0900	31.25	29.41	300	29.38	17224	--	14.8	1.07	7.13	-48.8	54.4	
0903	31.50	34.83	300	29.45	17217	--	13.7	0.99	7.96	-81.9	34.0	
0910	31.75	34.83	300	29.52	17206	--	13.3	0.97	8.25	-92.0	29.4	
0915	32.00	29.41	300	29.58	17216	--	12.8	0.92	8.76	-109.4	26.0	
0920	32.25	29.41	300	29.59	17215	--	12.3	0.89	9.31	-128.3	21.8	
0925	32.50	29.41	300	29.55	17213	--	12.1	0.87	9.05	-133.9	16.20	
0930	32.75	29.41	300	29.59	17194	--	11.6	0.85	8.55	-133.8	13.2	
0935	33.00	29.41	300	29.70	17200	--	11.4	0.82	9.19	-153.0	12.1	
0940	33.25	29.41	300	29.72	17200	--	11.1	0.80	8.74	-146.9	9.51	
0945	33.50	29.41	300	29.74	17196	--	10.9	0.79	8.66	-151.5	7.78	
0950	33.75	29.40	300	29.76	17194	--	10.8	0.78	8.68	-150.0	--	

Signature: Troy Horn

Date: 07/23/13

CH2MHILL	PROJECT NUMBER 433191.FI.FK.20	WELL NUMBER EPI04-MW23	SHEET 2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Ricc DATE: 07/23/13

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Troy Horn Date: 07/23/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW24	SHEET 1 OF 3

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 07/24/13

Weather:	Hot, Humid, 86 ° F	Sample Team:	Troy Horn
Total Depth:	47.66 FT.(BTOC) Measured		
Depth to Water: (-)	28.94 FT.(BTOC) Measured	Date and Time On Well:	07/24/13 0735
Water Column(h): (=)	18.72 FT.	Pump Start Date and Time:	07/24/13 0805
Water Volume in Well	3.05 GAL.	Pump Finish Date and Time:	07/24/13 1015
Pump Depth:	40.0 FT.(BTOC) Measured	Date and Time Off Well:	07/24/13 1040
Purge Device/Equip:	Hurricane Pump	Air Monitoring Readings:	0.0 ppm
'Measuring Device/Equipment:	YSI 556 MPS/ Hach 2100Q	**Total Purge Volume:**	**7.00 GAL.**

SAMPLE INFORMATION

Sample ID:	VEP4-GW24-0713	Parameters Collected for:	Select VOCs and Select SVOCs
Sample Date/Time:	07/24/13 1015		
Field Dup: YES/NO ID:	No	Parameters Collected for:	(FD) N/A
FD Sample Date/Time:	N/A		
MS/MSD: YES / NO	No	Sample Appearance:	Clear
Were samples filtered?	No	Field Test Kit Details:	Mn= 0.6; Fe= 0.0; Fe 2+= 0.0 (mg/L)
If YES, Which samples?	N/A		

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0825	1.75	29.33	300	28.46	6395	--	50.8	3.82	6.60	89.2	646	Hazy yellow
0830	2.50	29.10	200	30.11	6411	--	26.0	1.97	6.65	46.6	637	
0835	2.75	29.10	200	30.64	6415	--	23.7	1.8	6.67	33.4	551	
0840	3.20	29.09	250	30.62	6395	--	17.3	1.32	6.75	7.1	174	
0845	3.40	29.09	250	30.62	6375	--	16.1	1.22	6.78	2.3	95.2	
0850	3.60	29.09	280	30.84	6366	--	15.2	1.15	6.74	-6.4	45.3	
0855	3.80	29.09	280	30.93	6377	--	14.1	1.07	6.77	-14.6	29.1	
0900	4.00	29.09	280	31.02	6377	--	13.6	1.02	6.88	-19.8	21.9	
0905	4.20	29.09	280	30.92	6384	--	12.8	0.96	7.11	-27.8	18.5	
0910	4.40	29.09	280	30.92	6386	--	12.5	0.95	7.17	-29.6	16.0	
0915	4.60	29.09	280	30.49	6387	--	12.2	0.92	7.43	-41.0	14.7	
0920	4.80	29.09	280	30.27	6402	--	12.0	0.90	7.49	-68.8	14.0	
0925	5.00	29.07	280	30.16	6400	--	11.7	0.89	7.53	-73.5	13.8	
0930	5.20	29.11	280	30.42	6397	--	11.6	0.87	7.67	-76.9	11.7	
0935	5.40	29.11	280	29.37	6404	--	11.5	0.87	6.80	-81.8	11.9	
0940	5.60	29.09	280	29.07	6404	--	11.4	0.86	8.97	-88.8	9.5	pH Spike
0945	5.80	29.09	280	29.24	6407	--	11.4	0.86	10.43	-125.0	11.2	
0950	6.00	29.09	280	29.61	6416	--	11.4	0.86	8.39	-104.9	11.0	
0955	6.20	29.09	280	29.36	6406	--	11.3	0.85	8.55	-110.0	7.18	
1000	6.40	29.09	280	29.28	6403	--	11.2	0.84	8.37	-106.0	7.19	
1005	6.60	29.09	280	29.35	6398	--	11.0	0.83	8.34	-106.3	6.77	

Signature: Troy Horn Date: 07/24/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW24	SHEET 2 OF 3

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 07/24/13

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1010	6.80	29.09	280	29.40	6398	--	11.3	0.84	8.32	-106.3	6.08	
1015	7.00	29.09	280	29.55	6401	--	11.4	0.85	8.24	-106.7	6.04	

Signature: Troy Horn Date: 07/24/13

CH2MHILL	PROJECT NUMBER 433191.FI.FK.20	WELL NUMBER EPI04-MW24	SHEET 3 OF 3

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 07/24/13

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Troy Horn Date: 07/24/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW25	SHEET 1 OF 2

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Ric | DATE: 09/26/2013

Weather:	89° F Sunny	Sample Team:	Maria Danois
			Joe McCloud
Total Depth:	32.78 FT.(BTOC) Measured		
Depth to Water: (-)	20.15 FT.(BTOC) Measured	Date and Time On Well:	09/26/2013 0935
Water Column(h): (=)	12.63 FT.	Pump Start Date and Time:	09/26/2013 0950
Water Volume in Well	2.05 GAL.	Pump Finish Date and Time:	09/26/2013 1050
Pump Depth:	28.0 FT.(BTOC) Measured	Date and Time Off Well:	09/26/2013 1110
Purge Device/Equip:	Hurricane Pump	Air Monitoring Readings:	0.0 ppm
'Measuring Device/Equipment:	YSI 556 MPS/ Hach 2100Q	**Total Purge Volume:**	**3.10 GAL.**

SAMPLE INFORMATION

Sample ID:	VEP4-GW25-0913	Parameters Collected:	Select VOCs 1,4 Dioxane
Sample Date/Time:	09/26/2013 1050		
Field Dup: YES/NO ID:	No	Parameters Collected:	(FD) N/A
FD Sample Date/Time:	N/A		
MS/MSD: YES / NO	No	Sample Appearance:	Clear, Odorless
Were samples filtered?	No	Field Test Kit Details:	Mn= 0.0; Fe= 0.0; Fe 2+= 0.0 (mg/L)
If YES, Which samples?	N/A		

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
955	30.00	20.32	225	29.04	8.68	4.45	50.2	3.74	6.79	119.7	150	
1000	0.50	20.35	225	29.16	8.66	4.81	46.3	3.43	6.73	122.0	64.5	
1005	0.80	20.36	225	29.42	9.738	5.44	40.4	2.97	6.65	126.7	28.9	
1010	1.10	20.36	225	29.49	9.813	5.49	36.9	2.73	6.64	128.0	25.3	
1015	1.30	20.36	225	29.56	9.829	5.49	30.5	2.26	6.61	129.2	21	
1020	1.50	20.36	200	29.60	9.766	5.45	26.4	1.70	6.64	129.5	19.3	
1025	1.80	20.36	200	29.61	9.66	5.39	22.6	1.67	6.65	127.8	15.9	
1030	2.10	20.36	200	29.63	9.515	5.3	21.4	1.58	6.65	126.1	14.9	
1035	2.30	20.36	200	29.69	9.367	5.21	17.5	1.30	6.66	125.4	14.4	
1040	2.70	20.37	225	29.70	9.272	5.15	18.5	1.36	6.66	124.3	13.3	
1045	2.90	20.37	225	24.73	9.146	5.08	16.5	1.24	6.67	122.8	10.9	
1050	Collect VEP4-GW25-0913											

Signature: Maria Danois, Joe McCloud Date: 09/26/13

CH2MHILL	PROJECT NUMBER 433191.FI.FK.20	WELL NUMBER EPI04-MW25	SHEET 2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Ric DATE: 09/26/2013

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Maria Danois, Joe McCloud Date: 09/26/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW26	SHEET 1 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | Date: 09/24/13

Weather:	91° Partly Cloudy	Sample Team:	Maria Danois
			Joe McCloud
Total Depth:	32.18 FT.(BTOC) Measured		
Depth to Water: (-)	21.14 FT.(BTOC) Measured	Date and Time On Well:	09/24/13 1030
Water Column(h): (=)	11.04 FT.	Pump Start Date and Time:	09/24/13 1050
Water Volume in Well	1.80 GAL.	Pump Finish Date and Time:	09/24/13 1205
Pump Depth:	29.0 FT.(BTOC) Measured	Date and Time Off Well:	09/24/13 1240
Purge Device/Equip:	Hurriocane Pump	Air Monitoring Readings:	0.0 ppm
'Measuring Device/Equipment:	YSI 556 MPS/ Hach 2100Q	**Total Purge Volume:**	**4.80 GAL.**

SAMPLE INFORMATION

Sample ID:	VEP4-GW26-0513	Parameters Collected:	Select VOCs; 1,4 Diaxane
Sample Date/Time:	09/24/13 1210		
Field Dup: YES/NO ID:	N/A	Parameters Collected (FD):	N/A
FD Sample Date/Time:	N/A		
MS/MSD: YES / NO	No	Sample Appearance:	Clear
Were samples filtered?	No	Field Test Kit Details:	Mn= 0.3; Fe= 0.1; Fe 2+= 0.1 (mg/L)
If YES, Which samples?	N/A		

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1055	0.50	21.17	150	29.28	21.53	12.85	32.9	2.33	6.57	80.1	41.9	
1100	0.90	21.17	150	29.45	21.53	12.85	26.9	1.84	6.56	85.4	38.4	
1105	1.20	21.17	150	29.52	21.54	12.86	22.2	1.54	6.55	56.0	36.1	
1110	1.60	21.17	150	29.4	21.57	12.87	19.9	1.42	6.55	54.6	38.6	
1115	1.90	21.17	150	29.6	21.54	12.85	18.8	1.33	6.54	56.1	36.6	
1120	2.20	21.17	150	29.71	21.54	12.85	17.9	1.27	6.54	76.4	33.5	
1125	2.40	21.17	150	29.79	21.54	12.85	18.1	1.28	6.55	52.3	31.8	
1130	2.60	21.17	150	29.85	21.54	12.85	17.6	1.24	655.00	54.0	24.5	
1135	3.00	21.17	150	29.94	21.53	12.84	17.3	1.22	6.56	60.0	20.2	
1140	3.20	21.17	150	29.95	21.53	12.84	16.4	1.19	6.56	65.3	20.3	
1145	3.50	21.17	150	29.93	21.53	12.84	16.9	1.19	6.57	77.0	13.9	
1150	3.00	21.17	150	30.1	21.5	12.82	16.7	1.17	6.58	68.6	11.3	
1155	4.00	21.17	150	30.38	21.51	12.82	16.4	1.15	6.58	69.5	12	
1200	4.30	21.17	150	30.53	21.52	12.82	16.1	1.13	6.59	70.7	9.93	
1205	4.60	21.15	150	30.02	21.53	12.83	16.0	1.12	6.59	68.4	8.86	

Signature: Maria Danois, Joe McCloud Date: 09/24/13

CH2MHILL	PROJECT NUMBER 433191.FI.FK.20	WELL NUMBER EPI04-MW26	SHEET 2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico Date: 09/24/13

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Maria Danois, Joe McCloud Date: 09/24/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW27	SHEET 1 OF 2

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 9/26/13

Weather:	88°F Sunny	Sample Team:	Maria Danois
			Joe McCloud
Total Depth:	32.80 FT.(BTOC) Measured		
Depth to Water: (-)	10.39 FT.(BTOC) Measured	Date and Time On Well:	9/26/13 0730
Water Column(h): (=)	22.49 FT.	Pump Start Date and Time:	9/26/13 0750
Water Volume in Well	3.67 GAL.	Pump Finish Date and Time:	9/26/13 0900
Pump Depth:	28.0 FT.(BTOC) Measured	Date and Time Off Well:	9/26/13 0930
Purge Device/Equip:	Hurricane Pump	Air Monitoring Readings:	0.0 ppm
'Measuring Device/Equipment:	YSI 556 MPS/ Hach 2100Q	**Total Purge Volume:**	**3.50 GAL.**

SAMPLE INFORMATION

Sample ID:	VEP4-GW27-0913	Parameters Collected:	Select VOCs and Select SVOCs
Sample Date/Time:	9/26/13 0905		
Field Dup: YES/NO ID:	No	Parameters Collected (FD):	N/A
FD Sample Date/Time:	N/A		
MS/MSD: YES / NO	No	Sample Appearance:	Clear
Were samples filtered?	No	Field Test Kit Details:	Mn= 0.0; Fe= 0.1; Fe 2+= 0.1 (mg/L)
If YES, Which samples?	N/A		

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
755	0.30	10.42	250	27.67	24.70	14.73	9.8	0.71	6.50	251.9	606	
800	0.60	10.45	250	27.72	24.54	14.72	8.7	0.63	6.50	245.9	444	
805	0.90	10.42	200	28.11	24.10	14.55	8.0	0.58	6.50	237.2	275	
810	1.20	10.42	200	28.43	24.04	14.51	7.5	0.53	6.51	228.1	187	
815	1.40	10.45	200	28.47	24.00	14.45	6.8	0.49	6.49	221.7	143	
820	1.60	10.45	200	28.54	23.82	14.45	6.3	0.45	6.49	214.5	117	
825	1.80	10.45	200	28.73	23.71	14.29	6.3	0.45	6.49	205.5	92.3	
830	1.90	10.45	200	28.78	23.66	14.25	6.1	0.44	6.49	201.1	77.4	
835	2.20	10.45	200	28.93	23.59	14.21	5.9	0.42	6.49	193.6	56.2	
840	2.40	10.45	200	29.06	23.54	14.17	5.9	0.42	6.49	188.3	44.5	
845	2.60	10.45	200	29.31	23.48	14.13	5.7	0.41	6.49	182.8	36.3	
850	2.75	10.45	200	29.5	23.44	14.10	5.7	0.40	6.49	176.6	23.0	
855	2.90	10.45	200	29.57	23.46	14.12	5.8	0.41	6.49	172.4	23.0	
900	3.10	10.45	200	29.67	23.45	14.10	5.8	0.41	6.49	169.0	19.8	
905	Sample collected VEP4-GW27-0913											

Signature: Maria Danois, Joe McCloud Date: 09/26/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW27	SHEET 2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 09/26/13

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Maria Danois, Joe McCloud Date: 09/26/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW28	SHEET 1 OF 2

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 10/02/2013

Weather:	90° Sunny	Sample Team:	M. Danois
			N. Price
Total Depth:	26.00 FT.(BTOC) Measured		
Depth to Water: (-)	8.59 FT.(BTOC) Measured	Date and Time On Well:	10/02/2013 1035
Water Column(h): (=)	17.41 FT.	Pump Start Date and Time:	10/02/2013 1040
Water Volume in Well	2.84 GAL.	Pump Finish Date and Time:	10/02/2013 1155
Pump Depth:	21.0 FT.(BTOC) Measured	Date and Time Off Well:	10/02/2013 1210
Purge Device/Equip:	Hurricane Pump	Air Monitoring Readings:	0.0 ppm
'Measuring Device/Equipment:	YSI 556 MPS/ Hach 2100Q	**Total Purge Volume:**	**2.10 GAL.**

SAMPLE INFORMATION

Sample ID:	VEP4-GW28-1013	Parameters Colleced for:	Select VOCs; 1,4-Dioxane
Sample Date/Time:	10/02/2013 1130		
Field Dup: YES/NO ID:	No	Parameters Colleced for:	(FD) N/A
FD Sample Date/Time:	N/A		
MS/MSD: YES / NO	No	Sample Appearance:	Clear
Were samples filtered?	No	Field Test Kit Details:	Mn= 0.4; DO= 0.2; Fe 2+= 0.2 (mg/L)
If YES, Which samples?	N/A		

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1050	0.50	8.62	200	29.22	13.5	7.79	45.30	3.20	6.71	132.3	446	
1055	0.70	8.63	200	29.74	13.52	7.74	18.20	1.31	6.70	122.8	211	
1100	0.90	8.6.	200	30.05	13.53	7.75	12.10	0.87	6.71	114.6	82.2	
1105	1.20	8.63	200	30.37	13.51	7.73	9.30	0.67	6.70	106.7	40.8	
1110	1.40	8.62	200	30.37	13.52	7.73	8.60	0.61	6.69	96.0	29.6	
1115	1.60	8.62	200	30.41	13.52	7.74	6.50	0.47	6.69	87.1	21.1	
1120	1.80	8.62	200	29.81	13.5	7.73	5.70	0.41	6.68	78.8	15.6	
1125	2.10	8.62	200	29.76	13.52	7.74	5.70	0.40	6.68	74.3	14.4	
1130	Collect VEP4-GW28-1013											

Signature: M. Danoi/ N. Price Date: 10/2/2013

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW28	SHEET 2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 10/02/2013

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: M. Danoi/ N. Price Date: 10/2/2013

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW29	SHEET 1 OF 2

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Rico | DATE: 10/02/2013

Weather:	90° F Sunny	Sample Team:	M. Danois
			N. Price
Total Depth:	27.15 FT.(BTOC) Measured		
Depth to Water: (-)	15.77 FT.(BTOC) Measured	Date and Time On Well:	10/02/13 0740
Water Column(h): (=)	11.38 FT.	Pump Start Date and Time:	10/02/13 0753
Water Volume in Well	1.85 GAL.	Pump Finish Date and Time:	10/02/13 1005
Pump Depth:	22.0 FT.(BTOC) Measured	Date and Time Off Well:	10/02/13 1015
Purge Device/Equip:	Hurricane Pump	Air Monitoring Readings:	0.0 ppm
'Measuring Device/Equipment:	YSI 556 MPS/ Hach 2100Q	**Total Purge Volume:**	**3.30 GAL.**

SAMPLE INFORMATION

Sample ID:	VEP4-GW29-1013	Parameters Collected:	Select VOCs, 1.4-Dioxane
Sample Date/Time:	10/02/13 0925		
Field Dup: YES/NO ID:	No	Parameters Collected:	(FD) N/A
FD Sample Date/Time:	N/A		
MS/MSD: YES / NO	No	Sample Appearance:	Clear, Odorless
Were samples filtered?	No	Field Test Kit Details:	Mn= 0.3; DO= 0.1; Fe 2+= 0.2 (mg/L)
If YES, Which samples?	N/A		

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
805	1.00	15.84	200	28.20	12.87	6..55	71.7	5.64	6.71	179.4	NR	Cloudy
810	1.20	15.82	200	28.87	12.37	6.53	42.1	3.12	6.70	175.4	830	
815	1.30	15.86	200	29.59	12.49	6.48	45.6	3.34	6.70	170.7	575	
820	1.50	15.84	200	29.98	12.53	6.46	34.7	2.52	6.70	168.4	352	
825	1.70	18.84	200	30.14	12.54	6.45	32.9	2.45	6.71	166.3	251	
830	1.80	15.85	150	30.37	12.47	6.38	33.9	2.45	6.71	163.9	178	
835	2.00	15.85	150	29.81	12.32	6.36	32.1	2.36	6.69	160.8	126	
840	2.20	15.84	150	29.42	12.11	6.30	30.4	2.24	6.68	162.9	102	
845	2.40	15.84	150	29.27	12.03	6.27	30.0	2.22	6.67	165.5	72.9	
850	2.50	15.85	150	29.75	12.05	6.22	31.1	2.28	6.68	168.1	59.9	
855	2.60	15.84	150	30.64	12.21	6.21	31.5	2.27	6.69	166.1	50.5	
900	2.7	15.85	150	30.96	12.22	6.19	29.7	2.14	6.69	160.7	48	
905	2.8	15.84	150	30.45	12.19	6.18	28.8	2.09	6.68	158.9	34.8	
910	2.9	15.85	150	29.54	11.86	6.15	26.7	1.97	6.67	160.7	28.8	
915	3.1	15.85	150	30.14	11.92	6.11	28.2	2.07	6.67	161.8	28.7	
920	3.3	15.85	150	30.68	11..94	6.11	27.7	2.00	6.67	160.6	19.4	
925	Collect VEP4-GW29-1013											

Signature: M. Danoi/ N. Price Date: 10/2/2013

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW29	SHEET 2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Rico DATE: 10/02/2013

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: M. Danoi/ N. Price Date: 10/2/2013

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW30	SHEET 1 OF 2

CH2MHILL

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation | LOCATION : Vieques, Puerto Ric | DATE: 09/24/2013

Weather: 90° F Partly Cloudy, No wind

Sample Team: Maria Danois, Joe McCloud

Total Depth: 32.81 FT.(BTOC) Measured

Depth to Water: (-) 21.40 FT.(BTOC) Measured

Water Column(h): (=) 11.41 FT.

Water Volume in Well 1.86 GAL.

Pump Depth: 29.0 FT.(BTOC) Measured

Purge Device/Equip: Hurricane Pump

'Measuring Device/Equipment: YSI 556 MPS/ Hach 2100Q

Date and Time On Well: 9/24/13 0755

Pump Start Date and Time: 9/24/13 830

Pump Finish Date and Time: 9/24/13 955

Date and Time Off Well: 9/24/13 1015

Air Monitoring Readings: 0.0 ppm

Total Purge Volume: 5.00 GAL.

SAMPLE INFORMATION

Sample ID: VEP4-GW30-0913

Parameters Collected: Select VOCs 1,4 Dioxane

Sample Date/Time: 9/24/13 0955

Field Dup: YES/NO ID: No

Parameters Collected: (FD) N/A

FD Sample Date/Time: N/A

MS/MSD: YES / NO No

Sample Appearance: Clear, Odorless

Were samples filtered? No

Field Test Kit Details: Mn= 0.8; Fe= 0.1; Fe 2+= 0.1 (mg/L)

If YES, Which samples? N/A

FIELD PARAMETERS

Time	Purged Vol. (gals)	Depth to Water (ft)	Flow Rate (mL/min)	Temp., (°C)	SpCond (uS/cm) w/in 3%	Salinity (ppt)	DO (%)	DO (mg/L) w/in 10%	pH w/in 0.1	ORP (mV) w/in 10mV	Turbidity (NTU) w/in 10%	Color / Odor / Comments
835	0.30	21.46	150	29.18	18.34	9.93	62.0	4.24	6.55	126.7		NTU out of range
840	0.90	21.46	175	29.41	17.01	9.94	47.3	3.40	6.56	106.7		NTU out of range
845	1.20	21.47	145	29.60	17.02	9.94	36.7	2.64	6.56	87.0	410	
850	1.50	21.47	175	29.76	16.97	9.92	31.2	2.25	6.55	75.0	155	
855	1.80	21.47	175	29.78	16.98	9.91	28.1	2.02	6.56	70.4	68.8	Clear
900	2.20	21.47	175	29.79	17.01	9.93	25.7	2.01	6.57	69.5	40.9	
905	2.50	21.47	145	29.92	17	9.92	24.1	1.73	6.58	69.3	33.6	
910	2.90	21.47	175	30.00	17	9.92	22.5	1.61	6.58	65.0	23.8	
915	3.40	21.47	175	29.73	17.02	9.94	21.7	1.56	6.58	65.3	21.7	
920	3.50	21.47	100	30.00	17.01	9.93	20.5	1.47	6.57	58.8	17.6	
925	3.70	21.47	100	30.15	17.04	9.95	19.9	1.42	6.57	62.1	16.4	
930	3.90	21.47	100	29.89	17.03	9.94	19.2	1.38	6.57	66.6	13.7	
935	4.20	21.47	100	30.27	17.03	9.95	18.3	1.30	6.57	71.6	11.3	
940	4.40	21.47	100	30.30	17.04	9.95	17.5	1.24	6.57	63.6	9.1	
945	4.60	21.47	100	29.83	17.04	9.95	17.5	1.28	6.56	59.5	8.7	
950	4.80	21.47	100	30.22	17.04	9.95	17.3	1.24	6.56	68.1	7.8	

Signature: Maria Danois, Joe McCloud

Date: 09/24/13

PROJECT NUMBER	WELL NUMBER	
433191.FI.FK.20	EPI04-MW30	SHEET 2 OF 2

GROUNDWATER SAMPLING DATA SHEET

PROJECT : SWMU 20 Remedial Investigation LOCATION : Vieques, Puerto Ric DATE: 09/24/2013

NOTES (CONTINUED)

SOP(s) used (refer to SOPs in back of this log)? Yes

Were all requirements of the SAP, PIs and above mentioned SOP(s) met? Yes

Explanation of exceptions to SAP, PI's and SOP(s) ***including why, under what conditions, who authorized exception, anything considered in the decision*** **:**

PHOTO LOG

Photo Number	Compass Direction	Time	Description

Signature: Maria Danois, Joe McCloud Date: 09/24/13

PROJECT NUMBER	WELL NUMBER
433191.FI.FK.20	MW 10

GROUNDWATER SAMPLING DATA SHEET

SAMPLE INFORMATION

Client:	NAVFAC	Well ID:	MW10
Location:	Vieques - SWMU 20	Sample ID:	VEP4-GW10-0914
Event:	Groundwater Sampling	MS/MSD:	No (Yes/No)
Date:	9/16/2014		
Weather:	Sunny, humid, 80°F	FD:	(Yes/No)
PID:	N/A		
Total Depth:	42.50 FT. (BTOC)	Sample Team:	G. Kiffe
Depth to wate (-)	35.00 FT. (BTOC)		L. Parker
Water Column:	6.50 FT.	Measuring Device:	Heron Dipper T
(x)	0.163 GAL./FT.	Date and Time:	9/16/14 0900
Well Volume:	1.1 GAL.		
Total Purge Volume:	5.0 GAL.		
Purge Device:	Hurricane Pump		
Sample Time:	1040		
Sample Appearance:	Clear		
Flow Rate:	Purge rate: 200 mL/min, Pump depth: 40'		

WELL DIAMETER

[(2" DIA.= .163 GAL./FT.) (4" DIA. = .653 GAL./FT.)]

(1" DIA.= .041 GALIFT.) (1 1/4" DIA.= .064 GALIFT.)

FIELD PARAMETERS

Time	Depth to Water (DTW)	Flow Rate	Purged Vol. (gals)	pH w/in 0.1	Cond. ms/cm	Temp., (°C)	DO (%)	DO (mg/L) w/in 10%	ORP	Turbidity (NTU) w/in 10%	Color / Odor / Comments
915	35.60			6.56	11.18	29.11		1.15	191.7	>1000	brown, very cloudy
920	35.53		0.30	6.58	11.41	29.77		1	190.1	>1000	brown, very cloudy
925	35.50		0.60	6.58	11.47	30.09		1.12	189.5	>1000	brown, very cloudy
930	35.42		0.90	6.58	11.53	30.23		1.06	188.4	>1000	brown, very cloudy
935	35.42		1.20	6.58	11.57	30.35		1	187.3	994	brown, very cloudy
940	35.75		1.50	6.59	11.72	30.16		0.85	197.1	569	brown, very cloudy
945	35.60		1.80	6.57	11.81	30.03		0.77	194.1	378	brown, very cloudy
950	35.60		2.10	6.57	11.82	30.05		0.76	191.8	247	brown, very cloudy
955	35.53		2.40	6.57	11.85	30.05		0.79	189.7	161.0	brown, very cloudy
1000	35.50		2.70	6.57	11.93	30.11		0.92	188.3	109.0	brown, very cloudy
1005	35.44		3.00	6.57	12.02	30.09		0.66	187.7	67.4	Clear
1010	35.46		3.30	6.56	12.08	30.18		0.65	188.4	45.7	Clear
1015	35.45		3.60	6.56	12.11	30.19		0.63	185.8	40.3	Clear
1020	35.44		3.90	6.57	12.16	30.27		0.59	185.4	32.7	Clear
1025	35.44		4.20	6.56	12.2	30.29		0.58	185.1	28.9	Clear
1030	35.44		4.50	6.56	12.22	30.32		0.6	184.2	26.8	Clear
1035	35.44		4.8	6.56	12.27	30.35		0.59	183.9	24.7	Clear
1040	Collect samples										

Signature: G. Kiffe Date: 09/16/14

PROJECT NUMBER	WELL NUMBER
433191.FI.FK.20	MW 13

GROUNDWATER SAMPLING DATA SHEET

SAMPLE INFORMATION

Client:	NAVFAC	Well ID:	MW13
Location:	Vieques - SWMU 20	Sample ID:	VEP4-GW13-0914 & VEP-GW13P-0914
Event:	Groundwater Sampling	MS/MSD:	No (Yes/No)
Date:	9/16/14		
Weather:	Sunny, humid, 83°F	FD:	Yes (Yes/No)
PID:	NAVFAC		
Total Depth:	43.50 FT. (BTOC)	Sample Team:	G. Kiffe
Depth to wate	(-) 35.50 FT. (BTOC)		L. Parker
Water Column:	8.00 FT.	Measuring Device:	Heron Dipper T
	(x) 0.163 GAL./FT.	Date and Time:	9/16/14 1230
Well Volume:	1.3 GAL.		
Total Purge Volume:	6.0 GAL.		
Purge Device:	Hurricane Pump		
Sample Time:	1355 (parent) & 1400		
Sample Appearance:	Clear		
Flow Rate:	Purge rate: 250 mL/min, Pump depth: 40'		

WELL DIAMETER

[(2" DIA.= .163 GAL./FT.) (4" DIA. = .653 GAL./FT.)]

(1" DIA.= .041 GALIFT.) (1 1/4" DIA.= .064 GALIFT.)

FIELD PARAMETERS

Time	Depth to Water (DTW)	Flow Rate	Purged Vol. (gals)	pH w/in 0.1	Cond. ms/cm	Temp., (°C)	DO (%)	DO (mg/L) w/in 10%	ORP	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1250	35.75			6.21	16.63	30.58		1.86	131.5	>1000	brown, cloudy
1255	35.95		0.50	6.23	16.68	30.88		1.32	138.2	672	brown, cloudy
1300	36.00		1.00	6.26	16.72	31.05		0.98	130.6	389	brown, cloudy
1305	36.03		1.50	6.38	16.79	31.07		0.72	146.3	221	brown, cloudy
1310	36.07		2.00	6.47	16.82	31.10		0.52	157.4	175	brown, cloudy
1315	36.10		2.50	6.47	16.79	31.03		0.48	156.2	83.1	Clear
1320	36.12		3.00	6.48	16.74	30.92		0.41	155.1	37.2	Clear
1325	36.10		3.50	6.48	16.72	30.83		0.39	154.8	31.6	Clear
1330	36.08		4.00	6.48	16.71	30.76		0.38	154.3	27.2	Clear
1335	36.05		4.50	6.49	16.72	30.70		0.37	153.5	25.9	Clear
1340	36.10		5.00	6.49	16.71	30.66		0.36	153.6	13.2	Clear
1345	36.15		5.50	6.50	16.67	30.78		0.38	152.8	11.8	Clear
1350	36.12		6.00	6.50	16.69	30.86		0.35	152.7	7.5	Clear
1355	Collect sample (parent)										
1400	Collect duplicate sample										

Signature: G. Kiffe Date: 09/16/14

PROJECT NUMBER	WELL NUMBER
433191.FI.FK.20	MW 13D

GROUNDWATER SAMPLING DATA SHEET

SAMPLE INFORMATION

Client:	NAVFAC	Well ID:	MW13D
Location:	Vieques - SWMU 20	Sample ID:	VEP4-GW13D-0914
Event:	Groundwater Sampling	MS/MSD:	(Yes/No)
Date:	9/16/14		
Weather:	Sunny, humid, 83°F	FD:	(Yes/No)
PID:	NAVFAC		
Total Depth:	73.00 FT. (BTOC)	Sample Team:	G. Kiffe
Depth to wate (-)	35.77 FT. (BTOC)		L. Parker
Water Column:	37.23 FT.	Measuring Device:	Heron Dipper T
(x)	0.163 GAL./FT.	Date and Time:	9/16/14 1135
Well Volume:	6.1 GAL.		
Total Purge Volume:	3.0 GAL.		
Purge Device:	Hurricane Pump		
Sample Time:	1240		
Sample Appearance:	Clear		
Flow Rate:	Purge rate: 200 mL/min, Pump depth: 68'		

WELL DIAMETER

[(2" DIA.= .163 GAL./FT.) (4" DIA. = .653 GAL./FT.)]

(1" DIA.= .041 GALIFT.) (1 1/4" DIA.= .064 GALIFT.)

FIELD PARAMETERS

Time	Depth to Water (DTW)	Flow Rate	Purged Vol. (gals)	pH w/in 0.1	Cond. ms/cm	Temp., (°C)	DO (%)	DO (mg/L) w/in 10%	ORP	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1155	35.,86		0.30	6.86	7.735	30.28		3.89	126.3	9.37	Clear
1200	36.00		0.60	6.77	8.036	29.98		3.36	140.1	4.57	Clear
1205	35.77		0.90	6.72	8.066	30.09		3.75	140.6	2.73	Clear
1210	35.49		1.20	6.72	8.061	30.67		3.7	144.7	1.63	Clear
1215	35.26		1.50	6.72	8.038	30.82		3.84	148.4	1.33	Clear
1220	35.40		1.80	6.72	8.026	30.47		3.78	147.3	0.98	Clear
1225	35.32		2.10	6.72	7.98	30.75		3.6	150.6	1.07	Clear
1230	35.26		2.40	6.73	7.958	30.89		3.8	154.7	0.75	Clear
1235	35.26		2.70	6.73	7.94	30.96		3.59	155.2	0.8	Clear
1240	Collect samples										

Signature: G. Kiffe Date: 09/16/14

PROJECT NUMBER	WELL NUMBER
433191.FI.FK.20	MW 14

GROUNDWATER SAMPLING DATA SHEET

SAMPLE INFORMATION

Client:	NAVFAC	Well ID:	MW14
Location:	Vieques - SWMU 20	Sample ID:	VEP4-GW14-0914
Event:	Groundwater Sampling	MS/MSD:	No (Yes/No)
Date:	9/15/14		
Weather:	Sunny, humid, 83°F	FD:	(Yes/No)
PID:	0		
Total Depth:	41.50 FT. (BTOC)	Sample Team:	G. Kiffe
Depth to water (-)	33.32 FT. (BTOC)		L. Parker
Water Column:	8.18 FT.	Measuring Device:	Heron Dipper T
(x)	0.163 GAL./FT.	Date and Time:	9/15/14 1145
Well Volume:	1.3 GAL.		
Total Purge Volume:	7.0 GAL.		
Purge Device:	Hurricane Pump		
Sample Time:	1310		
Sample Appearance:	Clear		
Flow Rate:	Purge rate: 250 mL/min, Pump depth: 38'		

WELL DIAMETER

[(2" DIA.= .163 GAL./FT.) (4" DIA. = .653 GAL./FT.)]

(1" DIA.= .041 GALIFT.) (1 1/4" DIA.= .064 GALIFT.)

1200 started purge. Water appears very turbid. Disconnect YSI and run until it clears up

FIELD PARAMETERS

Time	Depth to Water (DTW)	Flow Rate	Purged Vol. (gals)	pH w/in 0.1	Cond. ms/cm	Temp., (°C)	DO (%)	DO (mg/L) w/in 10%	ORP	Turbidity (NTU) w/in 10%	Color / Odor / Comments
12:15	33.48		2.00	6.86	4.916	29.84		61.00	225.9	794	Brown, very cloudy
12:20	33.49		2.50	6.81	4.905	29.91		32.50	227	503	Brown, very cloudy
12:25	33.50		3.00	6.78	4.907	30.16		23.10	228.1	323	Brown, very cloudy
12:30	33.50		3.50	6.77	4.894	30.17		19.20	227.6	161	Brown, very cloudy
12:35	33.50		4.00	6.77	4.892	30.14		18.70	227.6	66.7	Clear
12:40	33.50		4.50	6.77	4.897	30.23		1.77	229.1	33	Clear
12:45	33.50		5.00	6.77	4.889	30.36		1.27	227.5	23.9	Clear
12:50	33.45		5.50	6.77	4.895	30.41		1.51	228.2	18.7	Clear
12:55	33.45		6.00	6.77	4.894	30.60		1.37	225.8	17.3	Clear
1300	33.45		6.50	6.77	4.893	30.59		1.34	224	15.3	Clear
1305	33.40		7.00	6.77	4.894	30.70		1.27	223.4	13.7	Clear
1310		Collect Sample									

Signature: G. Kiffe Date: 09/15/14

* Lots of ants around well cap and in stick up annular area

** Well will not lock. The well head casing is rusted out and will not close completely. Came back on 9/16 to lock well.

PROJECT NUMBER	WELL NUMBER
433191.FI.FK.20	MW 16

GROUNDWATER SAMPLING DATA SHEET

SAMPLE INFORMATION

Client:	NAVFAC	Well ID:	VEP4-MW16
Location:	Vieques - SWMU 20	Sample ID:	VEP4-GW16-0914
Event:	Groundwater Sampling	MS/MSD:	No (Yes/No)
Date:	9/11/4		
Weather:	Sunny, humid, 86°F	FD:	(Yes/No)
PID:	0		
Total Depth:	52.00 FT. (BTOC)	Sample Team:	G. Kiffe
Depth to wate	(-) 36.93 FT. (BTOC)		L. Parker
Water Column:	15.07 FT.	Measuring Device:	Heron Dipper T
	(x) 0.163 GAL./FT.	Date and Time:	9/11/14 1405
Well Volume:	25.0 GAL.		
Total Purge Volume:	3.5 GAL.		
Purge Device:	Hurricane Pump		
Sample Time:	9/11/14 1500		
Sample Appearance:	Clear		
Flow Rate:	Purge rate: 250 mL/min, Pump depth: 47'		

WELL DIAMETER

[(2" DIA.= .163 GAL./FT.) (4" DIA. = .653 GAL./FT.)]

(1" DIA.= .041 GALIFT.) (1 1/4" DIA.= .064 GALIFT.)

FIELD PARAMETERS

Time	Depth to Water (DTW)	Flow Rate	Purged Vol. (gals)	pH w/in 0.1	Cond. ms/cm	Temp., (°C)	DO (%)	DO (mg/L) w/in 10%	ORP	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1425	38.15			6.81	5.403	28.75		1.10	143.7	33.9	Brown, slightly cloudy
1430	38.00		0.50	6.73	5.411	29.37		1.22	132.8	24.5	Clear
1435	38.00		1.00	6.73	5.415	29.57		1.19	127.3	6.79	Clear
1440	37.90		1.50	6.73	5.418	29.72		1.11	125.1	3.78	Clear
1445	37.93		2.00	6.72	5.42	29.71		1.01	125.3	3.5	Clear
1450	37.95		2.50	6.73	5.422	29.82		1.04	125.2	3.47	Clear
1455	38.00		3.00	6.73	5.425	29.84		1.03	125.5	2.86	Clear
1500	Collect sample										

Signature: G. Kiffe Date: 09/11/14

PROJECT NUMBER	WELL NUMBER
433191.FI.FK.20	MW 17

GROUNDWATER SAMPLING DATA SHEET

SAMPLE INFORMATION

Client:	NAVFAC	Well ID:	MW-17
Location:	Vieques - SWMU 20	Sample ID:	VEP4-GW17-0914
Event:	Groundwater Sampling	MS/MSD:	No (Yes/No)
Date:	9/17/14		
Weather:	Sunny, humid, 83°F	FD:	(Yes/No)
PID:			
Total Depth:	51.00 FT. (BTOC)	Sample Team:	G. Kiffe
Depth to water (-)	33.67 FT. (BTOC)		L. Parker
Water Column:	17.33 FT.	Measuring Device:	Heron Dipper T
(x)	0.163 GAL./FT.	Date and Time:	9/17/14 1150
Well Volume:	2.8 GAL.		
Total Purge Volume:	4.5 GAL.		
Purge Device:	Hurricane Pump		
Sample Time:	1255		
Sample Appearance:	Clear		
Flow Rate:	Purge rate: 250 mL/min, Pump depth: 46'		

WELL DIAMETER

[(2" DIA.= .163 GAL./FT.) (4" DIA. = .653 GAL./FT.)]

(1" DIA.= .041 GALIFT.) (1 1/4" DIA.= .064 GALIFT.)

FIELD PARAMETERS

Time	Depth to Water (DTW)	Flow Rate	Purged Vol. (gals)	pH w/in 0.1	Cond. ms/cm	Temp., (°C)	DO (%)	DO (mg/L) w/in 10%	ORP	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1210	33.78			6.74	8.154	29.36		2.35	238.2	38.3	brown, slightly cloudy
1215	33.78		0.50	6.72	8.274	29.42		2.28	238.4	19	Clear
1220	33.78		1.00	6.70	8.363	29.57		2.08	238.3	13.8	Clear
1225	33.78		1.50	6.70	8.427	29.63		1.95	238.7	11.6	Clear
1230	33.77		2.00	6.70	8.441	29.85		1.82	238	7.38	Clear
1235	33.77		2.50	6.70	8.431	30.17		1.86	239.2	4.69	Clear
1240	33.77		3.00	6.71	8.445	30.30		1.73	239.4	3.89	Clear
1245	33.77		3.50	6.70	8.435	30.32		1.68	239.8	3.19	Clear
1250	33.77		4.00	6.70	8.447	30.50		1.67	240.5	2.6	Clear
1255	Sample taken										

Signature: G. Kiffe Date: 09/17/14

PROJECT NUMBER	WELL NUMBER
433191.FI.FK.20	MW 17D

GROUNDWATER SAMPLING DATA SHEET

SAMPLE INFORMATION

Client:	NAVFAC	Well ID:	MW-17D
Location:	Vieques - SWMU 20	Sample ID:	VEP4-GW17D-0914
Event:	Groundwater Sampling	MS/MSD:	No (Yes/No)
Date:	9/17/14		
Weather:	Sunny, humid, 83°F	FD:	(Yes/No)
PID:			
Total Depth:	86.00 FT. (BTOC)	Sample Team:	G. Kiffe
Depth to water (-)	34.02 FT. (BTOC)		L. Parker
Water Column:	51.98 FT.	Measuring Device:	Heron Dipper T
(x)	0.163 GAL./FT.	Date and Time:	9/17/14 1145
Well Volume:	8.5 GAL.		
Total Purge Volume:	4.5 GAL.		
Purge Device:	Hurricane Pump		
Sample Time:	1305		
Sample Appearance:	Clear		
Flow Rate:	Purge rate: 250 mL/min, Pump depth: 81'		

WELL DIAMETER

[(2" DIA.= .163 GAL./FT.) (4" DIA. = .653 GAL./FT.)]

(1" DIA.= .041 GALIFT.) (1 1/4" DIA.= .064 GALIFT.)

FIELD PARAMETERS

Time	Depth to Water (DTW)	Flow Rate	Purged Vol. (gals)	pH w/in 0.1	Cond. ms/cm	Temp., (°C)	DO (%)	DO (mg/L) w/in 10%	ORP	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1220	35.25			6.33	18.88	29.26		2.91	51.6	22.1	Clear
1225	35.30		0.50	6.35	18.91	29.07		2.72	50.9	17.3	Clear
1230	35.36		1.00	6.38	18.96	28.72		2.66	52.2	11.5	Clear
1235	35.42		1.50	6.42	18.8	28.91		2.56	55.6	8.47	Clear
1240	35.45		2.00	6.43	18.78	28.90		2.5	52.3	5.06	Clear
1245	35.45		2.50	6.44	18.73	28.79		2.39	45.8	3.96	Clear
1250	35.45		3.00	6.45	18.59	28.86		2.35	42.6	3.03	Clear
1255	35.45		3.50	6.45	18.43	28.93		2.3	40.2	2.31	Clear
1300	35.42		4.00	6.45	18.39	29.04		2.31	41.6	2.0	Clear
1305	Collect sample										

Signature: G. Kiffe Date: 09/17/14

PROJECT NUMBER	WELL NUMBER
433191.FI.FK.20	MW 18

GROUNDWATER SAMPLING DATA SHEET

SAMPLE INFORMATION

Client:	NAVFAC	Well ID:	MW18
Location:	Vieques - SWMU 20	Sample ID:	VEP4-GW18—914 -MS & -SD
Event:	Groundwater Sampling	MS/MSD:	Yes (Yes/No)
Date:	9/15/14		
Weather:	Sunny, humid, 85°F	FD:	(Yes/No)
PID:	0		
Total Depth:	45.00 FT. (BTOC)	Sample Team:	G. Kiffe
Depth to water (-)	30.24 FT. (BTOC)		L. Parker
Water Column:	14.76 FT.	Measuring Device:	Heron Dipper T
(x)	0.163 GAL./FT.	Date and Time:	9/15/14 1345
Well Volume:	GAL.		
Total Purge Volume:	5.0 GAL.		
Purge Device:	Hurricane Pump		
Sample Time:	1510		
Sample Appearance:	Clear		
Flow Rate:	Purge rate: 200 mL/min, Pump depth: 40'		

WELL DIAMETER

[(2" DIA.= .163 GAL./FT.) (4" DIA. = .653 GAL./FT.)]

(1" DIA.= .041 GALIFT.) (1 1/4" DIA.= .064 GALIFT.)

FIELD PARAMETERS

Time	Depth to Water (DTW)	Flow Rate	Purged Vol. (gals)	pH w/in 0.1	Cond. ms/cm	Temp., (°C)	DO (%)	DO (mg/L) w/in 10%	ORP	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1400	30.45			6.75	9.684	29.08		6.00	224.8	55.7	Clear
1405	30.38		0.30	6.73	9.676	29.14		5.84	224.9	94.3	Clear
1410	30.38		0.60	6.68	9.681	29.32		5.42	227.6	60.5	Clear
1415	30.38		0.90	6.66	9.703	29.48		4.24	229.8	37.1	Clear
1420	30.35		1.50	6.66	9.707	29.63		4.11	231	67.8	Clear
1425	30.35		1.80	6.65	9.728	29.60		3.58	232.6	60.9	Clear
1430	30.32		2.20	6.65	9.742	29.67		3.30	233.2	53.5	Clear
1435	30.32		2.50	6.65	9.76	29.82		2.90	235	40.1	Clear
1440	30.30		2.80	6.65	9.765	29.83		2.63	233.9	30.3	Clear
1445	30.30		3.10	6.65	9.77	29.95		2.44	234.5	22.8	Clear
1450	30.30		3.50	6.66	9.776	30.10		2.23	235.4	18.5	Clear
1455	30.30		3.80	6.65	9.785	29.79		2.10	234.1	13.6	Clear
1500	30.30		4.10	6.64	9.786	29.81		1.98	233.9	12.5	Clear
1505	30.30		4.40	6.64	9.796	29.80		1.96	232.2	15.1	Clear
1510	Collect sample + MS/MSD										

Signature: G. Kiffe Date: 09/15/14

PROJECT NUMBER	WELL NUMBER
433191.FI.FK.20	MW 19

GROUNDWATER SAMPLING DATA SHEET

SAMPLE INFORMATION

Client:	NAVFAC	Well ID:	VEP4-MW19
Location:	Vieques - SWMU 20	Sample ID:	VEP4-GW19-0914
Event:	Groundwater Sampling	MS/MSD:	No (Yes/No)
Date:	9/15/14		
Weather:	Sunny, humid, 82°F	FD:	(Yes/No)
PID:	0		
Total Depth:	39.00 FT. (BTOC)	Sample Team:	G. Kiffe
Depth to wate (-)	29.70 FT. (BTOC)		L. Parker
Water Column:	9.30 FT.	Measuring Device:	Heron Dipper T
(x)	0.163 GAL./FT.	Date and Time:	9/15/2014 0930
Well Volume:	1.5 GAL.		
Total Purge Volume:	6.0 GAL.		
Purge Device:	Hurricane Pump		
Sample Time:	9/15/14 1105		
Sample Appearance:	Clear		
Flow Rate:	Purge rate: 250 mL/min, Pump deptch: 34'		

WELL DIAMETER

[(2" DIA.= .163 GAL./FT.) (4" DIA. = .653 GAL./FT.)]

(1" DIA.= .041 GALIFT.) (1 1/4" DIA.= .064 GALIFT.)

FIELD PARAMETERS

Time	Depth to Water (DTW)	Flow Rate	Purged Vol. (gals)	pH w/in 0.1	Cond. ms/cm	Temp., (°C)	DO (%)	DO (mg/L) w/in 10%	ORP	Turbidity (NTU) w/in 10%	Color / Odor / Comments
950	29.92		0.50	6.58	9.642	28.61		4.38	275.3	>1000	very cloudy, brown
955	29.84		0.75	6.58	9.636	28.66		4.03	274.1	289	very cloudy, brown
1000	29.79		1.00	6.60	9.65	28.96		3.27	266.8	201	very cloudy, brown
1005	29.79		1.25	6.65	9.639	29.20		3.22	261.6	94.8	very cloudy, brown
1010	29.82		1.50	6.63	9.641	29.31		3.01	258.3	79.7	Clear
1015	29.80		2.00	6.63	9.646	29.40		2.65	254.4	54.7	Clear
1020	29.80		2.50	6.62	9.647	29.42		2.56	253.3	49.2	Clear
1025	29.80		2.75	6.62	9.645	29.39		2.39	250.7	48.8	Clear
1030	29.80		3.50	6.62	9.639	29.58		2.36	246.3	43.8	Clear
1035	29.80		4.00	6.63	9.628	29.86		2.26	242.8	35.7	Clear
1040	29.80		4.25	6.63	9.644	29.83		2.17	241.7	30.9	Clear
1045	29.80		4.50	6.62	9.612	29.62		1.96	236.9	23.0	Clear
1050	29.80		5.00	6.63	9.605	29.80		1.75	233	20.9	Clear
1055	29.80		5.25	6.64	9.606	29.79		1.71	232.4	21.4	Clear
1100	29.80		5.50	6.65	9.599	29.98		1.63	233	22.0	Clear
1105	Collect sample										

Signature: G. Kiffe Date: 09/15/14

PROJECT NUMBER	WELL NUMBER
433191.FI.FK.20	MW 20

GROUNDWATER SAMPLING DATA SHEET

SAMPLE INFORMATION

Client:	NAVFAC	Well ID:	VEP4-MW20
Location:	Vieques - SWMU 20	Sample ID:	VEP4-GW20-0914
Event:	Groundwater Sampling	MS/MSD:	(Yes/No)
Date:	9/12/14		
Weather:	Sunny, humid, 85°F	FD:	(Yes/No)
PID:	0.2 ppm		
Total Depth:	49.00 FT. (BTOC)	Sample Team:	G. Kiffe
Depth to water (-)	34.32 FT. (BTOC)		L. Parker
Water Column:	14.68 FT.	Measuring Device:	Heron Dipper T
(x)	0.163 GAL./FT.	Date and Time:	9/12/14 1230
Well Volume:	2.4 GAL.		
Total Purge Volume:	9.0 GAL.		
Purge Device:	Hurricane Pump		
Sample Time:	1410		
Sample Appearance:	Clear		
Flow Rate:	Purge rate: 250 mL/min, pump depth: 44'		

WELL DIAMETER

[(2" DIA.= .163 GAL./FT.) (4" DIA. = .653 GAL./FT.)]

(1" DIA.= .041 GALIFT.) (1 1/4" DIA.= .064 GALIFT.)

FIELD PARAMETERS

Time	Depth to Water (DTW)	Flow Rate	Purged Vol. (gals)	pH w/in 0.1	Cond. ms/cm	Temp., (°C)	DO (%)	DO (mg/L) w/in 10%	ORP	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1245	34.50			7.05	6.08	28.96		1.40	-28.7	>1000	Very cloudy, brown-grey
1250	34.48		0.50	6.90	6.149	29.40		1.35	-77.6	>1000	Very cloudy, brown-grey
1255	34.52		1.00	6.87	6.248	29.68		1.31	-113.7	>1000	Very cloudy, brown-grey
1300	34.50		1.50	6.86	6.264	29.59		1.29	-99.7	>1000	Very cloudy, brown-grey
1305	34.50		2.00	6.84	6.284	29.56		1.31	-120.1	222	Very cloudy, brown-grey
1310	34.50		2.50	6.85	6.294	29.52		1.32	-120.8	102	Very cloudy, brown-grey
1315	34.50		3.00	6.85	6.297	29.72		1.24	-108.7	54.7	Clear
1320	34.50		3.50	6.85	6.321	29.67		1.23	-102.4	53.6	Clear
1325	34.50		4.00	6.84	6.301	29.74		1.16	-90.4	39.0	Clear
1330	34.50		4.50	6.84	6.299	29.68		1.12	-95.3	32.2	Clear
1335	34.50		5.00	6.84	6.308	29.62		1.17	-96.4	23.2	Clear
1340	34.50		5.50	6.84	6.32	29.80		1.27	-95.7	18.8	Clear
1345	34.50		6.00	6.83	6.324	29.60		1.14	-96.7	19.5	Clear
1350	34.50		6.50	6.83	6.317	29.64		1.14	-84.6	20.0	Clear
1355	34.50		7.00	6.83	6.328	29.57		1.08	-75	16.1	Clear
1400	34.50		7.50	6.83	6.317	29.6		1.06	-70.1	13.2	Clear
1405	34.58		8.00	6.83	6.316	29.63		1.07	-65	11.8	Clear
1410			Sample collected								

Signature: G. Kiffe Date: 09/12/14

PROJECT NUMBER	WELL NUMBER
433191.FI.FK.20	MW 21

GROUNDWATER SAMPLING DATA SHEET

SAMPLE INFORMATION

Client:	NAVFAC	Well ID:	VEP4-MW21
Location:	Vieques - SWMU 20	Sample ID:	VEP-GW21-0914
Event:	Groundwater Sampling	MS/MSD:	(Yes/No)
Date:	9/11/14		
Weather:	Sunny, Humid, 84°F	FD:	(Yes/No)
PID:	0		
Total Depth:	60.00 FT. (BTOC)	Sample Team:	G. Kiffe
Depth to wate (-)	35.82 FT. (BTOC)		L. Parker
Water Column:	24.18 FT.	Measuring Device:	Heron Dipper T
(x)	0.163 GAL./FT.	Date and Time:	9/11/2014
Well Volume:	3.9 GAL.		
Total Purge Volume:	4.0 GAL.		
Purge Device:	Hurricane Pump		
Sample Time:	1300		
Sample Appearance:	Clear		
Flow Rate:	250 mL/min, pump depth: 55'		

WELL DIAMETER

[(2" DIA.= .163 GAL./FT.) (4" DIA. = .653 GAL./FT.)]

(1" DIA.= .041 GALIFT.) (1 1/4" DIA.= .064 GALIFT.)

FIELD PARAMETERS

Time	Depth to Water (DTW)	Flow Rate	Purged Vol. (gals)	pH w/in 0.1	Cond. ms/cm	Temp., (°C)	DO (%)	DO (mg/L) w/in 10%	ORP	Turbidity (NTU) w/in 10%	Color / Odor / Comments
12:25	36.40		0.50	7.09	2.412	28.85		2.66	155.9	33.1	Clear
12:30	36.40		1.00	7.03	2.67	29.22		2.12	155.6	6.79	Clear
12:35	36.30		1.50	7.03	2.738	29.35		2.17	155.7	3.23	Clear
12:40	36.23		2.00	7.03	2.793	29.23		2.24	156.2	2.06	Clear
12:45	36.25		2.50	7.03	2.795	29.32		2.31	155.2	1.99	Clear
12:50	36.28		3.00	7.03	2.816	29.46		2.28	154.9	1.6	Clear
12:55	36.30		3.50	7.03	2.843	29.40		2.23	154.6	1.32	Clear
1300	36.22		collect sample								

Signature: G. Kiffe Date:

PROJECT NUMBER	WELL NUMBER
433191.FI.FK.20	MW 22

GROUNDWATER SAMPLING DATA SHEET

SAMPLE INFORMATION

Client:	NAVFAC	Well ID:	VEP4-MW22
Location:	Vieques - SWMU 22	Sample ID:	VEP4-GW22-0914 & GW22P-0914
Event:	Groundwater Sampling	MS/MSD:	No Field dup (Yes/No)
Date:	9/11/14		
Weather:	Cloudy, some rain, 81 deg F	FD:	(Yes/No)
PID:	0		
Total Depth:	38.00 FT. (BTOC)	Sample Team:	G. Kiffe
Depth to wate (-)	30.88 FT. (BTOC)		L. Parker
Water Column:	7.12 FT.	Measuring Device:	Heron Dipper T
(x)	0.163 GAL./FT.	Date and Time:	9/11/2014
Well Volume:	1.2 GAL.		
Total Purge Volume:	10.0 GAL.		
Purge Device:	Hurricane Pump		
Sample Time:	Parent -11.05 & Duplicate 1110		
Sample Appearance:	Clear		
Flow Rate:	Purge rate: 300 mL/min, pump depth: 34'		

WELL DIAMETER

[(2" DIA.= .163 GAL./FT.) (4" DIA. = .653 GAL./FT.)]

(1" DIA.= .041 GALIFT.) (1 1/4" DIA.= .064 GALIFT.)

FIELD PARAMETERS

Time	Depth to Water (DTW)	Flow Rate	Purged Vol. (gals)	pH w/in 0.1	Cond. ms/cm	Temp., (°C)	DO (%)	DO (mg/L) w/in 10%	ORP	Turbidity (NTU) w/in 10%	Color / Odor / Comments
920	30.92			6.97	2.63	28.97		1.49	118.2	>1000	Brown, very cloudy
925	30.92		0.50	6.99	2.651	29.57		1.42	124.4	741	Brown, very cloudy
930	30.92		1.00	6.99	2.662	29.60		1.5	130.2	635	Brown, very cloudy
935	30.92		1.50	6.99	2.673	29.65		1.66	133.8	553	Brown, very cloudy
940	30.90		2.00	6.99	2.677	29.77		1.73	136.2	500	Brown, very cloudy
945	30.90		2.50	6.99	2.678	29.64		1.6	139.6	477	Brown, very cloudy
950	30.90		3.00	6.99	2.681	29.79		1.72	142.8	397	Brown, very cloudy
955	30.90		3.50	6.99	2.683	29.82		1.78	145.8	282	Brown, very cloudy
1000	30.90		4.00	6.99	2.687	29.84		1.84	148.1	193.0	Brown, very cloudy
1005	30.90		4.50	6.99	2.686	29.90		1.81	149.6	174.0	Brown, very cloudy
1010	30.90		5.00	6.98	2.692	29.90		1.91	151.2	151.0	Brown, very cloudy
1015	30.90		5.50	6.98	2.692	29.90		1.89	151.3	129.0	Brown, very cloudy
1020	30.90		6.00	6.98	2.693	29.96		1.95	152.1	71.8	Clear
1025	30.90		6.50	6.98	2.692	29.90		2.48	153.2	65.8	Clear
1030	30.90		7.00	6.98	2.696	29.73		2.38	153.8	45.9	Clear
1035	30.90		7.50	6.98	2.693	29.83		2.41	153.9	52.9	Clear
1040	30.90		8.00	6.98	2.692	29.87		2.37	154.1	42.7	Clear
1045	30.90		8.90	6.98	2.696	29.83		2.38	155.3	35.4	Clear
1050	30.90		9.00	6.98	2.698	29.84		2.4	155.6	25.5	Clear
1055	30.90		9.50	6.98	2.697	29.76		2.48	156	24.6	Clear
1100	30.90		10 gals	6.98	2.697	29.77		2.37	156.1	23.9	Clear
1105			collect	Parent	Sample						Clear
1110			collect	Fields	duplicate						Clear

Signature: G. Kiffe Date: 09/11/14

PROJECT NUMBER	WELL NUMBER
433193.FI.FK.20	MW23

GROUNDWATER SAMPLING DATA SHEET

SAMPLE INFORMATION

Client:	NAVFAC	Well ID:	VEP4-MW23
Location:	Vieques - SWMU 20	Sample ID:	VEP4-MW23-0914
Event:	Groundwater Sampling	MS/MSD:	No (Yes/No)
Date:	9/17/14		
Weather:	Sunny, humid, 80°F	FD:	(Yes/No)
PID:			
Total Depth:	38.00 FT. (BTOC)	Sample Team:	G. Kiffe
Depth to water (-)	29.70 FT. (BTOC)		L. Parker
Water Column:	8.30 FT.	Measuring Device:	Heron Dipper T
(x)	0.163 GAL./FT.	Date and Time:	9/17/2014 0905
Well Volume:	1.4 GAL.		
Total Purge Volume:	7.5 GAL.		
Purge Device:	Hurricane Pump		
Sample Time:	1055		
Sample Appearance:	clear		
Flow Rate:	225 mL/min Pump Depth = 34'		

WELL DIAMETER

[(2" DIA.= .163 GAL./FT.) (4" DIA. = .653 GAL./FT.)]

(1" DIA.= .041 GALIFT.) (1 1/4" DIA.= .064 GALIFT.)

FIELD PARAMETERS

Time	Depth to Water (DTW)	Flow Rate	Purged Vol. (gals)	pH w/in 0.1	Cond. ms/cm	Temp., (°C)	DO (%)	DO (mg/L) w/in 10%	ORP	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0925	29.88		--	6.37	15.06	28.64		6.09	277.7	>1000	Very brown, cloudy
0930	29.81		0.4	6.47	15.06	29.34		4.76	268.9	863	Very brown, cloudy
0935	29.81		0.8	6.48	15.09	29.62		4.67	267.2	419	Very brown, cloudy
0940	29.80		1.2	6.49	15.09	30.00		3.07	265.2	230	Very brown, cloudy
0945			1.6	6.49	15.09	30.18		3.02	262.6	289	Very brown, cloudy
0950	29.84		2.0	6.50	15.09	30.46		2.73	259.7	324	Very brown, cloudy
0955	29.80		2.4	6.50	15.06	30.29		2.43	257.8	113	Very brown, cloudy
1000			2.8	6.50	15.06	30.31		2.24	255.6	78.3	Clear
1005			3.2	6.50	15.04	30.40		1.96	244.8	48.2	Clear
1010	29.80		3.6	6.50	15.04	30.45		1.81	241.5	56.5	Clear
1015			4.0	6.51	15.05	30.35		1.99	241.5	42.1	Clear
1020			4.4	6.51	15.04	30.43		1.84	241.2	30.1	Clear
1025			4.8	6.51	15.06	30.51		1.82	241.6	22.9	Clear
1030			5.2	6.52	15.10	29.83		1.24	222.8	30.9	Clear
1035			5.6	6.50	15.08	29.85		0.90	225.5	21.3	Clear
1040			6.0	6.50	15.08	30.00		0.84	215.5	14.4	Clear
1045			6.4	6.50	14.99	30.13		0.85	213.6	12.2	Clear
1050			6.8	6.50	15.10	30.24		0.81	213.4	9.24	Clear
1055	Collect Sample										

Signature: G. Kiffe Date: 09/17/14

PROJECT NUMBER	WELL NUMBER
433193.FI.FK.20	MW24

GROUNDWATER SAMPLING DATA SHEET

SAMPLE INFORMATION

Client:	NAVFAC	Well ID:	VEP4-MW24
Location:	Vieques - SWMU 20	Sample ID:	VEP4-MW24-0914 & VEP4-GW24P-0914
Event:	Groundwater Sampling	MS/MSD:	NO (Yes/No)
Date:	9/23/14		
Weather:	Mostly sunny, humid, 85°F	FD:	Yes (Yes/No)
PID:			
Total Depth:	45.00 FT. (BTOC)	Sample Team:	G. Kiffe
Depth to wate (-)	29.62 FT. (BTOC)		L. Parker
Water Column:	14.38 FT.	Measuring Device:	Heron Dipper T
(x)	GAL./FT.	Date and Time:	9/23/2014
Well Volume:	GAL.		
Total Purge Volume:	5.5 GAL.		
Purge Device:	Hurricane Pump & LDPE tubing		
Sample Time:	1430		
Sample Appearance:	Clear		
Flow Rate:	250 mL/min Pump depth = 40'		

WELL DIAMETER

[(2" DIA.= .163 GAL./FT.) (4" DIA. = .653 GAL./FT.)]

(1" DIA.= .041 GALIFT.) (1 1/4" DIA.= .064 GALIFT.)

FIELD PARAMETERS

Time	Depth to Water (DTW)	Flow Rate	Purged Vol. (gals)	pH w/in 0.1	Cond. ms/cm	Temp., (°C)	DO (%)	DO (mg/L) w/in 10%	ORP	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1340	29.85		--	6.86	6.313	28.90	11.7	0.88	-3.0	214	Light brown, slightly cloudy
1345	29.84		0.5	6.83	6.327	28.87	9.5	0.77	29.6	240	Light brown, slightly cloudy
1350	29.89		1.0	6.80	6.322	28.82	10.0	0.79	25.1	177	Light brown, slightly cloudy
1355	29.84		1.5	6.80	6.328	28.92	10.1	0.77	37.1	37.5	Clear
1400	29.87		2.0	6.79	6.326	28.99	10.9	0.82	38.7	7.82	Clear
1405	29.87		2.5	6.78	6.351	29.00	10.7	0.80	31.9	8.97	Clear
1410	29.85		3.0	6.78	6.367	29.04	10.2	0.77	31.8	5.08	Clear
1415	29.82		3.5	6.78	6.365	29.12	10.9	0.82	40.8	4.54	Clear
1420	29.85		4.0	6.78	6.378	29.10	10.4	0.78	38.9	3.97	Clear
1425	29.81		4.5	6.78	6.387	29.09	11.0	0.83	37.6	3.34	Clear
1430	Collect parent sample										
1435	Collect duplicate sample										

Signature: G. Kiffe Date: 09/23/14

PROJECT NUMBER	WELL NUMBER
433193.FI.FK.20	MW24D

GROUNDWATER SAMPLING DATA SHEET

SAMPLE INFORMATION

Client:	NAVFAC	Well ID:	VEP4-MW24D
Location:	Vieques - SWMU 20	Sample ID:	VEP4-MW24D-0914
Event:	Groundwater Sampling	MS/MSD:	NO (Yes/No)
Date:	9/26/14		
Weather:	Sunny, humid, 83°F	FD:	NO (Yes/No)
PID:			
Total Depth:	74.30 FT. (BTOC)	Sample Team:	G. Kiffe
Depth to water (-)	29.98 FT. (BTOC)		L. Parker
Water Column:	44.32 FT.	Measuring Device:	Heron Dipper T
(x)	GAL./FT.	Date and Time:	9/26/2014
Well Volume:	7.2 GAL.		
Total Purge Volume:	6.5 GAL.		
Purge Device:	Hurricane Pump & teflon tubing		
Sample Time:	1345		
Sample Appearance:	clear		
Flow Rate:	250 mL/min Pump depth = 69 FT		

WELL DIAMETER

[(2" DIA.= .163 GAL./FT.) (4" DIA. = .653 GAL./FT.)]

(1" DIA.= .041 GALIFT.) (1 1/4" DIA.= .064 GALIFT.)

FIELD PARAMETERS

Time	Depth to Water (DTW)	Flow Rate	Purged Vol. (gals)	pH w/in 0.1	Cond. µs/cm	Temp., (°C)	DO (%)	DO (mg/L) w/in 10%	ORP	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1235	31.72		--	6.82	8.076	28.45	23.9	1.75	127.8	16.0	Clear
1240	31.80		0.5	6.79	8.069	28.61	23.8	1.79	119.0	15.6	Clear
1245	31.68		1.0	6.77	8.293	28.77	23.6	1.76	112.0	13.5	Clear
1250	31.73		1.5	6.77	8.322	28.79	23.2	1.73	112.5	10.2	Clear
1255	31.82		2.0	6.76	8.432	28.80	23.0	1.72	111.8	8.51	Clear
1300	31.80		2.5	6.76	8.420	28.77	23.3	1.77	111.6	8.36	Clear
1305	31.70		3.0	6.77	8.430	28.77	24.6	1.82	110.7	7.32	Clear
1310	31.85		3.5	6.76	8.432	28.74	25.8	1.93	109.0	5.00	Clear
1315	31.62		4.0	6.77	8.477	28.90	25.6	1.87	108.5	4.75	Clear
1320	31.72		4.5	6.76	8.463	28.68	25.6	1.98	107.0	3.45	Clear
1325	31.76		5.0	6.76	8.498	28.67	25.0	1.88	106.5	2.39	Clear
1330	31.40		5.5	6.76	8.503	28.76	26.9	2.04	106.4	2.17	Clear
1335	31.58		6.0	6.75	8.551	28.71	25.5	1.93	109.2	1.32	Clear
1340	31.35		6.5	6.76	8.561	28.78	26.3	1.98	108.5	1.03	Clear
1345	Collect sample										

Signature: G. Kiffe Date: 09/26/14

PROJECT NUMBER	WELL NUMBER
433193.FI.FK.20	MW25

GROUNDWATER SAMPLING DATA SHEET

SAMPLE INFORMATION

Client:	NAVFAC	Well ID:	VEP4-MW25
Location:	Vieques - SWMU 20	Sample ID:	VEP4-MW25-0914
Event:	Groundwater Sampling	MS/MSD:	No (Yes/No)
Date:	9/18/14		
Weather:	Sunny, humid, 82°F	FD:	(Yes/No)
PID:	NA		
Total Depth:	30.00 FT. (BTOC)	Sample Team:	G. Kiffe
Depth to water (-)	20.88 FT. (BTOC)		L. Parker
Water Column:	9.01 FT.	Measuring Device:	Heron Dipper T
(x)	0.163 GAL./FT.	Date and Time:	9/18/2014
Well Volume:	1.5 GAL.		
Total Purge Volume:	7.0 GAL.		
Purge Device:	Hurricane Pump		
Sample Time:	1115		
Sample Appearance:	clear		
Flow Rate:	250 mL/min Pump depth = 26 '		

WELL DIAMETER

[(2" DIA.= .163 GAL./FT.) (4" DIA. = .653 GAL./FT.)]

(1" DIA.= .041 GALIFT.) (1 1/4" DIA.= .064 GALIFT.)

FIELD PARAMETERS

Time	Depth to Water (DTW)	Flow Rate	Purged Vol. (gals)	pH w/in 0.1	Cond. ms/cm	Temp., (°C)	DO (%)	DO (mg/L) w/in 10%	ORP	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1000	21.03		--	6.67	8.963	29.16		11.91	181.7	127	Brown, slightly cloudy
1005	21.11		0.5	6.76	9.271	29.21		22.66	180.7	29.1	Clear
1010	20.99		1.0	6.74	11.07	29.20		27.67	181.8	24.4	Clear
1015	21.08		1.5	6.76	11.73	29.05		53.62	175.3	43.4	Clear
1020	21.08		2.0	6.75	11.97	29.08		55.29	173.1	32.1	Clear
1025	Switch out YSI. DO reading too high										Clear
1030	21.02		2.5	6.53	11.42	28.93		1.29	293.7	36.9	Clear
1035	21.00		3.0	6.64	11.57	28.94		0.91	289.2	11.5	Clear
1040	21.00		3.5	6.68	11.65	29.12		0.79	286.2	4.80	Clear
1045	21.00		4.0	6.69	11.70	29.26		0.82	282.4	4.44	Clear
1050	21.00		4.5	6.70	11.61	29.39		0.71	278.2	5.32	Clear
1055	21.00		5.0	6.71	11.51	29.58		0.62	273.6	6.55	Clear
1100	21.00		5.5	6.72	11.33	29.52		0.60	270.1	5.34	Clear
1105	21.00		6.0	6.72	11.18	29.67		0.59	267.1	5.21	Clear
1110	21.00		6.5	6.73	11.09	29.55		0.59	264.4	4.60	Clear
1115	Collect sample										

Signature: G. Kiffe Date: 09/18/14

PROJECT NUMBER	WELL NUMBER
433193.FI.FK.20	MW25D

GROUNDWATER SAMPLING DATA SHEET

SAMPLE INFORMATION

Client:	NAVFAC	Well ID:	VEP4-MW25D
Location:	Vieques - SWMU 20	Sample ID:	VEP4-MW25D-0914
Event:	Groundwater Sampling	MS/MSD:	NO (Yes/No)
Date:	9/23/14		
Weather:	Mostly sunny, humid, 83°F	FD:	NO (Yes/No)
PID:			
Total Depth:	FT. (BTOC)	Sample Team:	G. Kiffe
Depth to wate (-)	19.75 FT. (BTOC)		L. Parker
Water Column:	FT.	Measuring Device:	Heron Dipper T
(x)	GAL./FT.	Date and Time:	9/23/2014 1240
Well Volume:	GAL.		
Total Purge Volume:	6.5 GAL.		
Purge Device:	Hurricane Pump &LDPE tubing		
Sample Time:			
Sample Appearance:	Clear		
Flow Rate:	200 mL/min		

WELL DIAMETER

[(2" DIA.= .163 GAL./FT.) (4" DIA. = .653 GAL./FT.)]

(1" DIA.= .041 GALIFT.) (1 1/4" DIA.= .064 GALIFT.)

FIELD PARAMETERS

Time	Depth to Water (DTW)	Flow Rate	Purged Vol. (gals)	pH w/in 0.1	Cond. ms/cm	Temp., (°C)	DO (%)	DO (mg/L) w/in 10%	ORP	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1130	21.80		--	7.01	8.480	28.95	31.3	2.34	45.0	556	Light brown, slighly cloudy
1135	21.72		0.5	6.95	8.460	29.05	30.2	2.21	49.2	526	Light brown, slighly cloudy
1140	21.65		1.0	6.90	8.449	29.14	28.1	2.10	53.6	510	Light brown, slighly cloudy
1145	21.58		1.5	6.87	8.439	29.18	26.4	1.98	54.3	114	Light brown, slighly cloudy
1150	21.60		2.0	6.86	8.377	29.15	27.6	1.99	53.4	34.9	Clear
1155	21.39		2.5	6.86	8.346	29.44	25.8	1.92	52.1	24.1	Clear
1200	Horiba disconnected; reconnect and continue purge										
1205	21.45		3.0	6.89	8.350	28.91	25.4	1.89	96.8	9.63	Clear
1210	21.55		3.5	6.88	8.363	29.18	25.6	1.90	88.1	8.23	Clear
1215	21.55		4.0	6.87	8.397	29.25	25.3	1.90	80.7	6.14	Clear
1220	21.60		4.5	6.86	8.406	29.38	25.3	1.89	72.3	5.19	Clear
1225	21.70		5.0	6.85	8.384	29.08	25.6	1.91	65.8	5.03	Clear
1230	21.80		5.5	6.86	8.242	29.12	25.9	1.95	61.7	3.49	Clear
1235	21.85		6.0	6.86	8.235	29.15	25.7	1.93	61.5	2.63	Clear
1240	Collect sample										

Signature: G. Kiffe Date: 09/23/14

PROJECT NUMBER	WELL NUMBER
433193.FI.FK.20	MW26

GROUNDWATER SAMPLING DATA SHEET

SAMPLE INFORMATION

Client:	NAVFAC	Well ID:	VEP4-MW26
Location:	Vieques - SWMU 20	Sample ID:	VEP4-MW26-0914
Event:	Groundwater Sampling	MS/MSD:	No (Yes/No)
Date:	9/12/14		
Weather:	Sunny, 80°F	FD:	(Yes/No)
PID:	0		
Total Depth:	30.00 FT. (BTOC)	Sample Team:	G. Kiffe
Depth to water (-)	21.65 FT. (BTOC)		L. Parker
Water Column:	8.35 FT.	Measuring Device:	Heron Dipper T
(x)	0.163 GAL./FT.	Date and Time:	9/12/2014
Well Volume:	1.4 GAL.		
Total Purge Volume:	8.0 GAL.		
Purge Device:	Hurricane Pump		
Sample Time:	1055		
Sample Appearance:	clear		
Flow Rate:	250 mL/min; pump depth = 25 FT		

WELL DIAMETER

[(2" DIA.= .163 GAL./FT.) (4" DIA. = .653 GAL./FT.)]

(1" DIA.= .041 GALIFT.) (1 1/4" DIA.= .064 GALIFT.)

FIELD PARAMETERS

Time	Depth to Water (DTW)	Flow Rate	Purged Vol. (gals)	pH w/in 0.1	Cond. ms/cm	Temp., (°C)	DO (%)	DO (mg/L) w/in 10%	ORP	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0920	21.70		0.4	5.93	23.18	28.85		128.60	95.6	305	Brown, cloudy
0925	21.70		0.8	6.45	23.29	28.84		3.31	54.4	204	Brown, cloudy
0930	21.70		1.2	6.51	23.28	29.17		2.76	40.4	110	Brown, cloudy
0935	21.70		1.6	6.52	23.28	29.17		2.23	29.8	116	Brown, cloudy
0940	21.70		2.0	6.53	23.27	29.29		2.01	27.6	107	Brown, cloudy
0945	21.70		2.4	6.53	23.27	29.27		1.78	38.2	110	Brown, cloudy
0950	21.70		2.8	6.53	23.24	29.26		1.66	33.7	94.7	Brown, cloudy
0955	21.70		3.2	6.54	23.23	29.41		1.62	19.1	86.1	Clear
1000	21.70		3.6	6.54	23.23	29.43		1.54	24.5	92.4	Clear
1005	21.70		4.0	6.54	23.22	29.38		1.42	21.6	101	Clear
1010	21.70		4.4	6.54	23.21	29.45		1.31	21.3	42.6	Clear
1015	21.70		4.8	6.54	23.21	29.41		1.29	11.2	27.7	Clear
1020	21.70		5.2	6.54	23.20	29.40		1.13	10.3	18.3	Clear
1025	21.70		5.6	6.55	23.19	29.23		1.18	13.1	14.2	Clear
1030	21.70		6.0	6.54	23.19	29.46		1.18	12.2	12	Clear
1035	21.70		6.4	6.54	23.18	29.52		1.24	17.6	9.55	Clear
1040	21.70		6.8	6.54	23.18	29.55		1.13	13.0	8.9	Clear
1045	21.70		7.2	6.55	23.17	29.62		1.16	7.3	8.57	Clear
1050	21.70		7.6	6.55	23.16	29.67		1.05	6.6	7.2	Clear
1055	Collect Samples										

Signature: G. Kiffe Date: 09/12/14

PROJECT NUMBER	WELL NUMBER
433193.FI.FK.20	VEP4-MW27

GROUNDWATER SAMPLING DATA SHEET

SAMPLE INFORMATION

Client:	NAVFAC	Well ID:	VEP4-MW27
Location:	Vieques - SWMU 20	Sample ID:	VEP4-MW27-0914
Event:	Groundwater Sampling	MS/MSD:	(Yes/No)
Date:	9/10/14		
Weather:	Sunny, 80°F	FD:	(Yes/No)
PID:			
Total Depth:	30.00 FT. (BTOC)	Sample Team:	G. Kiffe
Depth to water (-)	11.16 FT. (BTOC)		L. Parker
Water Column:	18.84 FT.	Measuring Device:	Heron Dipper T
(x)	0.163 GAL./FT.	Date and Time:	9/10/2014
Well Volume:	3.1 GAL.		
Total Purge Volume:	5.0 GAL.		
Purge Device:	Hurricane Pump		
Sample Time:			
Sample Appearance:			
Flow Rate:	300 mL		

WELL DIAMETER

[(2" DIA.= .163 GAL./FT.) (4" DIA. = .653 GAL./FT.)]

(1" DIA.= .041 GALIFT.) (1 1/4" DIA.= .064 GALIFT.)

FIELD PARAMETERS

Time	Depth to Water (DTW)	Flow Rate	Purged Vol. (gals)	pH w/in 0.1	Cond. ms/cm	Temp., (°C)	DO (%)	DO* (mg/L) w/in 10%	ORP	Turbidity (NTU) w/in 10%	Color / Odor / Comments
14:25	11.16		0.5	6.57	31.35	28.06	11.48	0.85	24.0	320.00	Brown, cloudy
14:30	11.16		1.0	6.54	31.35	28.37	11.63	0.86	18.1	256.00	Brown, cloudy
14:35	11.16		1.5	6.50	30.70	28.19	12.22	0.86	11.3	201.00	Brown, cloudy
14:40	11.16		2.0	6.49	30.48	28.18	12.33	0.87	9.7	122.00	Brown, cloudy
14:45	11.16		2.5	6.48	30.67	28.24	12.46	0.88	16.4	53.30	Clear
14:50	11.16		3.0	6.48	30.32	28.48	12.82	0.90	18.6	15.30	Clear
14:55	11.16		3.5	6.48	30.35	28.64	12.84	0.90	13.1	9.37	Clear
15:00	11.16		4.0	6.48	30.32	28.45	12.91	0.91	33.9	6.30	Clear
15:05	11.16		4.5	6.48	30.25	28.66	12.92	0.91	35.9	5.64	Clear
15:10	11.16		5.0	6.48	30.25	28.42	13.00	0.92	39.6	5.10	Clear
15:15	Collect sample										

Signature: G. Kiffe Date: 09/10/14

PROJECT NUMBER	WELL NUMBER
433191.FI.FK.20	MW 28

GROUNDWATER SAMPLING DATA SHEET

SAMPLE INFORMATION

Client:	NAVFAC	Well ID:	VEP4-MW28
Location:	Vieques - SWMU 20	Sample ID:	VEP4-GW28-0914 + -MS/-SD
Event:	Groundwater Sampling	MS/MSD:	Yes (Yes/No)
Date:	9/9/14		
Weather:	Sunny, 80°F	FD:	No (Yes/No)
PID:	0		
Total Depth:	25.90 FT. (BTOC)	Sample Team:	G. Kiffe
Depth to wate (-)	9.29 FT. (BTOC)		L. Parker
Water Column:	16.61 FT.	Measuring Device:	Heron Dipper T
(x)	0.163 GAL./FT.	Date and Time:	9/9/2014 1330
Well Volume:	2.7 GAL.		
Total Purge Volume:	4.0 GAL.		
Purge Device:	Hurricane Pump		
Sample Time:	1500		
Sample Appearance:	Clear		
Flow Rate:	250 mL/min, pump depth=21'		

WELL DIAMETER

[(2" DIA.= .163 GAL./FT.) (4" DIA. = .653 GAL./FT.)]

(1" DIA.= .041 GALIFT.) (1 1/4" DIA.= .064 GALIFT.)

FIELD PARAMETERS

Time	Depth to Water (DTW)	Flow Rate	Purged Vol. (gals)	pH w/in 0.1	Cond. ms/cm	Temp., (°C)	DO (%)	DO (mg/L) w/in 10%	ORP	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1355	9.35		0.50	6.84	21354			1.54	188.4	340	brown, cloudy
1400	9.32		0.75	6.82	21350			1.41	179.3	320	brown, cloudy
1405	9.32		1.00	6.82	21346			1.2	170.1	299	brown, cloudy
1410	9.32		1.25	6.83	21342			1.05	166.4	252	brown, cloudy
1415	9.32		1.50	6.83	21350			1.1	165.2	203	brown, cloudy
1420	9.32		1.75	6.83	21352			1.12	164	169	brown, cloudy
1425	9.32		2.00	6.83	21360			1.15	163.5	121	brown, cloudy
1430	9.32		2.25	6.83	21365			1.17	163.2	83.9	clear
1435	9.32		2.50	6.83	21368			1.11	161.1	26.3	clear
1440	9.32		2.75	6.83	21355			1.14	161.5	17.1	clear
1445	9.32		3.00	6.83	21368			1.23	160.5	17.0	clear
1450	9.32		3.25	6.83	21362			1.24	159.5	16.3	clear
1455	9.32		3.50	6.83	21351			1.26	156.5	16.2	clear
1500	Collect sample										

Signature: G. Kiffe Date: 09/09/14

PROJECT NUMBER	WELL NUMBER
433191.FI.FK.20	MW 28D

GROUNDWATER SAMPLING DATA SHEET

SAMPLE INFORMATION

Client:	NAVFAC	Well ID:	MW-28D
Location:	Vieques - SWMU 20 (former PI-4)	Sample ID:	VEP4-GW28D-0914
Event:	Groundwater Sampling	MS/MSD:	No (Yes/No)
Date:	9/26/14		
Weather:	Mostly cloudy, 83°F, raining	FD:	No (Yes/No)
PID:			
Total Depth:	55.30 FT. (BTOC)	Sample Team:	G. Kiffe
Depth to wate (-)	8.55 FT. (BTOC)		L. Parker
Water Column:	46.75 FT.	Measuring Device:	Heron Dipper T
(x)	GAL./FT.	Date and Time:	9/26/14 0945
Well Volume:	7.6 GAL.		
Total Purge Volume:	5.0 GAL.		
Purge Device:	Hurricane Pump & teflon tubing		
Sample Time:	0945		
Sample Appearance:	Clear		
Flow Rate:			

WELL DIAMETER

[(2" DIA.= .163 GAL./FT.) (4" DIA. = .653 GAL./FT.)]

(1" DIA.= .041 GALIFT.) (1 1/4" DIA.= .064 GALIFT.)

FIELD PARAMETERS

Time	Depth to Water (DTW)	Flow Rate	Purged Vol. (gals)	pH w/in 0.1	Cond. ms/cm	Temp., (°C)	DO (%)	DO (mg/L) w/in 10%	ORP	Turbidity (NTU) w/in 10%	Color / Odor / Comments
855	9.10	250		6.59	19.58	28.08	25.1	1.67	125.2	146	Slightly cloudy
900	9.05	250	0.50	6.71	19.67	28.03	19	1.39	102.7	221	Slightly cloudy
905	9.05	250	1.00	6.73	19.67	28.09	16.7	1.21	96.2	169	Slightly cloudy
910	9.05	250	1.50	6.75	19.69	28.13	15.9	1.17	92.6	99.6	Slightly cloudy
915	9.15	250	2.00	6.77	19.67	28.06	18.9	1.36	92.7	38.1	Clear
920	9.10	250	2.50	6.77	19.8	28.13	14	1.02	85.9	15.1	Clear
925	9.10	250	3.00	6.77	19.81	28.11	17.2	1.22	85.8	5.14	Clear
930	9.00	250	3.50	6.77	19.82	28.15	16.6	1.21	86.3	3.72	Clear
935	9.03	250.0	4.00	6.77	19.86	28.14	17.2	1.25	86.6	3.7	Clear
940	9.02	250.0	4.50	6.77	19.88	28.13	17.7	1.29	86.9	1.9	Clear
945	Collect sample										

Signature: G. Kiffe Date: 09/26/14

PROJECT NUMBER	WELL NUMBER
433193.FI.FK.20	MW29

GROUNDWATER SAMPLING DATA SHEET

SAMPLE INFORMATION

Client:	NAVFAC	Well ID:	VEP4-MW29
Location:	Vieques - SWMU 20	Sample ID:	VEP4-MW29-0914
Event:	Groundwater Sampling	MS/MSD:	(Yes/No)
Date:	9/10/14		
Weather:	Sunny, 80°F	FD:	(Yes/No)
PID:			
Total Depth:	27.00 FT. (BTOC)	Sample Team:	G. Kiffe
Depth to water (-)	16.73 FT. (BTOC)		L. Parker
Water Column:	10.27 FT.	Measuring Device:	Heron Dipper T
(x)	0.163 GAL./FT.	Date and Time:	9/10/2014
Well Volume:	1.7 GAL.		
Total Purge Volume:	9.5 GAL.		
Purge Device:	Hurricane Pump		
Sample Time:			
Sample Appearance:			
Flow Rate:	300 mL		

WELL DIAMETER

[(2" DIA.= .163 GAL./FT.) (4" DIA. = .653 GAL./FT.)]

(1" DIA.= .041 GALIFT.) (1 1/4" DIA.= .064 GALIFT.)

FIELD PARAMETERS

Time	Depth to Water (DTW)	Flow Rate	Purged Vol. (gals)	pH w/in 0.1	Cond. ms/cm	Temp., (°C)	DO (%)	DO* (mg/L) w/in 10%	ORP	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1135	16.88		0.5	6.56	20.65	28.82	1.85	0.13	39.9	217	Cloudy & brown
1140	16.90		1.0	6.53	20.73	29.30	11.62	0.84	41.7	188	Cloudy & brown
1145	16.92		1.5	6.53	20.74	29.29	12.14	0.87	29.3	132	Cloudy & brown
1150	16.94		2.0	6.52	20.69	29.06	13.27	0.96	13.8	101	Cloudy & brown
1155	16.90		2.5	6.52	20.68	29.41	13.67	0.98	37.5	72.9	Cloudy & brown
1200	16.86		3.0	6.52	20.62	29.53	13.80	0.99	35.4	61.3	Cloudy & brown
1205	16.86		3.5	6.52	20.62	29.47	13.90	1.00	26.7	55.4	Clear
1210	16.86		4.0	6.52	20.65	29.50	14.20	1.02	20.1	50.2	Clear
1215	16.86		4.5	6.52	20.43	29.52	14.51	1.04	15.4	41.3	Clear
1220	16.88		5.0	6.52	20.33	29.49	14.69	1.05	13.6	38.9	Clear
1225	16.88		5.50	6.52	20.26	29.48	14.88	1.07	12.9	34.6	Clear
1230	16.90		6.00	6.52	20.29	29.45	14.87	1.07	13.9	33.2	Clear
1235	16.90		6.50	6.52	20.22	29.48	14.99	1.08	30.3	30.1	Clear
1240	16.90		7.00	6.52	20.17	29.72	14.95	1.07	30.5	22.6	Clear
1245	16.90		7.50	6.52	20.15	29.70	15.15	1.08	32.3	17.9	Clear
1250	16.90		8.00	6.52	20.14	29.67	15.41	1.1	35.6	13.1	Clear
1255	16.90		8.5	6.51	20.04	29.36	17.29	1.25	33.9	7.24	Clear
1300	16.90		9	6.51	20.01	29.27	17.31	1.25	28.5	6.11	Clear
1305	16.90		9.5	6.51	19.97	29.22	17.35	1.25	25.8	4.25	Clear
1310	Collect sample										

Signature: G. Kiffe Date:

*DO (mg/L calculated from DO % using YSI calculator)

PROJECT NUMBER	WELL NUMBER
433193.FI.FK.20	MW30

GROUNDWATER SAMPLING DATA SHEET

SAMPLE INFORMATION

Client:	NAVFAC	Well ID:	VEP4-MW30
Location:	Vieques - SWMU 20	Sample ID:	VEP4-MW30-0914
Event:	Groundwater Sampling	MS/MSD:	No (Yes/No)
Date:	9/10/14		
Weather:	Sunny, 80°F	FD:	(Yes/No)
PID:	0		
Total Depth:	30.00 FT. (BTOC)	Sample Team:	G. Kiffe
Depth to water	(-) 22.27 FT. (BTOC)		L. Parker
Water Column:	7.73 FT.	Measuring Device:	Heron Dipper T
	(x) 0.163 GAL./FT.	Date and Time:	9/10/2014 0930
Well Volume:	1.3 GAL.		
Total Purge Volume:	6.0 GAL.		
Purge Device:	Monsoon Pump		
Sample Time:	1050		
Sample Appearance:	Clear		
Flow Rate:	350 mL/min		

WELL DIAMETER

[(2" DIA.= .163 GAL./FT.) (4" DIA. = .653 GAL./FT.)]

(1" DIA.= .041 GALIFT.) (1 1/4" DIA.= .064 GALIFT.)

FIELD PARAMETERS

Time	Depth to Water (DTW)	Flow Rate	Purged Vol. (gals)	pH w/in 0.1	Cond. ms/cm	Temp., (°C)	DO (%)	DO (mg/L) w/in 10%	ORP	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0955	22.40		0.5	6.35	18.61	28.75	9.02	0.66	11.5	321	Brown, cloudy
1000	22.40		1.0	6.35	18.64	29.11	10.20	0.74	26.8	216	Brown, cloudy
1005	22.40		1.5	6.38	18.65	29.22	10.86	0.79	33.7	109	Brown, cloudy
1010	22.34		2.0	6.39	18.67	29.41	11.55	0.83	40.5	51.6	Clear
1015	22.34		2.5	6.39	18.68	29.45	11.44	0.83	24.5	27.8	Clear
1020	22.34		3.0	6.39	18.69	29.48	11.75	0.85	26.0	20.1	Clear
1025	22.34		3.5	6.39	18.68	29.47	12.10	0.87	27.5	14.0	Clear
1030	22.34		4.0	6.39	18.68	29.41	12.67	0.92	15.9	8.26	Clear
1035	22.34		4.5	6.40	18.68	29.49	13.15	0.95	8.8	4.27	Clear
1040	22.34		5.0	6.40	18.67	29.45	13.47	0.97	6.4	4.01	Clear
1045	22.34		5.5	6.40	18.67	29.40	13.61	0.98	6.39	3.82	Clear
1050	Collect Sample										

Signature: G. Kiffe Date: 09/10/14

*DO (mg/L calculated from DO % using YSI calculator)

PROJECT NUMBER	WELL NUMBER
433193.FI.FK.20	MW31

GROUNDWATER SAMPLING DATA SHEET

SAMPLE INFORMATION

Client:	NAVFAC	Well ID:	VEP4-MW31
Location:	Vieques - SWMU 20	Sample ID:	VEP4-MW31-0914
Event:	Groundwater Sampling	MS/MSD:	NO (Yes/No)
Date:	9/26/14		
Weather:	Cloudy, rainy, humid, 82°F	FD:	NO (Yes/No)
PID:			
Total Depth:	31.00 FT. (BTOC)	Sample Team:	G. Kiffe
Depth to wate	(-) 11.69 FT. (BTOC)		L. Parker
Water Column:	19.41 FT.	Measuring Device:	Heron Dipper T
	(x) GAL./FT.	Date and Time:	9/26/2014
Well Volume:	3.2 GAL.		
Total Purge Volume:	6.5 GAL.		
Purge Device:	& teflon tubingHurricane Pump		
Sample Time:	1135		
Sample Appearance:	clear		
Flow Rate:	Pump depth = 26		

WELL DIAMETER

[(2" DIA.= .163 GAL./FT.) (4" DIA. = .653 GAL./FT.)]

(1" DIA.= .041 GALIFT.) (1 1/4" DIA.= .064 GALIFT.)

FIELD PARAMETERS

Time	Depth to Water (DTW)	Flow Rate	Purged Vol. (gals)	pH w/in 0.1	Cond. ms/cm	Temp., (°C)	DO (%)	DO (mg/L) w/in 10%	ORP	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1015	13.00	250	--	7.03	19.02	28.03	25.8	1.90	247.7	439	Light brown, cloudy
1020	14.20	250	0.5	7.05	18.55	28.16	17.9	1.31	350.1	201	Light brown, cloudy
1025	13.99	200	1.0	7.07	17.96	28.21	17.4	1.29	448.6	122	Light brown, cloudy
1030	13.97	200	1.4	7.01	18.37	28.42	17.6	1.28	443.0	63.3	Clear
1035	14.05	200	1.8	6.99	18.47	28.41	16.6	1.21	436.2	19.5	Clear
1040	14.00	200	2.2	6.99	18.55	28.45	16.9	1.23	426.3	13.5	Clear
1045	13.90	200	2.6	6.98	18.60	28.50	16.6	1.22	393.2	11.3	Clear
1050	13.85	200	3.0	6.97	18.71	28.55	16.9	1.22	380.0	8.15	Clear
1055	13.90	200	3.4	6.96	18.76	28.55	16.5	1.20	307.2	7.43	Clear
1100	13.90	200	3.8	6.96	18.75	28.52	16.3	1.19	276.4	5.53	Clear
1105	13.85	200	4.2	6.95	18.76	28.54	16.6	1.18	213.0	5.15	Clear
1110	13.90	200	4.6	6.95	18.97	28.56	16.6	1.20	179.2	5.30	Clear
1115	13.92	200	5.0	6.95	18.79	28.53	15.6	1.14	161.3	3.91	Clear
1120	13.95	200	5.4	6.95	18.75	28.51	15.9	1.17	151.3	3.33	Clear
1125	13.98	200	5.8	6.96	18.73	28.51	16.0	1.18	148.8	3.02	Clear
1130	13.95	200	6.2	6.95	18.77	28.50	16.0	1.17	143.7	3.20	Clear
1135	Collect sample										

Signature: G. Kiffe Date: 09/26/14

PROJECT NUMBER	WELL NUMBER
433193.FI.FK.20	MW32

GROUNDWATER SAMPLING DATA SHEET

SAMPLE INFORMATION

Client:	NAVFAC	Well ID:	VEP4-MW32
Location:	Vieques - SWMU 20	Sample ID:	VEP4-MW32-0914
Event:	Groundwater Sampling	MS/MSD:	NO (Yes/No)
Date:	9/23/14		
Weather:	Mostly sunny, breezy, 80°F	FD:	NO (Yes/No)
PID:			
Total Depth:	23.50 FT. (BTOC)	Sample Team:	G. Kiffe
Depth to water (-)	4.71 FT. (BTOC)		L. Parker
Water Column:	18.79 FT.	Measuring Device:	Heron Dipper T
(x)	GAL./FT.	Date and Time:	9/23/2014 1020
Well Volume:	GAL.		
Total Purge Volume:	7.5 GAL.		
Purge Device:	Hurricane Pump &LDPE tubing		
Sample Time:	1020		
Sample Appearance:	clear		
Flow Rate:	180 mL/min Pump depth = 18.5		

WELL DIAMETER

[(2" DIA.= .163 GAL./FT.) (4" DIA. = .653 GAL./FT.)]

(1" DIA.= .041 GALIFT.) (1 1/4" DIA.= .064 GALIFT.)

FIELD PARAMETERS

Time	Depth to Water (DTW)	Flow Rate	Purged Vol. (gals)	pH w/in 0.1	Cond. µs/cm	Temp., (°C)	DO (%)	DO (mg/L) w/in 10%	ORP	Turbidity (NTU) w/in 10%	Color / Odor / Comments
0855	5.80	250	--	6.46	70.82	29.66	35.1	2.04	106.3	>1000	Brown, cloudy
0900	8.30	200	0.4	6.54	68.22	30.11	18.9	1.09	87.5	>1000	Brown, cloudy
0905	8.58	180	0.8	6.55	68.28	30.27	25.4	1.48	83.9	464	Brown, cloudy
0910	8.98	180	1.2	6.55	68.42	30.24	19.1	1.11	81.4	240	Brown, cloudy
0915	9.45	180	1.6	6.56	68.36	30.16	23.2	1.36	82.2	179	Brown, cloudy
0920	9.50	180	2.0	6.54	70.04	30.40	20.7	1.19	79.6	165	Brown, cloudy
0925	9.50	180	2.4	6.53	71.02	30.30	20.6	1.19	75.8	128	Brown, cloudy
0930	9.38	180	2.8	6.53	71.72	30.32	24.2	1.40	74.0	66.0	Clear
0935	9.50	180	3.2	6.52	76.17	30.26	23.0	1.32	76.6	69.6	Clear
0940	9.55	180	3.6	6.51	74.72	29.84	26.1	1.48	80.1	62.7	Clear
0945	9.60	180	4.0	6.51	74.88	30.14	26.8	1.52	77.7	33.5	Clear
0950	9.50	180	4.4	6.51	71.87	30.29	26.3	1.49	82.3	22.7	Clear
0955	9.52	180	4.8	6.51	74.25	30.41	21.1	1.19	83	21.5	Clear
1000	9.46	180	5.2	6.50	74.41	30.55	27.4	1.56	84.2	14.9	Clear
1005	9.56	180	5.6	6.50	74.44	30.57	28.7	1.62	83	10.8	Clear
1010	9.60	180	6.0	6.49	74.79	30.46	28.0	1.56	82.3	6.76	Clear
1015	9.65	180	6.4	6.48	74.76	30.55	27.0	1.53	84.6	5.27	Clear
1020	Collect sample		6.8								

Signature: G. Kiffe Date: 09/23/14

PROJECT NUMBER	WELL NUMBER
433193.FI.FK.20	MW33

GROUNDWATER SAMPLING DATA SHEET

SAMPLE INFORMATION

Client:	NAVFAC	Well ID:	VEP4-MW33
Location:	Vieques - SWMU 20	Sample ID:	VEP4-MW33-0914
Event:	Groundwater Sampling	MS/MSD:	NO (Yes/No)
Date:	9/26/14		
Weather:	Overcast, hot, 87°F	FD:	NO (Yes/No)
PID:			
Total Depth:	15.00 FT. (BTOC)	Sample Team:	G. Kiffe
Depth to water (-)	3.82 FT. (BTOC)		L. Parker
Water Column:	11.18 FT.	Measuring Device:	Heron Dipper T
(x)	GAL./FT.	Date and Time:	9/26/2014
Well Volume:	GAL.		
Total Purge Volume:	GAL.		
Purge Device:	Hurricane Pump		
Sample Time:	1720		
Sample Appearance:	Clear		
Flow Rate:	250 mL/min Pump depth = 13 FT		

WELL DIAMETER

[(2" DIA.= .163 GAL./FT.) (4" DIA. = .653 GAL./FT.)]

(1" DIA.= .041 GALIFT.) (1 1/4" DIA.= .064 GALIFT.)

FIELD PARAMETERS

Time	Depth to Water (DTW)	Flow Rate	Purged Vol. (gals)	pH w/in 0.1	Cond. ms/cm	Temp., (°C)	DO (%)	DO (mg/L) w/in 10%	ORP	Turbidity (NTU) w/in 10%	Color / Odor / Comments
1550	5.2	300	0.1	6.12	101.6	30.22	16.2	0.78	36.6	1000	Cloudy, odorless
1605	5.2	250	1.3	6.14	102.1	30.16	8.5	0.42	30.0	850	adjust flow (250mL/min)
1615	5.2	250	1.9	6.11	102.6	30.06	10.6	0.50	20.7	782	
1620	5.2	250	2.2	6.11	102.6	30.10	8.4	0.50	18.8	1000	
1625	5.2	250	2.5	6.11	102.5	30.13	6.9	0.36	18.3	257	
1630	5.2	250	2.8	6.11	102.4	30.13	6.0	0.30	18.3	124	
1635	5.2	250	3.1	6.11	102.4	30.12	5.5	0.27	18.2	87.8	
1640	5.2	250	3.3	6.12	102.3	30.14	3.5	0.17	20.8	57.2	
1645	5.2	250	3.5	6.12	102.3	30.14	3.1	0.15	20.2	41.4	
1650	5.2	250	3.8	6.11	102.2	30.14	3.1	0.14	20.4	21.7	
1655	5.2	250	4.0	6.11	102.2	30.14	3.2	0.16	20.1	12.2	
1700	5.2	250	4.2	6.11	102.1	30.14	2.8	0.15	20.2	10.0	
1705	5.2	250	4.5	6.11	101.9	30.13	2.4	0.12	21.3	6.8	
1710	5.2	250	4.7	6.11	101.6	30.13	2.3	0.12	21.6	4.9	
1715	5.2	250	5.0	6.11	101.6	30.13	2.3	0.12	21.8	4.7	Clear, odorless
1720	Collect sample										

Signature: G. Kiffe Date: 09/26/14

Appendix G
Survey Data

227 Fish Dr., Angier, NC 27501
A Veteran Owned Company

ECLS
•Engineering
•Construction Staking
•Land Surveying
•Subsurface Utility Locating

CH2MHILL SURVEYOR REPORT

CTO-0013 SWMU 20

Location and Elevation Survey

Former Vieques Naval Training Range

Vieques, Puerto Rico

Page 1 Survey Control Stations/Methodology

Page 2 Monitoring Well Locations

Date of Survey: 06/12/2013 – 06/13/2013

Name(s) of crew: Dillon Smith & Luis Lopez

Weather Conditions

Date: 06/12/2013
Temperature: 80°F; Barometric Pressure: 30.0

Date: 06/13/2013
Temperature: 79°F; Barometric Pressure: 30.0

Survey Control Stations:

The Horizontal values shown in this report are provided in North American Datum of 1983 (NAD83) Universal Transverse Mercator (UTM), Zone 20. The Vertical values shown in this report are in PRVD02 Datum current adjustment.

All coordinates shown in meters.

CONTROL USED	ELEV.	NORTHING	EASTING
	(Meters)	(Meters)	(Meters)
GARCIA REBAR	20.47	2,005,196.34	244,391.78
GARCIA CROSS	20.27	2,005,187.07	244,375.17
GARCIA BOLT	20.38	2,005,197.87	244,376.76

All monitoring wells were established with a Pro Mark 3 Base Rover GPS/RTK Network System referencing Garcia Rebar with the following UTM Zone 20 coordinates, Northing: 2,005,196.34, Easting: 244,391.78. Checks were made with the Garcia Cross and Garcia Bolt control points. Raw survey data collected in UTM Zone 20 Coordinates NAD83/PRVD02.

Upon review of field control data, the accuracies obtained on horizontal control work complied with Second Order Class II (1:20,000) or better, as outlined in the FGDC Geospatial Positioning Accuracy Standards. The accuracies obtained on vertical control work complied with the Second Order Class II (0.35 √M [M in miles]) or better, as outlined in the FGDC Geospatial Positioning Accuracy Standards.

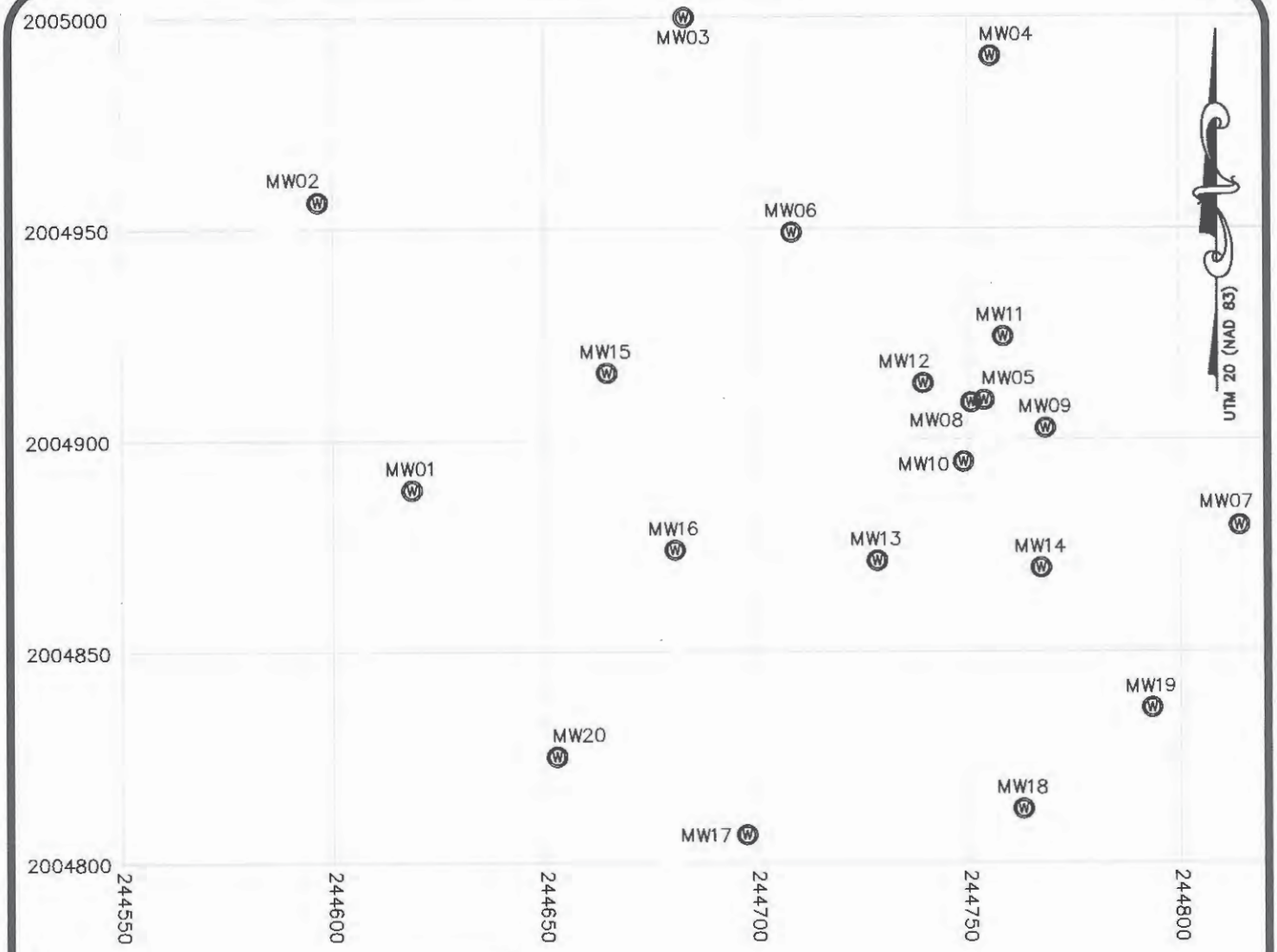
227 Fish Dr., Angier, NC 27501
A Veteran Owned Company

Monitoring Well Locations:

WELL NUMBER	TOP OF CASING	NORTHING	EASTING
	(Meters)	(Meters)	(Meters)
MW-01	11.19	2,004,888.37	244,618.63
MW-02	12.66	2,004,956.61	244,596.59
MW-03	13.28	2,004,999.98	244,683.21
MW-04	12.41	2,004,990.81	244,755.52
MW-05	10.43	2,004,909.43	244,753.80
MW-06	12.03	2,004,949.15	244,708.45
MW-07	8.89	2,004,879.79	244,813.99
MW-08	10.43	2,004,908.87	244,750.71
MW-09	10.11	2,004,902.78	244,768.25
MW-10	10.36	2,004,894.86	244,748.87
MW-11	10.52	2,004,924.57	244,758.32
MW-12	10.47	2,004,913.48	244,739.38
MW-13	10.45	2,004,871.55	244,728.42
MW-14	9.81	2,004,869.81	244,767.14
MW-15	11.76	2,004,915.98	244,664.73
MW-16	10.88	2,004,874.07	244,680.65
MW-17	9.77	2,004,806.64	244,697.47
MW-18	8.82	2,004,812.79	244,762.84
MW-19	8.64	2,004,836.68	244,793.28
MW-20	9.99	2,004,825.30	244,652.63

LUIS A. LOPEZ RIJOS
AGRIMENSOR LICENCIADO
LIC. #17933
PUERTO RICO

Digitally signed by Luis Antonio Lopez Rijos
DN: c=US, st=Puerto Rico, o=Colegio de Ingenieros y Agrimensores de Puerto Rico, title=17933 PS, cn=Luis Antonio Lopez Rijos, email=lalopezr@bioesign.com
Date: 2013.07.03 18:35:34 -04'00'



WELL NUMBER	TOP OF CASING	NORTHING	EASTING
	(Meters)	(Meters)	(Meters)
MW-01	11.19	2,004,888.37	244,618.63
MW-02	12.66	2,004,956.61	244,596.59
MW-03	13.28	2,004,999.98	244,683.21
MW-04	12.41	2,004,990.81	244,755.52
MW-05	10.43	2,004,909.43	244,753.80
MW-06	12.03	2,004,949.15	244,708.45
MW-07	8.89	2,004,879.79	244,813.99
MW-08	10.43	2,004,908.87	244,750.71
MW-09	10.11	2,004,902.78	244,768.25
MW-10	10.36	2,004,894.86	244,748.87
MW-11	10.52	2,004,924.57	244,758.32
MW-12	10.47	2,004,913.48	244,739.38
MW-13	10.45	2,004,871.55	244,728.42
MW-14	9.81	2,004,869.81	244,767.14
MW-15	11.76	2,004,915.98	244,664.73
MW-16	10.88	2,004,874.07	244,680.65
MW-17	9.77	2,004,806.64	244,697.47
MW-18	8.82	2,004,812.79	244,762.84
MW-19	8.64	2,004,836.68	244,793.28
MW-20	9.59	2,004,825.30	244,652.63

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DN: c=US, st=Puerto Rico, o=Colegio de Ingenieros y Agrimensores de Puerto Rico, title=17933 PS, cn=Luis Antonio Lopez Rijos, email=lalopezr@bioesign.com
Date: 2013.07.03 18:36:09 -04'00'

NOTE: FIELD DATA SURVEYED BY ECLS, INC. ON 06-12-2013 THROUGH 06-13-2013

GRAPHIC SCALE

15 7.5 0 15 30 60

1 CM = 15 M

LEGEND
MW = MONITORING WELL
DATUM
HORIZONTAL: UTM 20 (NAD83) VERTICAL: PR GRID (PRVD02)

ECLS

PROJ. NO.:	CTO-0013
FILENAME:	SWMU 20
DRAWN BY:	DWS
SCALE:	1CM=15M
DATE:	06-28-2013

CH2MHILL

LOCATION AND ELEVATION SURVEY
AT THE
FORMER VIEQUES NAVAL TRAINING RANGE
VIEQUES, PUERTO RICO
CTO-0013 SWMU 20

ECLS
SURVEYING THE EAST COAST
227 FISH DRIVE
ANGIER, NC 27501
910.897.3257
910.897.2329 FAX

227 Fish Dr., Angier, NC 27501
A Veteran Owned Company

ECLS
•Engineering
•Construction Staking
•Land Surveying
•Subsurface Utility Locating

CH2MHILL SURVEYOR REPORT

CTO-0013 SWMU 20

Location and Elevation Survey

Former Vieques Naval Training Range

Vieques, Puerto Rico

Page	1	Survey Control Stations/Methodology
Page	2	Monitoring Well Locations

LUIS A. LOPEZ RIJOS
AGRIMENSOR LICENCIADO
LIC. #17933
PUERTO RICO

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DN: c=US, st=Puerto Rico, o=Colegio de Ingenieros y Agrimensores de Puerto Rico, title=17933 PS, cn=Luis Antonio Lopez Rijos, email=lalopezr@bioesign.com
Date: 2013.10.03 20:13:02 -04'00'

Date of Survey: 09/25/2013

Name(s) of crew: Don Williams & Luis Lopez

Weather Conditions

Temperature: 83°F; Barometric Pressure: 29.9

Survey Control Stations:

The Horizontal values shown in this report are provided in North American Datum of 1983 (NAD83) Universal Transverse Mercator (UTM), Zone 20. The Vertical values shown in this report are in PRVD02 Datum current adjustment.

All coordinates shown in meters.

CONTROL USED	ELEV.	NORTHING	EASTING
	(Meters)	(Meters)	(Meters)
GARCIA REBAR	20.02	2,005,195.84	244,391.60

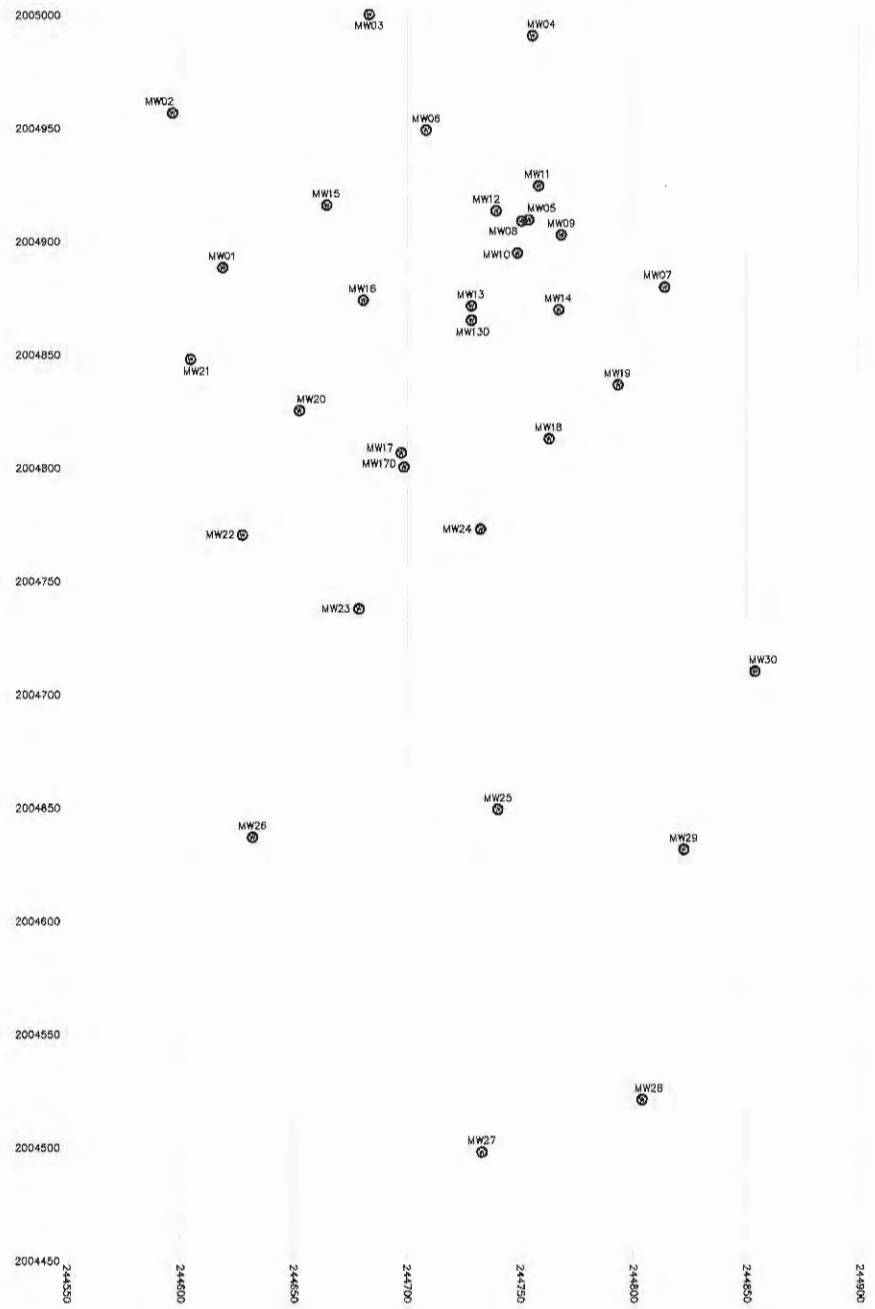
All monitoring wells were established with a Pro Mark 3 Base Rover GPS/RTK Network System referencing Garcia Rebar with the following UTM Zone 20 coordinates, Northing: 2,005,195.84, Easting: 244,391.60. Raw survey data collected in UTM Zone 20 Coordinates NAD83/PRVD02.

Upon review of field control data, the accuracies obtained on horizontal control work complied with Second Order Class II (1:20,000) or better, as outlined in the FGDC Geospatial Positioning Accuracy Standards. The accuracies obtained on vertical control work complied with the Second Order Class II (0.35 √M [M in miles]) or better, as outlined in the FGDC Geospatial Positioning Accuracy Standards.

227 Fish Dr., Angier, NC 27501
A Veteran Owned Company

Monitoring Well Locations:

WELL NUMBER	TOP OF CASING	NORTHING	EASTING
	(Meters)	(Meters)	(Meters)
MW-01	11.19	2004888.37	244618.63
MW-02	12.66	2004956.61	244596.59
MW-03	13.28	2004999.98	244683.21
MW-04	12.41	2004990.81	244755.52
MW-05	10.43	2004909.43	244753.80
MW-06	12.03	2004949.15	244708.45
MW-07	8.89	2004879.79	244813.99
MW-08	10.43	2004908.87	244750.71
MW-09	10.11	2004902.78	244768.25
MW-10	10.36	2004894.86	244748.87
MW-11	10.52	2004924.57	244758.32
MW-12	10.47	2004913.48	244739.38
MW-13	10.45	2004871.55	244728.42
MW-13D	10.20	2004865.20	244728.45
MW-14	9.81	2004869.81	244767.14
MW-15	11.76	2004915.98	244664.73
MW-16	10.88	2004874.07	244680.65
MW-17	9.77	2004806.64	244697.47
MW-17D	9.77	2004800.39	244698.59
MW-18	8.82	2004812.79	244762.84
MW-19	8.64	2004836.68	244793.28
MW-20	9.99	2004825.30	244652.63
MW-21	10.39	2004847.96	244604.45
MW-22	8.89	2004770.30	244627.35
MW-23	8.51	2004737.80	244678.76
MW-24	8.49	2004772.95	244732.40
MW-25	5.79	2004649.23	244740.07
MW-26	6.08	2004636.96	244631.82
MW-27	2.87	2004497.99	244733.17
MW-28	2.44	2004521.00	244803.93
MW-29	4.68	2004631.55	244822.34
MW-30	6.37	2004710.06	244853.76



WELL NUMBER	TOP OF CASING	NORTHING	EASTING
	(Meters)	(Meters)	(Meters)
MW-01	11.19	2004888.37	244618.63
MW-02	12.66	2004956.61	244596.59
MW-03	13.28	2004999.98	244683.21
MW-04	12.41	2004990.81	244755.52
MW-05	10.43	2004909.43	244753.80
MW-06	12.03	2004949.15	244708.45
MW-07	8.89	2004879.79	244813.99
MW-08	10.43	2004908.87	244750.71
MW-09	10.11	2004902.78	244768.25
MW-10	10.36	2004894.86	244748.87
MW-11	10.52	2004924.57	244758.32
MW-12	10.47	2004913.48	244739.38
MW-13	10.45	2004871.55	244728.42
MW-13D	10.20	2004865.20	244728.45
MW-14	9.81	2004869.81	244767.14
MW-15	11.76	2004915.98	244664.73
MW-16	10.88	2004874.07	244680.65
MW-17	9.77	2004806.64	244697.47
MW-17D	9.77	2004800.39	244698.59
MW-18	8.82	2004812.79	244762.84
MW-19	8.64	2004836.68	244793.28
MW-20	9.99	2004825.30	244652.63
MW-21	10.39	2004847.96	244604.45
MW-22	8.89	2004770.30	244627.35
MW-23	8.51	2004737.80	244678.76
MW-24	8.49	2004772.95	244732.40
MW-25	5.79	2004649.23	244740.07
MW-26	6.08	2004636.96	244631.82
MW-27	2.87	2004497.99	244733.17
MW-28	2.44	2004521.00	244803.93
MW-29	4.68	2004631.55	244822.34
MW-30	6.37	2004710.06	244853.76

GTM 20 (NAD 83)

LUIS A. LOPEZ RIJOS
AGRIMENSOR LICENCIADO
LIC. # 17933
PUERTO RICO

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DN: c=US, st=Puerto Rico, o=Colegio de Ingenieros y Agrimensores de Puerto Rico, title=17933 PS, cn=Luis Antonio Lopez Rijos, email=lalopezr@bioesign.com
Date: 2013.10.03 20:12:08 -04'00'

NOTE: FIELD DATA SURVEYED BY ECLS, INC. ON 09-25-2013

LEGEND
MW = MONITORING WELL
DATUM
HORIZONTAL: UTM 20 (NAD83) VERTICAL: PR GRID (PRVD02)

GRAPHIC SCALE
15 7.5 0 15 30 60
1 CM = 15 M

ECLS
SURVEYING THE EAST COAST
227 FISH DRIVE
ANGIER, NC 27501
910.897.3257 ECLSINC.COM 910.897.2229 FAX

REVISIONS:

SURVEY BY:

CH2MHILL
LOCATION AND ELEVATION SURVEY
AT THE
FORMER VIEQUES NAVAL TRAINING RANGE
VIEQUES, PUERTO RICO
CTO-0013 SWMU 20

PROJ. NO.:	CTO-0013
FILENAME:	SWMU 20
DRAWN BY:	DWS
SCALE:	1CM=15M
DATE:	10-03-2013

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•Subsurface Utility Locating

CH2MHILL SURVEYOR REPORT

CTO-0013 SWMU 20 & 1, and Regional Well

Monitoring Well Location Survey

Former Vieques Naval Training Range

Vieques, Puerto Rico

Page	1	Survey Control Stations/Methodology
Page	2-3	Monitoring Well Locations

Date of Survey: 11/10/2014 – 11/14/2014 & 12/08/2014

Name(s) of crew: Carlos Roger, Juan Roman & Darrell Taylor

Weather Conditions

Date: 11/10/2014	Temperature: 82°F	Barometric Pressure: 29.9
Date: 11/11/2014	Temperature: 81°F	Barometric Pressure: 29.9
Date: 11/12/2014	Temperature: 82°F	Barometric Pressure: 29.9
Date: 11/13/2014	Temperature: 82°F	Barometric Pressure: 29.9
Date: 11/14/2014	Temperature: 83°F	Barometric Pressure: 29.9
Date: 12/08/2014	Temperature: 83°F	Barometric Pressure: 30.0

Survey Control Stations:

The Horizontal values shown in this report are provided in North American Datum of 1983 (NAD83) Universal Transverse Mercator (UTM), Zone 20. The values shown below are based on coordinates that were RE-ESTABLISHED utilizing the historic coordinates provided to us by CH2M Hill for OP1-A.

All coordinates shown in meters.

CONTROL USED	ELEV.	NORTHING	EASTING
	(Meters)	(Meters)	(Meters)
GARCIA REBAR	20.02	2,005,196.238	244,391.404
GARCIA CROSS	19.85	2,005,187.057	244,374.756
OP1-A		2,006,232.482	254,863.580

Monitoring well locations were established using a Trimble R-4 GPS/RTK Network System, a Leica TCR 407 total station and a Sokkia C3 2 level. Checks were made into the Garcia Rebar and Garcia Cross control points. Raw survey data collected in UTM Zone 20 Coordinates NAD83/PRVD02.

Upon review of field control data, the accuracies obtained on horizontal control work complied with Second Order Class II (1:20,000) or better, as outlined in the FGDC Geospatial Positioning Accuracy Standards. The accuracies obtained on vertical control work complied with the Second Order Class II (0.35 √M [M in miles]) or better, as outlined in the FGDC Geospatial Positioning Accuracy Standards.

Monitoring Well Locations:

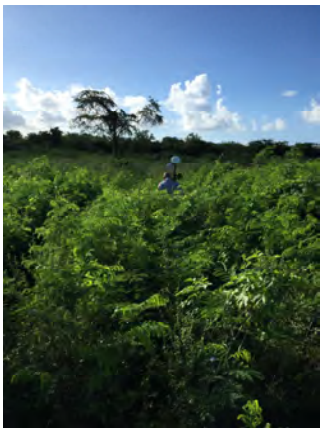
Regional GW Well – Monitoring Well 17

WELL NUMBER	TOP OF WELL	TOP OF CASING	CONCRETE PAD	NORTHING	EASTING
	(Meters)	(Meters)	(Meters)	(Meters)	(Meters)
MW-17	28.014	27.911	26.992	2,006,932.493	252,636.833

SWMU 1 – Monitoring Well 3

WELL NUMBER	TOP OF WELL	TOP OF CASING	CONCRETE PAD	NORTHING	EASTING
	(feet)	(feet)	(feet)	(Meters)	(Meters)
MW-3	16.44	16.14	13.31	2,005,117.69*	246,674.22*

Monitoring Well 3: The Northing* and Easting* were provided by CH2M Hill from a previous survey. The elevations were determined by shooting the top of casing of Monitoring Well 4 and Monitoring Well 3 from the same setup using a Level. We found that the top of casing of MW 4 is 2.81 feet higher than MW 3. We then used the elevation of MW 4 from the previous survey (18.95 feet) and the difference that we shot to determine the elevation of the top of casing of MW 3 to be 16.14 feet. We used a steel tape to measure the difference in elevation from the top of casing to the top of concrete (-2.83 feet) and to the top of the well (+0.30). We provided the elevation data in FEET to be consistent with the previous data.



Field Crew Heading to MW 3

SWMU 20 – Monitoring Wells

WELL NUMBER	TOP OF WELL	TOP OF CASING	CONCRETE PAD	NORTHING	EASTING
	(Meters)	(Meters)	(Meters)	(Meters)	(Meters)
MW-06	12.149	12.030	11.262	2,004,949.53	244,708.26
MW-24D	8.682	8.630	7.673	2,004,775.66	244,730.91
MW-25D	5.793	5.735	4.882	2,004,646.89	244,740.36
MW-28D	2.269	2.168	2.269	2,004,519.99	244,801.50
MW-31	3.421	3.293	3.421	2,004,424.74	244,623.36
MW-32	1.208	1.147	0.227	2,004,325.79	244,817.01
MW-33	1.061	1.009	0.085	2,004,459.58	244,945.38

Monitoring Wells in SWMU 20: The Northing and Easting were establish using Trimble R-4 GPS/RTK Network System. The elevations were determined by running a level loop from Garcia Rebar through the monitoring wells using a Sokkia C3 2 level. **Since the main purpose of the elevations is to stay consistent with the previous data, the elevations for these wells have all been lowered by 0.022 meters (the average of the difference in elevation of the existing monitoring wells that we checked into as shown in the table below).**

SWMU 20 – Monitoring Wells used to check elevations

WELL NUMBER	PRIOR TOP OF CASING	CURRENT TOP OF CASING	DIFFERENCE TOP OF CASING
	(Meters)	(Meters)	(Meters)
MW-11	10.52	10.545	+0.025
MW-12	10.47	10.491	+0.021
MW-25	5.79	5.813	+0.023
MW-29	4.68	4.700	+0.020

Appendix H
Analytical Data Summary

TABLE H-1
Validated Surface Soil Raw Analytical Data
2006-2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW13D	EPI04-MW17D		EPI04-SO01	EPI04-SO02	EPI04-SO03	EPI04-SO04	EPI04-SO05		EPI04-SO06	EPI04-SO07	EPI04-SO08		EPI04-SO09
Sample ID	VEP4-SS16-0001	VEP4-SS17-0001	VEP4-SS17P-0001	EPI04-SS01-0001	EPI04-SS02-0001	EPI04-SS03-0001	EPI04-SS04-0001	EPI04-SS05-0001	EPI04-SS05P-0001	EPI04-SS06-0001	EPI04-SS07-0001	EPI04-SS08-0001	EPI04-SS08P-0001	EPI04-SS09-0001
Sample Date	05/30/13	06/05/13	06/05/13	01/26/06	01/26/06	01/26/06	01/26/06	01/26/06	01/26/06	01/26/06	01/25/06	01/25/06	01/25/06	01/24/06
Chemical Name														
Volatile Organic Compounds (µg/kg)														
1,1,1-Trichloroethane	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
1,1,2,2-Tetrachloroethane	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
1,1,2-Trichloroethane	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
1,1-Dichloroethane	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
1,1-Dichloroethene	2.57 U	3.29 U	2.27 U	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
1,2,4-Trichlorobenzene	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
1,2-Dibromo-3-chloropropane	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
1,2-Dibromoethane	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
1,2-Dichlorobenzene	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
1,2-Dichloroethane	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
1,2-Dichloropropane	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
1,3-Dichlorobenzene	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
1,4-Dichlorobenzene	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
2-Butanone	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
2-Hexanone	NA	NA	NA	13 UJ	10 UJ	12 U	12 U	11 UJ	11 UJ	10 UJ	10 U	10 U	11 U	10 U
4-Methyl-2-pentanone	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
Acetone	NA	NA	NA	13 U	10 U	28 J	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
Benzene	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
Bromodichloromethane	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
Bromoform	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
Bromomethane	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
Carbon disulfide	NA	NA	NA	13 U	10 U	10 J	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
Carbon tetrachloride	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
Chlorobenzene	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
Chloroethane	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
Chloroform	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
Chloromethane	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
cis-1,2-Dichloroethene	2.57 U	3.29 U	2.27 U	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
cis-1,3-Dichloropropene	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
Cyclohexane	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
Dibromochloromethane	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
Dichlorodifluoromethane (Freon-12)	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
Ethylbenzene	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
Isopropylbenzene	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
Methyl acetate	NA	NA	NA	13 U	10 U	12 UJ	12 UJ	11 U	11 U	10 U	10 U	10 U	11 U	10 U
Methylcyclohexane	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
Methylene chloride	NA	NA	NA	13 U	10 UJ	12 UJ	12 UJ	11 U	11 U	10 U	10 U	10 U	11 U	10 U
Methyl-tert-butyl ether (MTBE)	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
Styrene	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
Tetrachloroethene	2.57 U	3.29 U	2.27 U	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
Toluene	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
trans-1,2-Dichloroethene	2.57 U	3.29 U	2.27 U	13 UJ	10 U	12 U	12 U	11 UJ	11 UJ	10 UJ	10 U	10 U	11 U	10 U
trans-1,3-Dichloropropene	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
Trichloroethene	2.57 U	3.29 U	2.27 U	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
Trichlorofluoromethane (Freon-11)	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
Vinyl chloride	2.57 U	3.29 U	2.27 U	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U
Xylene, total	NA	NA	NA	13 U	10 U	12 U	12 U	11 U	11 U	10 U	10 U	10 U	11 U	10 U

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Validated Surface Soil Raw Analytical Data
2006-2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW13D	EPI04-MW17D		EPI04-SO01	EPI04-SO02	EPI04-SO03	EPI04-SO04	EPI04-SO05		EPI04-SO06	EPI04-SO07	EPI04-SO08		EPI04-SO09
Sample ID	VEP4-SS16-0001	VEP4-SS17-0001	VEP4-SS17P-0001	EPI04-SS01-0001	EPI04-SS02-0001	EPI04-SS03-0001	EPI04-SS04-0001	EPI04-SS05-0001	EPI04-SS05P-0001	EPI04-SS06-0001	EPI04-SS07-0001	EPI04-SS08-0001	EPI04-SS08P-0001	EPI04-SS09-0001
Sample Date	05/30/13	06/05/13	06/05/13	01/26/06	01/26/06	01/26/06	01/26/06	01/26/06	01/26/06	01/26/06	01/25/06	01/25/06	01/25/06	01/24/06
Chemical Name														
Semivolatile Organic Compounds (µg/kg)														
1,1-Biphenyl	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
1,4-Dioxane	34.8 U	379 U	353 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,2'-Oxybis(1-chloropropane)	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
2,4,5-Trichlorophenol	NA	NA	NA	920 U	900 U	880 U	880 U	880 U	880 U	910 U	920 U	870 U	880 U	930 U
2,4,6-Trichlorophenol	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
2,4-Dichlorophenol	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
2,4-Dimethylphenol	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
2,4-Dinitrophenol	NA	NA	NA	920 R	900 R	880 R	880 R	880 R	880 R	910 UJ	920 UJ	870 UJ	880 UJ	930 UJ
2,4-Dinitrotoluene	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
2,6-Dinitrotoluene	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
2-Chloronaphthalene	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
2-Chlorophenol	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
2-Methylnaphthalene	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
2-Methylphenol	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
2-Nitroaniline	NA	NA	NA	920 U	900 U	880 U	880 U	880 U	880 U	910 U	920 U	870 U	880 U	930 U
2-Nitrophenol	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
3,3'-Dichlorobenzidine	NA	NA	NA	370 UJ	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
3-Nitroaniline	NA	NA	NA	920 U	900 U	880 U	880 U	880 U	880 U	910 U	920 U	870 U	880 U	930 U
4,6-Dinitro-2-methylphenol	NA	NA	NA	920 UJ	900 UJ	880 UJ	880 UJ	880 UJ	880 UJ	910 U	920 U	870 U	880 U	930 U
4-Bromophenyl-phenylether	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
4-Chloro-3-methylphenol	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
4-Chloroaniline	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
4-Chlorophenyl-phenylether	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
4-Methylphenol	NA	NA	NA	370 U	360 U	350 U	350 U	350 UJ	350 U	360 U	370 U	350 U	350 U	370 U
4-Nitroaniline	NA	NA	NA	920 U	900 U	880 U	880 U	880 U	880 U	910 U	920 U	870 U	880 U	930 U
4-Nitrophenol	NA	NA	NA	920 U	900 U	880 U	880 U	880 U	880 U	910 UJ	920 UJ	870 U	880 U	930 U
Acenaphthene	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Acenaphthylene	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Acetophenone	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Anthracene	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Atrazine	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 UJ	370 U	350 UJ	350 UJ	370 UJ
Benzaldehyde	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 UJ	370 UJ	350 UJ	350 UJ	370 UJ
Benzo(a)anthracene	NA	NA	NA	370 UJ	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Benzo(a)pyrene	NA	NA	NA	370 R	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Benzo(b)fluoranthene	NA	NA	NA	370 R	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Benzo(g,h,i)perylene	NA	NA	NA	370 R	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Benzo(k)fluoranthene	NA	NA	NA	370 R	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
bis(2-Chloroethoxy)methane	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
bis(2-Chloroethyl)ether	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
bis(2-Ethylhexyl)phthalate	NA	NA	NA	370 UJ	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Butylbenzylphthalate	NA	NA	NA	370 UJ	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Caprolactam	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Carbazole	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Chrysene	NA	NA	NA	370 UJ	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Dibenz(a,h)anthracene	NA	NA	NA	370 R	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Dibenzofuran	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Diethylphthalate	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Dimethyl phthalate	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Di-n-butylphthalate	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Di-n-octylphthalate	NA	NA	NA	370 R	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Fluoranthene	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U

TABLE H-1
Validated Surface Soil Raw Analytical Data
2006-2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW13D	EPI04-MW17D		EPI04-SO01	EPI04-SO02	EPI04-SO03	EPI04-SO04	EPI04-SO05		EPI04-SO06	EPI04-SO07	EPI04-SO08		EPI04-SO09
Sample ID	VEP4-SS16-0001	VEP4-SS17-0001	VEP4-SS17P-0001	EPI04-SS01-0001	EPI04-SS02-0001	EPI04-SS03-0001	EPI04-SS04-0001	EPI04-SS05-0001	EPI04-SS05P-0001	EPI04-SS06-0001	EPI04-SS07-0001	EPI04-SS08-0001	EPI04-SS08P-0001	EPI04-SS09-0001
Sample Date	05/30/13	06/05/13	06/05/13	01/26/06	01/26/06	01/26/06	01/26/06	01/26/06	01/26/06	01/26/06	01/25/06	01/25/06	01/25/06	01/24/06
Chemical Name														
Fluorene	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Hexachlorobenzene	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Hexachlorobutadiene	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Hexachlorocyclopentadiene	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Hexachloroethane	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Indeno(1,2,3-cd)pyrene	NA	NA	NA	370 R	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Isophorone	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Naphthalene	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
n-Nitroso-di-n-propylamine	NA	NA	NA	370 UJ	360 UJ	350 UJ	350 U	350 U	350 UJ	360 U	370 U	350 U	350 U	370 U
n-Nitrosodiphenylamine	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Nitrobenzene	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Pentachlorophenol	NA	NA	NA	920 UJ	900 UJ	880 UJ	880 U	880 UJ	880 UJ	910 U	920 U	870 U	880 U	930 U
Phenanthrene	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Phenol	NA	NA	NA	370 U	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Pyrene	NA	NA	NA	370 UJ	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U	370 U
Pesticide/Polychlorinated Biphenyls (µg/kg)														
4,4'-DDD	NA	NA	NA	3.7 U	3.6 U	3.5 U	3.5 U	3.5 U	3.5 U	2.1 J	3.1 J	3.5 U	3.5 U	3.7 U
4,4'-DDE	NA	NA	NA	3.8	2.2 J	12	1.2 J	2.7 J	4.7	620	36	29	27	9.1
4,4'-DDT	NA	NA	NA	1.4 J	3.6 U	3.1 J	3.5 U	1.4 J	27	100	7.8	3.1 J	5.3	1.4 J
Aldrin	NA	NA	NA	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	3.7 U	1.9 U	1.8 U	1.8 U	1.9 U
alpha-BHC	NA	NA	NA	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	3.7 U	1.9 U	1.8 U	1.8 U	1.9 U
alpha-Chlordane	NA	NA	NA	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	3.7 U	1.9 U	1.8 U	1.8 U	1.9 U
Aroclor-1016	NA	NA	NA	NA	NA	NA	35 U	NA	NA	NA	NA	35 U	35 U	37 U
Aroclor-1221	NA	NA	NA	NA	NA	NA	71 U	NA	NA	NA	NA	71 U	71 U	75 U
Aroclor-1232	NA	NA	NA	NA	NA	NA	35 U	NA	NA	NA	NA	35 U	35 U	37 U
Aroclor-1242	NA	NA	NA	NA	NA	NA	35 U	NA	NA	NA	NA	35 U	35 U	37 U
Aroclor-1248	NA	NA	NA	NA	NA	NA	35 U	NA	NA	NA	NA	35 U	35 U	37 U
Aroclor-1254	NA	NA	NA	NA	NA	NA	35 U	NA	NA	NA	NA	35 U	35 U	37 U
Aroclor-1260	NA	NA	NA	NA	NA	NA	35 U	NA	NA	NA	NA	35 U	35 U	37 U
beta-BHC	NA	NA	NA	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	3.7 U	1.9 U	1.8 U	1.8 U	1.9 U
delta-BHC	NA	NA	NA	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	0.75 J	1.9 U	1.8 U	1.8 U	1.9 U
Dieldrin	NA	NA	NA	3.7 U	3.6 U	3.5 U	3.5 U	3.5 U	3.5 U	7.3 U	3.7 U	3.5 U	3.5 U	3.7 U
Endosulfan I	NA	NA	NA	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	3.7 U	1.9 U	1.8 U	1.8 U	1.9 U
Endosulfan II	NA	NA	NA	3.7 U	3.6 U	3.5 U	3.5 U	3.5 U	3.5 U	7.3 U	3.7 U	3.5 U	3.5 U	3.7 U
Endosulfan sulfate	NA	NA	NA	3.7 U	3.6 U	3.5 U	3.5 U	3.5 U	3.5 U	7.3 U	3.7 U	3.5 U	3.5 U	3.7 U
Endrin	NA	NA	NA	3.7 U	3.6 U	3.5 U	3.5 U	3.5 U	3.5 U	7.3 U	3.7 U	3.5 U	3.5 U	3.7 U
Endrin aldehyde	NA	NA	NA	3.7 U	3.6 U	3.5 U	3.5 U	3.5 U	3.5 U	7.3 U	3.7 U	3.5 U	3.5 U	3.7 U
Endrin ketone	NA	NA	NA	3.7 U	3.6 U	3.5 U	3.5 U	3.5 U	3.5 U	7.3 U	3.7 U	3.5 U	3.5 U	3.7 U
gamma-BHC (Lindane)	NA	NA	NA	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	3.7 U	1.9 U	1.8 U	1.8 U	1.9 U
gamma-Chlordane	NA	NA	NA	0.69 J	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1 J	1.9 U	1.8 U	1.8 U	0.79 J
Heptachlor	NA	NA	NA	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	3.7 U	1.9 U	1.8 U	1.8 U	1.9 U
Heptachlor epoxide	NA	NA	NA	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	3.7 U	1.9 U	1.8 U	1.8 U	1.9 U
Methoxychlor	NA	NA	NA	19 U	18 U	18 U	18 U	18 U	18 U	37 U	19 U	18 U	18 U	19 U
Toxaphene	NA	NA	NA	190 U	180 U	180 U	180 U	180 U	180 U	370 U	190 U	180 U	180 U	190 U

TABLE H-1
Validated Surface Soil Raw Analytical Data
2006-2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW13D	EPI04-MW17D		EPI04-SO01	EPI04-SO02	EPI04-SO03	EPI04-SO04	EPI04-SO05		EPI04-SO06	EPI04-SO07	EPI04-SO08		EPI04-SO09
Sample ID	VEP4-SS16-0001	VEP4-SS17-0001	VEP4-SS17P-0001	EPI04-SS01-0001	EPI04-SS02-0001	EPI04-SS03-0001	EPI04-SS04-0001	EPI04-SS05-0001	EPI04-SS05P-0001	EPI04-SS06-0001	EPI04-SS07-0001	EPI04-SS08-0001	EPI04-SS08P-0001	EPI04-SS09-0001
Sample Date	05/30/13	06/05/13	06/05/13	01/26/06	01/26/06	01/26/06	01/26/06	01/26/06	01/26/06	01/26/06	01/25/06	01/25/06	01/25/06	01/24/06
Chemical Name														
Total Metals (mg/kg)														
Aluminum	NA	NA	NA	5,720 J	9,040 J	7,450 J	8,220	6,770 J	6,930 J	6,100 J	8,540 J	12,200	12,300	9,970 J
Antimony	NA	NA	NA	6.7 U	6.5 U	6.4 U	6.4 U	6.4 U	6.4 U	6.6 U	6.7 U	0.62 J	0.75 J	6.8 U
Arsenic	NA	NA	NA	3.2 J	1.1 U	1.1 U	0.35 J	1.1 U	1.1 U	1.1 U	1.1 U	0.58 J	0.39 J	1.1 U
Barium	NA	NA	NA	33 J	45.4 J	52.1 J	55.7	52.7 J	53.3 J	52.1 J	50.9 J	57.4	58.3	64.9 J
Beryllium	NA	NA	NA	0.55 U	0.54 U	0.53 U	0.53 U	0.53 U	0.53 U	0.55 U	0.56 U	0.039 J	0.53 U	0.56 U
Cadmium	NA	NA	NA	0.55 U	0.54 U	0.53 U	0.53 U	0.53 U	0.53 U	0.55 U	0.56 U	0.15 J	0.53 U	0.56 U
Calcium	NA	NA	NA	171,000 J	15,400 J	7,200 J	2,770	2,700 J	2,850 J	4,610 J	7,410 J	5,290	6,860	10,000 J
Chromium	NA	NA	NA	14.1 J	12.7 J	10.1 J	9.1	9 J	8.8 J	10.2 J	10 J	7.2	8.3	11.8 J
Cobalt	NA	NA	NA	5.6 U	8.3 J	9 J	9.7	9.1 J	9.8 J	8.3 J	9.1 J	13.2	12.5	9.6 J
Copper	NA	NA	NA	19.9 J	43.5 J	32.1 J	33.2	37.1 J	37.6 J	39.3 J	38.8 J	34.9	36.2	43 J
Cyanide	NA	NA	NA	0.54 J	2.7 U	2.7 U	0.72 J	2.7 U	2.7 U	2.7 U	2.8 U	2.6 U	2.7 U	2.8 U
Iron	NA	NA	NA	14,200 J	16,100 J	15,000 J	13,600	14,100 J	14,200 J	14,400 J	16,000 J	24,700	24,100	17,300 J
Lead	NA	NA	NA	28.8 J	7.3 J	4.1 J	2.7 J	3.2 J	2.7 J	7.6 J	6.8 J	5	2.9	3.5 J
Magnesium	NA	NA	NA	27,000 J	5,030 J	1,770 J	1,510	1,430 J	1,540 J	1,380 J	2,070 J	8,730	7,820	4,000 J
Manganese	NA	NA	NA	265 J	444 J	567 J	584	572 J	573 J	514 J	365 J	549	540	432 J
Mercury	NA	NA	NA	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
Nickel	NA	NA	NA	5.3 J	7.2 J	4.3 U	4.3 U	4.3 U	4.2 U	4.4 U	4.5 U	4.3 J	4.7 J	5.6 J
Potassium	NA	NA	NA	805 J	950 J	849 J	1,150 J	1,040 J	1,030 J	753 J	823 J	1,500 J	1,630 J	1,030 J
Selenium	NA	NA	NA	7.8 U	3.8 UJ	0.55 J	3.7 U	0.38 J	0.45 J	0.54 J	0.44 J	0.59 J	3.7 U	4 UJ
Silver	NA	NA	NA	2.2 U	1.1 UJ	1.1 U	1.1 U	1.1 U	1.1 UJ	1.1 U	1.1 U	1.1 U	1.1 U	1.1 UJ
Sodium	NA	NA	NA	555 U	542 U	532 U	533 U	532 U	531 U	546 U	557 U	529 U	532 U	564 U
Thallium	NA	NA	NA	0.56 U	0.54 U	0.53 U	0.53 U	0.53 U	0.53 U	0.55 U	0.56 U	0.53 U	0.53 U	0.56 U
Vanadium	NA	NA	NA	37.9 J	49.7 J	56.1 J	49.5	51 J	50.7 J	55.5 J	57.5 J	64.7	63.8	63.8 J
Zinc	NA	NA	NA	23.9 J	27.3 J	16.7 J	16.7 J	19.5 J	18 J	38.7 J	22.7 J	28.6	28.6	18.7 J
Wet Chemistry (mg/kg)														
Total organic carbon (TOC)	8,600	8,330	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

\\Tampa\Proj\USNAVFACENGCOM\433193CTO0013\SWMU_20_RI_Report_draft\Appendix H - Analytical Data Summary\native files\[Table 4-1 - Surface Soil Exceedances.xlsx], Dean, Juliana/VBO, 02/19/2015

Notes:

Shading indicates detections
NA - Not analyzed
J - Analyte present, value may or may not be accurate or precise
NZ-01 - Estimated result; one or more QC criteria recovered outside acceptance limits (for unvalidated data)
R - Rejected Result
U - Nondetect
UJ - Analyte not detected, quantitation limit may be inaccurate
mg/kg - Milligrams per kilogram
µg/kg - Micrograms per kilogram

TABLE H-1
Validated Surface Soil Raw Analytical Data
2006-2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-SO10	EPI04-SO11	EPI04-SO12	EPI04-SO13	EPI04-SO14	EPI04-SO15	EPI04-SO21		EPI04-SO22	EPI04-SO23	EPI04-SO24	EPI04-SO25
Sample ID	EPI04-SS10-0001	EPI04-SS11-0001	EPI04-SS12-0001	EPI04-SS13-0001	EPI04-SS14-0006	EPI04-SS15-0006	VEP4-SS21-0001	VEP4-SS21P-0001	VEP4-SS22-0001	VEP4-SS23-0001	VEP4-SS24-0001	VEP4-SS25-0001
Sample Date	01/24/06	01/25/06	01/24/06	01/25/06	01/31/06	01/31/06	09/17/14	09/17/14	09/16/14	09/22/14	09/18/14	09/22/14
Chemical Name												
Volatile Organic Compounds (µg/kg)												
1,1,1-Trichloroethane	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	10 U	11 U	10 U	12 U	14 U	14 U	2.4 U	2.49 U	2.55 U	3.01 U	2.58 U	3.02 U
1,2,4-Trichlorobenzene	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
1,2-Dibromoethane	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
2-Butanone	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
2-Hexanone	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
4-Methyl-2-pentanone	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
Acetone	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
Benzene	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
Bromodichloromethane	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
Bromoform	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
Bromomethane	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
Carbon disulfide	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
Chlorobenzene	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
Chloroethane	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
Chloroform	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
Chloromethane	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	10 U	11 U	10 U	12 U	14 U	14 U	2.4 U	2.49 U	2.55 U	3.01 U	2.58 U	3.02 U
cis-1,3-Dichloropropene	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
Cyclohexane	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
Dibromochloromethane	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane (Freon-12)	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
Ethylbenzene	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
Isopropylbenzene	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
Methyl acetate	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
Methylcyclohexane	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
Methylene chloride	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
Methyl-tert-butyl ether (MTBE)	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
Styrene	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
Tetrachloroethene	10 U	11 U	10 U	12 U	14 U	14 U	2.4 U	2.49 U	2.55 UJ	3.01 U	2.58 U	3.02 U
Toluene	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
trans-1,2-Dichloroethene	10 U	11 U	10 U	12 U	14 U	14 U	2.4 U	2.49 U	2.55 U	3.01 U	2.58 U	3.02 U
trans-1,3-Dichloropropene	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
Trichloroethene	10 U	11 U	10 U	12 U	14 U	14 U	2.4 U	2.49 U	2.55 U	3.01 U	2.58 U	3.02 U
Trichlorofluoromethane (Freon-11)	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA
Vinyl chloride	10 U	11 U	10 U	12 U	14 U	14 U	2.4 U	2.49 U	2.55 U	3.01 U	2.58 U	3.02 U
Xylene, total	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA	NA	NA	NA

TABLE H-1
Validated Surface Soil Raw Analytical Data
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Vieques, Puerto Rico

Station ID	EPI04-SO10	EPI04-SO11	EPI04-SO12	EPI04-SO13	EPI04-SO14	EPI04-SO15	EPI04-SO21		EPI04-SO22	EPI04-SO23	EPI04-SO24	EPI04-SO25
Sample ID	EPI04-SS10-0001	EPI04-SS11-0001	EPI04-SS12-0001	EPI04-SS13-0001	EPI04-SS14-0006	EPI04-SS15-0006	VEP4-SS21-0001	VEP4-SS21P-0001	VEP4-SS22-0001	VEP4-SS23-0001	VEP4-SS24-0001	VEP4-SS25-0001
Sample Date	01/24/06	01/25/06	01/24/06	01/25/06	01/31/06	01/31/06	09/17/14	09/17/14	09/16/14	09/22/14	09/18/14	09/22/14
Chemical Name												
Semivolatile Organic Compounds (µg/kg)												
1,1-Biphenyl	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
1,4-Dioxane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,2'-Oxybis(1-chloropropane)	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	900 U	900 U	900 U	920 U	910 U	900 U	NA	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
2,4-Dichlorophenol	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	900 UJ	900 UJ	900 UJ	920 UJ	910 R	900 UJ	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
2-Chlorophenol	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
2-Methylphenol	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
2-Nitroaniline	900 U	900 U	900 U	920 U	910 U	900 U	NA	NA	NA	NA	NA	NA
2-Nitrophenol	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	360 U	360 U	360 U	370 U	360 UJ	360 UJ	NA	NA	NA	NA	NA	NA
3-Nitroaniline	900 U	900 U	900 U	920 U	910 U	900 U	NA	NA	NA	NA	NA	NA
4,6-Dinitro-2-methylphenol	900 U	900 U	900 U	920 U	910 UJ	900 U	NA	NA	NA	NA	NA	NA
4-Bromophenyl-phenylether	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
4-Chloroaniline	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
4-Methylphenol	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
4-Nitroaniline	900 U	900 U	900 U	920 U	910 UJ	900 UJ	NA	NA	NA	NA	NA	NA
4-Nitrophenol	900 UJ	900 U	900 U	920 UJ	910 U	900 U	NA	NA	NA	NA	NA	NA
Acenaphthene	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Acenaphthylene	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Acetophenone	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Anthracene	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Atrazine	360 UJ	360 UJ	360 UJ	370 UJ	360 U	360 UJ	NA	NA	NA	NA	NA	NA
Benzaldehyde	360 UJ	360 UJ	360 UJ	370 UJ	360 U	360 UJ	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
bis(2-Chloroethoxy)methane	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
bis(2-Chloroethyl)ether	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	360 U	360 U	360 U	370 U	130 J	360 U	NA	NA	NA	NA	NA	NA
Butylbenzylphthalate	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Caprolactam	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Carbazole	360 U	360 U	360 U	370 U	360 U	360 UJ	NA	NA	NA	NA	NA	NA
Chrysene	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Dibenzofuran	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Diethylphthalate	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Dimethyl phthalate	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Di-n-octylphthalate	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Fluoranthene	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA

TABLE H-1
Validated Surface Soil Raw Analytical Data
2006-2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-SO10	EPI04-SO11	EPI04-SO12	EPI04-SO13	EPI04-SO14	EPI04-SO15	EPI04-SO21		EPI04-SO22	EPI04-SO23	EPI04-SO24	EPI04-SO25
Sample ID	EPI04-SS10-0001	EPI04-SS11-0001	EPI04-SS12-0001	EPI04-SS13-0001	EPI04-SS14-0006	EPI04-SS15-0006	VEP4-SS21-0001	VEP4-SS21P-0001	VEP4-SS22-0001	VEP4-SS23-0001	VEP4-SS24-0001	VEP4-SS25-0001
Sample Date	01/24/06	01/25/06	01/24/06	01/25/06	01/31/06	01/31/06	09/17/14	09/17/14	09/16/14	09/22/14	09/18/14	09/22/14
Chemical Name												
Fluorene	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Hexachlorocyclopentadiene	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Hexachloroethane	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Isophorone	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Naphthalene	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
n-Nitroso-di-n-propylamine	360 U	360 U	360 U	370 U	360 U	360 UJ	NA	NA	NA	NA	NA	NA
n-Nitrosodiphenylamine	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Nitrobenzene	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Pentachlorophenol	900 U	900 U	900 U	920 U	910 U	900 U	NA	NA	NA	NA	NA	NA
Phenanthrene	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Phenol	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Pyrene	360 U	360 U	360 U	370 U	360 U	360 U	NA	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyls (µg/kg)												
4,4'-DDD	3.6 U	3.6 U	3.6 U	3.7 U	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	84	26	180	5.9	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	2.8 J	3.6	22	3.7 U	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	1.8 U	1.8 U	1.8 U	1.9 U	NA	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	1.8 U	1.8 U	1.8 U	1.9 U	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	1.8 U	1.8 U	1.8 U	1.9 U	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1016	36 U	36 U	36 U	37 U	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	73 U	73 U	73 U	74 U	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	36 U	36 U	36 U	37 U	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	36 U	36 U	36 U	37 U	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	36 U	36 U	36 U	37 U	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	36 U	36 U	36 U	37 U	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	36 U	36 U	28 J	37 U	NA	NA	NA	NA	NA	NA	NA	NA
beta-BHC	1.8 U	1.8 U	1.8 U	1.9 U	NA	NA	NA	NA	NA	NA	NA	NA
delta-BHC	1.8 U	1.8 U	1.8 U	1.9 U	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	3.6 U	3.6 U	3.6 U	3.7 U	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	0.44 J	1.8 U	1.8 U	1.9 U	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	3.6 U	3.6 U	3.6 U	3.7 U	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	3.6 U	3.6 U	3.6 U	3.7 U	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	3.6 U	3.6 U	3.6 U	3.7 U	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	3.6 U	3.6 U	3.6 U	3.7 U	NA	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	3.6 U	3.6 U	3.6 U	3.7 U	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	1.8 U	1.8 U	1.8 U	1.9 U	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	1.8 U	1.8 U	1.8 U	0.57 J	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	1.8 U	1.8 U	1.8 U	1.9 U	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	1.8 U	1.8 U	1.8 U	1.9 U	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	18 U	18 U	18 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA
Toxaphene	180 U	180 U	180 U	190 U	NA	NA	NA	NA	NA	NA	NA	NA

TABLE H-1
Validated Surface Soil Raw Analytical Data
2006-2014
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Vieques, Puerto Rico

Station ID	EPI04-SO10	EPI04-SO11	EPI04-SO12	EPI04-SO13	EPI04-SO14	EPI04-SO15	EPI04-SO21		EPI04-SO22	EPI04-SO23	EPI04-SO24	EPI04-SO25
Sample ID	EPI04-SS10-0001	EPI04-SS11-0001	EPI04-SS12-0001	EPI04-SS13-0001	EPI04-SS14-0006	EPI04-SS15-0006	VEP4-SS21-0001	VEP4-SS21P-0001	VEP4-SS22-0001	VEP4-SS23-0001	VEP4-SS24-0001	VEP4-SS25-0001
Sample Date	01/24/06	01/25/06	01/24/06	01/25/06	01/31/06	01/31/06	09/17/14	09/17/14	09/16/14	09/22/14	09/18/14	09/22/14
Chemical Name												
Total Metals (mg/kg)												
Aluminum	8,820 J	10,800	8,290	8,590 J	13,300	14,400	NA	NA	NA	NA	NA	NA
Antimony	6.5 U	0.82 J	0.58 J	6.6 U	6.6 U	6.6 U	NA	NA	NA	NA	NA	NA
Arsenic	1.1 U	1.1 U	1.1 U	1.1 U	0.83 J	0.86 J	NA	NA	NA	NA	NA	NA
Barium	57.3 J	80.5	62.9	63.1 J	168	99.1	NA	NA	NA	NA	NA	NA
Beryllium	0.54 U	0.54 U	0.07 J	0.55 U	0.55 U	0.55 U	NA	NA	NA	NA	NA	NA
Cadmium	0.54 U	0.54 U	0.11 J	0.55 U	0.55 U	0.55 U	NA	NA	NA	NA	NA	NA
Calcium	10,900 J	11,200	6,060	11,000 J	21,100	12,500	NA	NA	NA	NA	NA	NA
Chromium	11.9 J	13	9.6	13 J	14.3	13.6	NA	NA	NA	NA	NA	NA
Cobalt	9.2 J	11.4	9.1	11.7 J	14.9	10	NA	NA	NA	NA	NA	NA
Copper	34 J	42.1	32.4	31.9 J	52.8	51	NA	NA	NA	NA	NA	NA
Cyanide	2.7 U	2.7 U	2.7 U	2.8 U	0.23 J	2.7 U	NA	NA	NA	NA	NA	NA
Iron	15,900 J	19,200	15,900	16,900 J	20,100	20,200	NA	NA	NA	NA	NA	NA
Lead	3.9 J	6.6	2.8	3.4 J	2.3 J	2 J	NA	NA	NA	NA	NA	NA
Magnesium	2,910 J	3,720	2,720	2,870 J	4,590	4,600	NA	NA	NA	NA	NA	NA
Manganese	501 J	638	536	707 J	968	427	NA	NA	NA	NA	NA	NA
Mercury	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	NA	NA	NA	NA	NA	NA
Nickel	4.7 J	5.7 J	4.6 J	5.2 J	8.2	7.1	NA	NA	NA	NA	NA	NA
Potassium	1,120 J	1,540 J	1,030 J	1,110 J	2,420 J	1,590 J	NA	NA	NA	NA	NA	NA
Selenium	3.8 U	0.56 J	0.68 J	0.61 J	0.78 J	3.8 U	NA	NA	NA	NA	NA	NA
Silver	1.1 U	1.1 U	1.1 U	1.1 UJ	1.1 U	1.1 U	NA	NA	NA	NA	NA	NA
Sodium	542 U	545 U	545 U	554 U	549 U	546 U	NA	NA	NA	NA	NA	NA
Thallium	0.54 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U	NA	NA	NA	NA	NA	NA
Vanadium	62.3 J	73	54.2	68.5 J	86.1	78.4	NA	NA	NA	NA	NA	NA
Zinc	19.4 J	27	20.4	13.8 J	24.8 J	26.5 J	NA	NA	NA	NA	NA	NA
Wet Chemistry (mg/kg)												
Total organic carbon (TOC)	NA	NA	NA	NA	NA	NA	9,910	NA	30,400 NZ-01	27,800	11,600	24,000

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Notes:

Shading indicates detections
NA - Not analyzed
J - Analyte present, value may or may not be accurate or precise
NZ-01 - Estimated result; one or more QC criteria recovered outside acceptance limits (for unvalidated data)
R - Rejected Result
U - Nondetect
UJ - Analyte not detected, quantitation limit may be inaccurate
mg/kg - Milligrams per kilogram
µg/kg - Micrograms per kilogram

TABLE H-2
Validated Subsurface Soil Raw Analytical Data
2006 - 2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW08	EPI04-MW09	EPI04-MW10	EPI04-MW11		EPI04-MW12	EPI04-MW13D	EPI04-MW17D	EPI04-SO01	EPI04-SO02
Sample ID	VEP4-SB16-1617-1111	VEP4-SB19-0607-1111	VEP4-SB18-1214-1111	VEP4-SB20-0608-1111	VEP4-SB20P-0608-1111	VEP4-SB17-1011-1111	VEP4-SB16-0406	VEP4-SB17-0406	EPI04-SB01-0406	EPI04-SB02-0406
Sample Date	11/03/11	11/08/11	11/15/11	11/10/11	11/10/11	11/11/11	05/30/13	06/05/13	01/26/06	01/26/06
Depth of Soil Sample Below Land Surface	16 - 17'	6 - 7'	12 - 14'	6 - 8'	6 - 8'	10 - 11'	4 - 6'	4 - 6'	4 - 6'	4 - 6'
Chemical Name										
Volatile Organic Compounds (µg/kg)										
1,1,1-Trichloroethane	2.22 U	2.59 U	2.67 U	2.45 U	2.82 U	2.62 U	NA	NA	10 U	10 U
1,1,2,2-Tetrachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
1,1,2-Trichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
1,1-Dichloroethane	2.22 U	2.59 U	2.67 U	2.45 U	2.82 U	2.62 U	NA	NA	10 U	10 U
1,1-Dichloroethene	2.22 U	2.59 U	2.67 U	2.45 U	2.82 U	2.62 U	2.23 U	4.08 U	10 U	10 U
1,2,4-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
1,2-Dibromo-3-chloropropane	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
1,2-Dibromoethane	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
1,2-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
1,2-Dichloroethane	2.22 U	2.59 U	2.67 U	2.45 U	2.82 U	2.62 U	NA	NA	10 U	10 U
1,2-Dichloropropane	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
1,3-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
1,4-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
2-Butanone	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
2-Hexanone	NA	NA	NA	NA	NA	NA	NA	NA	10 UJ	10 UJ
4-Methyl-2-pentanone	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
Acetone	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
Benzene	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
Bromoform	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
Bromomethane	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
Carbon disulfide	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
Carbon tetrachloride	2.22 U	2.59 U	2.67 U	2.45 U	2.82 U	2.62 U	NA	NA	10 U	10 U
Chlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
Chloroethane	2.22 U	2.59 U	2.67 U	2.45 U	2.82 U	2.62 U	NA	NA	10 U	10 U
Chloroform	2.22 U	2.59 U	2.67 U	2.45 U	2.82 U	2.62 U	NA	NA	10 U	10 U
Chloromethane	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
cis-1,2-Dichloroethene	2.22 U	2.59 U	2.67 U	2.45 U	2.82 U	2.62 U	2.23 U	4.08 U	10 U	10 U
cis-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
Cyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
Dibromochloromethane	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
Dichlorodifluoromethane (Freon-12)	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
Isopropylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
Methyl acetate	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
Methylcyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
Methylene chloride	4.43 UJ	5.18 UJ	5.34 U	4.91 U	5.64 U	5.25 U	NA	NA	10 U	10 U
Methyl-tert-butyl ether (MTBE)	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
Styrene	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
Tetrachloroethene	2.22 U	2.59 U	2.67 U	2.45 U	2.82 U	2.62 U	2.23 U	4.08 U	10 U	10 U
Toluene	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
trans-1,2-Dichloroethene	2.22 U	2.59 U	2.67 U	2.45 U	2.82 U	2.62 U	2.23 U	4.08 U	10 UJ	10 UJ
trans-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
Trichloroethene	2.22 U	2.59 U	2.67 U	2.45 U	2.82 U	2.62 U	2.23 U	4.08 U	10 U	10 U
Trichlorofluoromethane (Freon-11)	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
Vinyl chloride	2.22 U	2.59 U	2.67 U	2.45 U	2.82 U	2.62 U	2.23 U	4.08 U	10 U	10 U
Xylene, total	NA	NA	NA	NA	NA	NA	NA	NA	10 U	10 U
Semivolatile Organic Compounds (µg/kg)										

TABLE H-2
Validated Subsurface Soil Raw Analytical Data
2006 - 2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW08	EPI04-MW09	EPI04-MW10	EPI04-MW11		EPI04-MW12	EPI04-MW13D	EPI04-MW17D	EPI04-SO01	EPI04-SO02
Sample ID	VEP4-SB16-1617-1111	VEP4-SB19-0607-1111	VEP4-SB18-1214-1111	VEP4-SB20-0608-1111	VEP4-SB20P-0608-1111	VEP4-SB17-1011-1111	VEP4-SB16-0406	VEP4-SB17-0406	EPI04-SB01-0406	EPI04-SB02-0406
Sample Date	11/03/11	11/08/11	11/15/11	11/10/11	11/10/11	11/11/11	05/30/13	06/05/13	01/26/06	01/26/06
Depth of Soil Sample Below Land Surface	16 - 17'	6 - 7'	12 - 14'	6 - 8'	6 - 8'	10 - 11'	4 - 6'	4 - 6'	4 - 6'	4 - 6'
Chemical Name										
1,1-Biphenyl	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
1,4-Dioxane	NA	NA	NA	NA	NA	NA	34.9 U	33.4 U	NA	NA
2,2'-Oxybis(1-chloropropane)	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
2,4,5-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	880 U	860 U
2,4,6-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
2,4-Dichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
2,4-Dimethylphenol	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
2,4-Dinitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	880 UJ	860 UJ
2,4-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
2,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
2-Chloronaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
2-Chlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
2-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
2-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	880 U	860 U
2-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
3,3'-Dichlorobenzidine	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
3-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	880 U	860 U
4,6-Dinitro-2-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	880 U	860 U
4-Bromophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
4-Chloro-3-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
4-Chloroaniline	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
4-Chlorophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
4-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	880 U	860 U
4-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	880 UJ	860 UJ
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Acetophenone	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Anthracene	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Atrazine	NA	NA	NA	NA	NA	NA	NA	NA	350 UJ	340 UJ
Benzaldehyde	NA	NA	NA	NA	NA	NA	NA	NA	350 UJ	340 UJ
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
bis(2-Chloroethoxy)methane	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
bis(2-Chloroethyl)ether	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
bis(2-Ethylhexyl)phthalate	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Butylbenzylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Caprolactam	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Carbazole	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Diethylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Dimethyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Di-n-butylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Di-n-octylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U

TABLE H-2
Validated Subsurface Soil Raw Analytical Data
2006 - 2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW08	EPI04-MW09	EPI04-MW10	EPI04-MW11		EPI04-MW12	EPI04-MW13D	EPI04-MW17D	EPI04-SO01	EPI04-SO02
Sample ID	VEP4-SB16-1617-1111	VEP4-SB19-0607-1111	VEP4-SB18-1214-1111	VEP4-SB20-0608-1111	VEP4-SB20P-0608-1111	VEP4-SB17-1011-1111	VEP4-SB16-0406	VEP4-SB17-0406	EPI04-SB01-0406	EPI04-SB02-0406
Sample Date	11/03/11	11/08/11	11/15/11	11/10/11	11/10/11	11/11/11	05/30/13	06/05/13	01/26/06	01/26/06
Depth of Soil Sample Below Land Surface	16 - 17'	6 - 7'	12 - 14'	6 - 8'	6 - 8'	10 - 11'	4 - 6'	4 - 6'	4 - 6'	4 - 6'
Chemical Name										
Hexachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Hexachlorobutadiene	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Hexachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Isophorone	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
n-Nitroso-di-n-propylamine	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
n-Nitrosodiphenylamine	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Nitrobenzene	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	880 U	860 U
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Phenol	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA	350 U	340 U
Pesticide/Polychlorinated Biphenyls (µg/kg)										
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	3.5 U	3.4 U
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	3.5 U	3.4 U
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	3.5 U	3.4 U
Aldrin	NA	NA	NA	NA	NA	NA	NA	NA	1.8 U	1.8 U
alpha-BHC	NA	NA	NA	NA	NA	NA	NA	NA	1.8 U	1.8 U
alpha-Chlordane	NA	NA	NA	NA	NA	NA	NA	NA	1.8 U	1.8 U
Aroclor-1016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beta-BHC	NA	NA	NA	NA	NA	NA	NA	NA	1.8 U	1.8 U
delta-BHC	NA	NA	NA	NA	NA	NA	NA	NA	1.8 U	1.8 U
Dieldrin	NA	NA	NA	NA	NA	NA	NA	NA	3.5 U	3.4 U
Endosulfan I	NA	NA	NA	NA	NA	NA	NA	NA	1.8 U	1.8 U
Endosulfan II	NA	NA	NA	NA	NA	NA	NA	NA	3.5 U	3.4 U
Endosulfan sulfate	NA	NA	NA	NA	NA	NA	NA	NA	3.5 U	3.4 U
Endrin	NA	NA	NA	NA	NA	NA	NA	NA	3.5 U	3.4 U
Endrin aldehyde	NA	NA	NA	NA	NA	NA	NA	NA	3.5 U	3.4 U
Endrin ketone	NA	NA	NA	NA	NA	NA	NA	NA	3.5 U	3.4 U
gamma-BHC (Lindane)	NA	NA	NA	NA	NA	NA	NA	NA	1.8 U	1.8 U
gamma-Chlordane	NA	NA	NA	NA	NA	NA	NA	NA	0.49 J	0.45 J
Heptachlor	NA	NA	NA	NA	NA	NA	NA	NA	1.8 U	1.8 U
Heptachlor epoxide	NA	NA	NA	NA	NA	NA	NA	NA	1.8 U	1.8 U
Methoxychlor	NA	NA	NA	NA	NA	NA	NA	NA	18 U	18 U
Toxaphene	NA	NA	NA	NA	NA	NA	NA	NA	180 U	180 U
Total Metals (mg/kg)										
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA	9,060 J	6,660 J
Antimony	NA	NA	NA	NA	NA	NA	NA	NA	6.4 U	6.3 U
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	1.1 U	1 U
Barium	NA	NA	NA	NA	NA	NA	NA	NA	46.9 J	42.4 J
Beryllium	NA	NA	NA	NA	NA	NA	NA	NA	0.53 U	0.52 U
Cadmium	NA	NA	NA	NA	NA	NA	NA	NA	0.53 U	0.52 U

TABLE H-2
Validated Subsurface Soil Raw Analytical Data
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Station ID	EPI04-MW08	EPI04-MW09	EPI04-MW10	EPI04-MW11		EPI04-MW12	EPI04-MW13D	EPI04-MW17D	EPI04-SO01	EPI04-SO02
Sample ID	VEP4-SB16-1617-1111	VEP4-SB19-0607-1111	VEP4-SB18-1214-1111	VEP4-SB20-0608-1111	VEP4-SB20P-0608-1111	VEP4-SB17-1011-1111	VEP4-SB16-0406	VEP4-SB17-0406	EPI04-SB01-0406	EPI04-SB02-0406
Sample Date	11/03/11	11/08/11	11/15/11	11/10/11	11/10/11	11/11/11	05/30/13	06/05/13	01/26/06	01/26/06
Depth of Soil Sample Below Land Surface	16 - 17'	6 - 7'	12 - 14'	6 - 8'	6 - 8'	10 - 11'	4 - 6'	4 - 6'	4 - 6'	4 - 6'
Chemical Name										
Calcium	NA	NA	NA	NA	NA	NA	NA	NA	14,100 J	2,050 J
Chromium	NA	NA	NA	NA	NA	NA	NA	NA	16.2 J	10.8 J
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA	7.9 J	8.1 J
Copper	NA	NA	NA	NA	NA	NA	NA	NA	45 J	39.3 J
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	2.7 U	2.6 U
Iron	NA	NA	NA	NA	NA	NA	NA	NA	21,400 J	15,000 J
Lead	NA	NA	NA	NA	NA	NA	NA	NA	1.6 J	1.1 J
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	4,890 J	2,580 J
Manganese	NA	NA	NA	NA	NA	NA	NA	NA	308 J	322 J
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	0.11 U	0.1 U
Nickel	NA	NA	NA	NA	NA	NA	NA	NA	6.6 J	5.8 J
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	531 U	523 U
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	3.7 U	3.7 U
Silver	NA	NA	NA	NA	NA	NA	NA	NA	1.1 U	1 U
Sodium	NA	NA	NA	NA	NA	NA	NA	NA	470 J	523 U
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	0.53 U	0.52 U
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	99.4 J	60.3 J
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	18.7	13.9 J
Wet Chemistry (mg/kg)										
Total organic carbon (TOC)	6,070 J	925 J	362 J	1,320 J	NA	3,020	2,530	5,610	NA	NA

C:\Users\jmcmanus\Documents___NAVFAC__working\SWMU 20 RI\Apps\H\[Table H-2 - Subsurface Soil Exceedances.xlsx], Dean, Juliana/VBO, 02/19/2015

Notes:
Shading indicates detections
NA - Not analyzed
J - Analyte present, value may or may not be accurate or precise
R - Rejected Result
U - Nondetect
UJ - Analyte not detected, quantitation limit may be inaccurate
mg/kg - Milligrams per kilogram
µg/kg - Micrograms per kilogram

TABLE H-2
Validated Subsurface Soil Raw Analytical Data
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Vieques, Puerto Rico

Station ID	EPI04-SO03	EPI04-SO04	EPI04-SO05	EPI04-SO06	EPI04-SO07	EPI04-SO08		EPI04-SO09	EPI04-SO10	EPI04-SO11	EPI04-SO12	EPI04-SO13	EPI04-SO14	
Sample ID	EPI04-SB03-0406	EPI04-SB04-0406	EPI04-SB05-0406	EPI04-SB06-0406	EPI04-SB07-0406	EPI04-SB08-0406	EPI04-SB08P-0406	EPI04-SB09-0406	EPI04-SB10-0406	EPI04-SB11-0406	EPI04-SB12-0406	EPI04-SB13-0406	EPI04-SB14-0406	EPI04-SB14P-0406
Sample Date	01/26/06	01/26/06	01/26/06	01/26/06	01/25/06	01/25/06	01/25/06	01/24/06	01/24/06	01/25/06	01/24/06	01/25/06	02/14/06	02/14/06
Depth of Soil Sample Below Land Surface	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'
Chemical Name														
Volatile Organic Compounds (µg/kg)														
1,1,1-Trichloroethane	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,1,2-Trichloroethane	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,1-Dichloroethane	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,1-Dichloroethene	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2,4-Trichlorobenzene	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dibromo-3-chloropropane	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dibromoethane	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichlorobenzene	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethane	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloropropane	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Butanone	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Hexanone	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Methyl-2-pentanone	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acetone	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzene	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bromodichloromethane	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bromoform	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bromomethane	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Carbon disulfide	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Carbon tetrachloride	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chlorobenzene	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroethane	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroform	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloromethane	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
cis-1,2-Dichloroethene	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
cis-1,3-Dichloropropene	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Cyclohexane	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibromochloromethane	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichlorodifluoromethane (Freon-12)	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Ethylbenzene	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Isopropylbenzene	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Methyl acetate	10 UJ	11 UJ	11 UJ	11 UJ	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Methylcyclohexane	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Methylene chloride	10 UJ	11 UJ	11 UJ	11 UJ	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Methyl-tert-butyl ether (MTBE)	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Styrene	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Toluene	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
trans-1,2-Dichloroethene	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
trans-1,3-Dichloropropene	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trichloroethene	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trichlorofluoromethane (Freon-11)	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Vinyl chloride	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Xylene, total	10 U	11 U	11 U	11 U	10 U	11 U	11 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Semivolatile Organic Compounds (µg/kg)														

TABLE H-2
Validated Subsurface Soil Raw Analytical Data
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Vieques, Puerto Rico

Station ID	EPI04-SO03	EPI04-SO04	EPI04-SO05	EPI04-SO06	EPI04-SO07	EPI04-SO08		EPI04-SO09	EPI04-SO10	EPI04-SO11	EPI04-SO12	EPI04-SO13	EPI04-SO14	
Sample ID	EPI04-SB03-0406	EPI04-SB04-0406	EPI04-SB05-0406	EPI04-SB06-0406	EPI04-SB07-0406	EPI04-SB08-0406	EPI04-SB08P-0406	EPI04-SB09-0406	EPI04-SB10-0406	EPI04-SB11-0406	EPI04-SB12-0406	EPI04-SB13-0406	EPI04-SB14-0406	EPI04-SB14P-0406
Sample Date	01/26/06	01/26/06	01/26/06	01/26/06	01/25/06	01/25/06	01/25/06	01/24/06	01/24/06	01/25/06	01/24/06	01/25/06	02/14/06	02/14/06
Depth of Soil Sample Below Land Surface	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'
Chemical Name														
1,1-Biphenyl	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
1,4-Dioxane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,2'-Oxybis(1-chloropropane)	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
2,4,5-Trichlorophenol	870 U	950 U	870 U	920 U	920 U	870 U	880 U	890 U	900 U	940 U	890 U	950 U	860 U	860 U
2,4,6-Trichlorophenol	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
2,4-Dichlorophenol	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
2,4-Dimethylphenol	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
2,4-Dinitrophenol	870 UJ	950 R	870 UJ	920 UJ	920 UJ	870 UJ	880 UJ	890 UJ	900 UJ	940 UJ	890 UJ	950 UJ	860 R	860 R
2,4-Dinitrotoluene	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
2,6-Dinitrotoluene	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
2-Chloronaphthalene	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
2-Chlorophenol	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
2-Methylnaphthalene	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
2-Methylphenol	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
2-Nitroaniline	870 U	950 U	870 U	920 U	920 U	870 U	880 U	890 U	900 U	940 U	890 U	950 U	860 UJ	860 UJ
2-Nitrophenol	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
3,3'-Dichlorobenzidine	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
3-Nitroaniline	870 U	950 U	870 U	920 U	920 U	870 U	880 U	890 U	900 U	940 U	890 U	950 U	860 U	860 U
4,6-Dinitro-2-methylphenol	870 U	950 UJ	870 U	920 U	920 U	870 U	880 U	890 U	900 U	940 U	890 U	950 U	860 UJ	860 UJ
4-Bromophenyl-phenylether	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
4-Chloro-3-methylphenol	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
4-Chloroaniline	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
4-Chlorophenyl-phenylether	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
4-Methylphenol	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
4-Nitroaniline	870 U	950 U	870 U	920 U	920 U	870 U	880 U	890 U	900 U	940 U	890 U	950 U	860 UJ	860 UJ
4-Nitrophenol	870 UJ	950 U	870 UJ	920 UJ	920 UJ	870 U	880 U	890 U	900 UJ	940 U	890 U	950 UJ	860 UJ	860 UJ
Acenaphthene	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Acenaphthylene	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Acetophenone	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Anthracene	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Atrazine	350 UJ	380 U	350 UJ	370 UJ	370 UJ	350 UJ	350 UJ	350 UJ	360 UJ	380 UJ	350 UJ	380 UJ	340 U	340 U
Benzaldehyde	350 UJ	380 U	350 UJ	370 UJ	370 UJ	350 UJ	350 UJ	350 UJ	360 UJ	380 UJ	350 UJ	380 UJ	340 U	340 U
Benzo(a)anthracene	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Benzo(a)pyrene	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Benzo(b)fluoranthene	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Benzo(g,h,i)perylene	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Benzo(k)fluoranthene	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
bis(2-Chloroethoxy)methane	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
bis(2-Chloroethyl)ether	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
bis(2-Ethylhexyl)phthalate	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Butylbenzylphthalate	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Caprolactam	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Carbazole	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Chrysene	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Dibenz(a,h)anthracene	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Dibenzofuran	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Diethylphthalate	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Dimethyl phthalate	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Di-n-butylphthalate	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Di-n-octylphthalate	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Fluoranthene	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Fluorene	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U

TABLE H-2
Validated Subsurface Soil Raw Analytical Data
2006 - 2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-SO03	EPI04-SO04	EPI04-SO05	EPI04-SO06	EPI04-SO07	EPI04-SO08		EPI04-SO09	EPI04-SO10	EPI04-SO11	EPI04-SO12	EPI04-SO13	EPI04-SO14	
Sample ID	EPI04-SB03-0406	EPI04-SB04-0406	EPI04-SB05-0406	EPI04-SB06-0406	EPI04-SB07-0406	EPI04-SB08-0406	EPI04-SB08P-0406	EPI04-SB09-0406	EPI04-SB10-0406	EPI04-SB11-0406	EPI04-SB12-0406	EPI04-SB13-0406	EPI04-SB14-0406	EPI04-SB14P-0406
Sample Date	01/26/06	01/26/06	01/26/06	01/26/06	01/25/06	01/25/06	01/25/06	01/24/06	01/24/06	01/25/06	01/24/06	01/25/06	02/14/06	02/14/06
Depth of Soil Sample Below Land Surface	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'
Chemical Name														
Hexachlorobenzene	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Hexachlorobutadiene	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Hexachlorocyclopentadiene	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Hexachloroethane	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Indeno(1,2,3-cd)pyrene	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Isophorone	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Naphthalene	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
n-Nitroso-di-n-propylamine	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
n-Nitrosodiphenylamine	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Nitrobenzene	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Pentachlorophenol	870 U	950 U	870 U	920 U	920 U	870 U	880 U	890 U	900 U	940 U	890 U	950 U	860 U	860 U
Phenanthrene	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Phenol	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Pyrene	350 U	380 U	350 U	370 U	370 U	350 U	350 U	350 U	360 U	380 U	350 U	380 U	340 U	340 U
Pesticide/Polychlorinated Biphenyls (µg/kg)														
4,4'-DDD	3.5 U	3.8 U	3.5 U	3.7 U	1.2 J	3.5 U	3.5 U	0.89 J	3.6 U	3.8 U	3.5 U	3.8 U	NA	NA
4,4'-DDE	1.5 J	3.8 U	3.5 U	2.7 J	1.1 J	71	47	44	50	0.79 J	220	3.8 U	NA	NA
4,4'-DDT	3.5 U	3.8 U	3.5 U	2.2 J	3.7 U	8.5	11	56	1.9 J	3.8 U	6.1	3.8 U	NA	NA
Aldrin	1.8 U	2 U	1.8 U	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U	1.9 U	1.8 U	2 U	NA	NA
alpha-BHC	1.8 U	2 U	1.8 U	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U	1.9 U	1.8 U	2 U	NA	NA
alpha-Chlordane	1.8 U	2 U	1.8 U	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U	1.9 U	1.8 U	2 U	NA	NA
Aroclor-1016	NA	38 U	NA	NA	NA	35 U	35 U	35 U	36 U	38 U	35 U	38 U	NA	NA
Aroclor-1221	NA	77 U	NA	NA	NA	71 U	71 U	72 U	73 U	76 U	72 U	77 U	NA	NA
Aroclor-1232	NA	38 U	NA	NA	NA	35 U	35 U	35 U	36 U	38 U	35 U	38 U	NA	NA
Aroclor-1242	NA	38 U	NA	NA	NA	35 U	35 U	35 U	36 U	38 U	35 U	38 U	NA	NA
Aroclor-1248	NA	38 U	NA	NA	NA	35 U	35 U	35 U	36 U	38 U	35 U	38 U	NA	NA
Aroclor-1254	NA	38 U	NA	NA	NA	35 U	35 U	35 U	36 U	38 U	35 U	38 U	NA	NA
Aroclor-1260	NA	38 U	NA	NA	NA	35 U	35 U	35 U	36 U	38 U	35 U	38 U	NA	NA
beta-BHC	1.8 U	2 U	1.8 U	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U	1.9 U	1.8 U	2 U	NA	NA
delta-BHC	1.8 U	2 U	1.8 U	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U	1.9 U	1.8 U	2 U	NA	NA
Dieldrin	3.5 U	3.8 U	3.5 U	3.7 U	3.7 U	3.5 U	3.5 U	3.5 U	3.6 U	3.8 U	3.5 U	3.8 U	NA	NA
Endosulfan I	1.8 U	2 U	1.8 U	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U	1.9 U	1.8 U	2 U	NA	NA
Endosulfan II	3.5 U	3.8 U	3.5 U	3.7 U	3.7 U	3.5 U	3.5 U	3.5 U	3.6 U	3.8 U	3.5 U	3.8 U	NA	NA
Endosulfan sulfate	3.5 U	3.8 U	3.5 U	3.7 U	3.7 U	3.5 U	3.5 U	3.5 U	3.6 U	3.8 U	3.5 U	3.8 U	NA	NA
Endrin	3.5 U	3.8 U	3.5 U	3.7 U	3.7 U	3.5 U	3.5 U	3.5 U	3.6 U	3.8 U	3.5 U	3.8 U	NA	NA
Endrin aldehyde	3.5 U	3.8 U	3.5 U	3.7 U	3.7 U	1.5 J	3.5 U	3.5 U	3.6 U	3.8 U	3.5 U	3.8 U	NA	NA
Endrin ketone	3.5 U	3.8 U	3.5 U	3.7 U	3.7 U	3.5 U	3.5 U	3.5 U	3.6 U	3.8 U	3.5 U	3.8 U	NA	NA
gamma-BHC (Lindane)	1.8 U	2 U	1.8 U	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U	1.9 U	1.8 U	2 U	NA	NA
gamma-Chlordane	1.8 U	2 U	0.65 J	0.5 J	0.48 J	1.8 U	1.8 U	1.8 U	1.1 J	1.9 U	1.8 U	2 U	NA	NA
Heptachlor	1.8 U	2 U	1.8 U	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U	1.9 U	1.8 U	2 U	NA	NA
Heptachlor epoxide	1.8 U	2 U	1.8 U	1.9 U	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U	1.9 U	1.8 U	2 U	NA	NA
Methoxychlor	18 U	20 U	18 U	19 U	19 U	18 U	18 U	18 U	18 U	19 U	18 U	20 U	NA	NA
Toxaphene	180 U	200 U	180 U	190 U	190 U	180 U	180 U	180 U	180 U	190 U	180 U	200 U	NA	NA
Total Metals (mg/kg)														
Aluminum	7,240 J	7,350	7,370 J	12,400 J	8,380 J	8,620	8,000	12,000	12,200 J	16,700	9,980	10,100 J	6,820	6,950
Antimony	6.3 U	6.9 U	6.3 U	6.7 U	6.7 U	0.52 J	0.44 J	0.61 J	6.5 U	0.79 J	0.6 J	6.9 U	0.2 J	0.27 J
Arsenic	1.1 U	1.2 U	1 U	1.1 U	1.1 U	0.54 J	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.2 U	1 U	1 U
Barium	44.7 J	51.8	44.4 J	84.3 J	55.8 J	47.3	42.3	61.1	75.1 J	106	57.6	68.6 J	52.4 J	45.9 J
Beryllium	0.52 U	0.58 U	0.53 U	0.56 U	0.56 U	0.53 U	0.53 U	0.54 U	0.54 U	0.56 U	0.034 J	0.58 U	0.52 U	0.52 U
Cadmium	0.52 U	0.58 U	0.53 U	0.56 U	0.56 U	0.53 U	0.53 U	0.54 U	0.54 U	0.56 U	0.079 J	0.58 U	0.52 U	0.52 U

TABLE H-2
Validated Subsurface Soil Raw Analytical Data
2006 - 2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-SO03	EPI04-SO04	EPI04-SO05	EPI04-SO06	EPI04-SO07	EPI04-SO08		EPI04-SO09	EPI04-SO10	EPI04-SO11	EPI04-SO12	EPI04-SO13	EPI04-SO14	
Sample ID	EPI04-SB03-0406	EPI04-SB04-0406	EPI04-SB05-0406	EPI04-SB06-0406	EPI04-SB07-0406	EPI04-SB08-0406	EPI04-SB08P-0406	EPI04-SB09-0406	EPI04-SB10-0406	EPI04-SB11-0406	EPI04-SB12-0406	EPI04-SB13-0406	EPI04-SB14-0406	EPI04-SB14P-0406
Sample Date	01/26/06	01/26/06	01/26/06	01/26/06	01/25/06	01/25/06	01/25/06	01/24/06	01/24/06	01/25/06	01/24/06	01/25/06	02/14/06	02/14/06
Depth of Soil Sample Below Land Surface	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'
Chemical Name														
Calcium	3,180 J	2,760	2,310 J	3,040 J	2,550 J	2,980	2,970	4,750	9,410 J	5,060	2,810	4,530 J	3,080	3,900
Chromium	11.3 J	10.6	11.4 J	11.6 J	11.2 J	9.6	11	11.7 J	13.1 J	18.1	14	12.4 J	10.2 J	9.1 J
Cobalt	7.5 J	7.7	7.4 J	11.1 J	9.3 J	9.3	8	10.2 J	9.5 J	15.8	10.8	11.5 J	7.6 J	7.6 J
Copper	44.9 J	41.7	48.8 J	57.5 J	48.4 J	39.3	40.2	43.5	39.4 J	111	44.2	56.3 J	41.1 J	41.5 J
Cyanide	2.6 U	2.9 U	2.6 U	2.8 U	2.8 U	2.6 U	2.7 U	2.7 U	2.7 U	2.8 U	2.7 U	2.9 U	2.6 U	2.6 U
Iron	17,100 J	15,700	16,800 J	20,500 J	18,500 J	17,600	17,600	17,800	18,300 J	30,000	18,700	18,700 J	14,600	13,900
Lead	2.3 J	1.4 J	1 U	1.4 J	1.5 J	1.2	1.1	4.3 J	1.6 J	1.8	1.5	1.5 J	1 J	1.2 J
Magnesium	2,360 J	2,510	2,930 J	3,250 J	3,080 J	4,020	3,330	3,900	3,110 J	7,810	2,930	4,900 J	2,340	2,450
Manganese	309 J	395	374 J	504 J	594 J	382	368	441	445 J	730	499	626 J	367 J	328 J
Mercury	0.1 U	0.12 U	0.1 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.12 U	0.1 U	0.1 U
Nickel	4.5 J	5	5.9 J	9.7 J	6.7 J	4.6 J	4.4 J	5.9 J	5.3 J	11.5 J	6.7 J	8.8 J	4.6 J	4.5 J
Potassium	526 U	577 U	527 U	555 U	556 U	805 J	715 J	858 J	1,050 J	806 J	670 J	883 J	521 U	519 U
Selenium	3.7 U	0.54 J	3.7 U	0.49 J	3.9 U	3.7 U	3.7 U	3.8 U	0.59 J	0.74 J	3.8 U	4 U	0.54 J	0.57 J
Silver	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.2 U	1 U	1 U
Sodium	526 U	577 U	527 U	555 U	556 U	528 U	532 U	538 U	542 U	565 U	540 U	636 J	521 U	519 U
Thallium	0.53 U	0.58 U	0.53 U	0.56 U	0.56 U	0.53 U	0.53 U	0.54 U	0.54 U	0.56 U	0.54 U	0.58 U	0.52 U	0.52 U
Vanadium	65.6 J	61.7	62.7 J	70.3 J	75.3 J	59.3	61.8	61.9	67 J	113	72.7	76.2 J	55.8 J	51.3 J
Zinc	15 J	15.7 J	18.3 J	17.4 J	17.2 J	14.2	13.7	17.6 J	16.6 J	38.2	16.7	22.8 J	19.6 J	17.1 J
Wet Chemistry (mg/kg)														
Total organic carbon (TOC)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Notes:
Shading indicates detections
NA - Not analyzed
J - Analyte present, value may or may not be accurate or precise
R - Rejected Result
U - Nondetect
UJ - Analyte not detected, quantitation limit may be inaccurate
mg/kg - Milligrams per kilogram
µg/kg - Micrograms per kilogram

TABLE H-2
Validated Subsurface Soil Raw Analytical Data
2006 - 2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-SO15	EPI04-SO21	EPI04-SO22	EPI04-SO23	EPI04-SO24	EPI04-SO25
Sample ID	EPI04-SB15-0406	VEP4-SB21-0406	VEP4-SB22-0406	VEP4-SB23-0406	VEP4-SB24-0406	VEP4-SB25-0406
Sample Date	02/14/06	09/17/14	09/16/14	09/22/14	09/18/14	09/22/14
Depth of Soil Sample Below Land Surface	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'
Chemical Name						
Volatile Organic Compounds (µg/kg)						
1,1,1-Trichloroethane	12 U	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	12 U	NA	NA	NA	NA	NA
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	12 U	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	12 U	NA	NA	NA	NA	NA
1,1-Dichloroethane	12 U	NA	NA	NA	NA	NA
1,1-Dichloroethene	12 U	2.57 U	2.43 U	3.4 U	3.32 U	2.7 U
1,2,4-Trichlorobenzene	12 U	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	12 U	NA	NA	NA	NA	NA
1,2-Dibromoethane	12 U	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	12 U	NA	NA	NA	NA	NA
1,2-Dichloroethane	12 U	NA	NA	NA	NA	NA
1,2-Dichloropropane	12 U	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	12 U	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	12 U	NA	NA	NA	NA	NA
2-Butanone	12 U	NA	NA	NA	NA	NA
2-Hexanone	12 U	NA	NA	NA	NA	NA
4-Methyl-2-pentanone	12 U	NA	NA	NA	NA	NA
Acetone	12 U	NA	NA	NA	NA	NA
Benzene	12 U	NA	NA	NA	NA	NA
Bromodichloromethane	12 U	NA	NA	NA	NA	NA
Bromoform	12 U	NA	NA	NA	NA	NA
Bromomethane	12 U	NA	NA	NA	NA	NA
Carbon disulfide	12 U	NA	NA	NA	NA	NA
Carbon tetrachloride	12 U	NA	NA	NA	NA	NA
Chlorobenzene	12 U	NA	NA	NA	NA	NA
Chloroethane	12 U	NA	NA	NA	NA	NA
Chloroform	12 U	NA	NA	NA	NA	NA
Chloromethane	12 U	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	12 U	2.57 U	2.43 U	3.4 U	3.32 U	2.7 U
cis-1,3-Dichloropropene	12 U	NA	NA	NA	NA	NA
Cyclohexane	12 U	NA	NA	NA	NA	NA
Dibromochloromethane	12 U	NA	NA	NA	NA	NA
Dichlorodifluoromethane (Freon-12)	12 U	NA	NA	NA	NA	NA
Ethylbenzene	12 U	NA	NA	NA	NA	NA
Isopropylbenzene	12 U	NA	NA	NA	NA	NA
Methyl acetate	12 U	NA	NA	NA	NA	NA
Methylcyclohexane	12 U	NA	NA	NA	NA	NA
Methylene chloride	12 U	NA	NA	NA	NA	NA
Methyl-tert-butyl ether (MTBE)	12 U	NA	NA	NA	NA	NA
Styrene	12 U	NA	NA	NA	NA	NA
Tetrachloroethene	12 U	2.57 U	2.43 U	3.4 U	3.32 U	2.7 U
Toluene	12 U	NA	NA	NA	NA	NA
trans-1,2-Dichloroethene	12 U	2.57 U	2.43 U	3.4 U	3.32 U	2.7 U
trans-1,3-Dichloropropene	12 U	NA	NA	NA	NA	NA
Trichloroethene	12 U	2.57 U	2.43 U	3.4 U	3.32 U	2.7 U
Trichlorofluoromethane (Freon-11)	12 U	NA	NA	NA	NA	NA
Vinyl chloride	12 U	2.57 U	2.43 U	3.4 U	3.32 U	2.7 U
Xylene, total	12 U	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (µg/kg)						

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SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-SO15	EPI04-SO21	EPI04-SO22	EPI04-SO23	EPI04-SO24	EPI04-SO25
Sample ID	EPI04-SB15-0406	VEP4-SB21-0406	VEP4-SB22-0406	VEP4-SB23-0406	VEP4-SB24-0406	VEP4-SB25-0406
Sample Date	02/14/06	09/17/14	09/16/14	09/22/14	09/18/14	09/22/14
Depth of Soil Sample Below Land Surface	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'
Chemical Name						
1,1-Biphenyl	350 U	NA	NA	NA	NA	NA
1,4-Dioxane	NA	NA	NA	NA	NA	NA
2,2'-Oxybis(1-chloropropane)	350 U	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	890 U	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	350 U	NA	NA	NA	NA	NA
2,4-Dichlorophenol	350 U	NA	NA	NA	NA	NA
2,4-Dimethylphenol	350 U	NA	NA	NA	NA	NA
2,4-Dinitrophenol	890 R	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	350 U	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	350 U	NA	NA	NA	NA	NA
2-Chloronaphthalene	350 U	NA	NA	NA	NA	NA
2-Chlorophenol	350 U	NA	NA	NA	NA	NA
2-Methylnaphthalene	350 U	NA	NA	NA	NA	NA
2-Methylphenol	350 U	NA	NA	NA	NA	NA
2-Nitroaniline	890 UJ	NA	NA	NA	NA	NA
2-Nitrophenol	350 U	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	350 U	NA	NA	NA	NA	NA
3-Nitroaniline	890 U	NA	NA	NA	NA	NA
4,6-Dinitro-2-methylphenol	890 UJ	NA	NA	NA	NA	NA
4-Bromophenyl-phenylether	350 U	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	350 U	NA	NA	NA	NA	NA
4-Chloroaniline	350 U	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	350 U	NA	NA	NA	NA	NA
4-Methylphenol	350 U	NA	NA	NA	NA	NA
4-Nitroaniline	890 UJ	NA	NA	NA	NA	NA
4-Nitrophenol	890 UJ	NA	NA	NA	NA	NA
Acenaphthene	350 U	NA	NA	NA	NA	NA
Acenaphthylene	350 U	NA	NA	NA	NA	NA
Acetophenone	350 U	NA	NA	NA	NA	NA
Anthracene	350 U	NA	NA	NA	NA	NA
Atrazine	350 U	NA	NA	NA	NA	NA
Benzaldehyde	350 U	NA	NA	NA	NA	NA
Benzo(a)anthracene	350 U	NA	NA	NA	NA	NA
Benzo(a)pyrene	350 U	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	350 U	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	350 U	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	350 U	NA	NA	NA	NA	NA
bis(2-Chloroethoxy)methane	350 U	NA	NA	NA	NA	NA
bis(2-Chloroethyl)ether	350 U	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	350 U	NA	NA	NA	NA	NA
Butylbenzylphthalate	350 U	NA	NA	NA	NA	NA
Caprolactam	350 U	NA	NA	NA	NA	NA
Carbazole	350 U	NA	NA	NA	NA	NA
Chrysene	350 U	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	350 U	NA	NA	NA	NA	NA
Dibenzofuran	350 U	NA	NA	NA	NA	NA
Diethylphthalate	350 U	NA	NA	NA	NA	NA
Dimethyl phthalate	350 U	NA	NA	NA	NA	NA
Di-n-butylphthalate	350 U	NA	NA	NA	NA	NA
Di-n-octylphthalate	350 U	NA	NA	NA	NA	NA
Fluoranthene	350 U	NA	NA	NA	NA	NA
Fluorene	350 U	NA	NA	NA	NA	NA

TABLE H-2
Validated Subsurface Soil Raw Analytical Data
2006 - 2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-SO15	EPI04-SO21	EPI04-SO22	EPI04-SO23	EPI04-SO24	EPI04-SO25
Sample ID	EPI04-SB15-0406	VEP4-SB21-0406	VEP4-SB22-0406	VEP4-SB23-0406	VEP4-SB24-0406	VEP4-SB25-0406
Sample Date	02/14/06	09/17/14	09/16/14	09/22/14	09/18/14	09/22/14
Depth of Soil Sample Below Land Surface	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'
Chemical Name						
Hexachlorobenzene	350 U	NA	NA	NA	NA	NA
Hexachlorobutadiene	350 U	NA	NA	NA	NA	NA
Hexachlorocyclopentadiene	350 U	NA	NA	NA	NA	NA
Hexachloroethane	350 U	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	350 U	NA	NA	NA	NA	NA
Isophorone	350 U	NA	NA	NA	NA	NA
Naphthalene	350 U	NA	NA	NA	NA	NA
n-Nitroso-di-n-propylamine	350 U	NA	NA	NA	NA	NA
n-Nitrosodiphenylamine	350 U	NA	NA	NA	NA	NA
Nitrobenzene	350 U	NA	NA	NA	NA	NA
Pentachlorophenol	890 U	NA	NA	NA	NA	NA
Phenanthrene	350 U	NA	NA	NA	NA	NA
Phenol	350 U	NA	NA	NA	NA	NA
Pyrene	350 U	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyls (µg/kg)						
4,4'-DDD	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA
Aldrin	NA	NA	NA	NA	NA	NA
alpha-BHC	NA	NA	NA	NA	NA	NA
alpha-Chlordane	NA	NA	NA	NA	NA	NA
Aroclor-1016	NA	NA	NA	NA	NA	NA
Aroclor-1221	NA	NA	NA	NA	NA	NA
Aroclor-1232	NA	NA	NA	NA	NA	NA
Aroclor-1242	NA	NA	NA	NA	NA	NA
Aroclor-1248	NA	NA	NA	NA	NA	NA
Aroclor-1254	NA	NA	NA	NA	NA	NA
Aroclor-1260	NA	NA	NA	NA	NA	NA
beta-BHC	NA	NA	NA	NA	NA	NA
delta-BHC	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA
Endosulfan I	NA	NA	NA	NA	NA	NA
Endosulfan II	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	NA	NA	NA	NA	NA	NA
Endrin	NA	NA	NA	NA	NA	NA
Endrin aldehyde	NA	NA	NA	NA	NA	NA
Endrin ketone	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	NA	NA	NA	NA	NA	NA
gamma-Chlordane	NA	NA	NA	NA	NA	NA
Heptachlor	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	NA	NA	NA	NA	NA	NA
Methoxychlor	NA	NA	NA	NA	NA	NA
Toxaphene	NA	NA	NA	NA	NA	NA
Total Metals (mg/kg)						
Aluminum	11,900	NA	NA	NA	NA	NA
Antimony	0.32 J	NA	NA	NA	NA	NA
Arsenic	1.1 U	NA	NA	NA	NA	NA
Barium	62.6 J	NA	NA	NA	NA	NA
Beryllium	0.54 U	NA	NA	NA	NA	NA
Cadmium	0.54 U	NA	NA	NA	NA	NA

TABLE H-2
Validated Subsurface Soil Raw Analytical Data
2006 - 2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-SO15	EPI04-SO21	EPI04-SO22	EPI04-SO23	EPI04-SO24	EPI04-SO25
Sample ID	EPI04-SB15-0406	VEP4-SB21-0406	VEP4-SB22-0406	VEP4-SB23-0406	VEP4-SB24-0406	VEP4-SB25-0406
Sample Date	02/14/06	09/17/14	09/16/14	09/22/14	09/18/14	09/22/14
Depth of Soil Sample Below Land Surface	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'	4 - 6'
Chemical Name						
Calcium	3,740	NA	NA	NA	NA	NA
Chromium	10.5 J	NA	NA	NA	NA	NA
Cobalt	11.3 J	NA	NA	NA	NA	NA
Copper	65.9 J	NA	NA	NA	NA	NA
Cyanide	0.21 J	NA	NA	NA	NA	NA
Iron	18,100	NA	NA	NA	NA	NA
Lead	1.4 J	NA	NA	NA	NA	NA
Magnesium	3,550	NA	NA	NA	NA	NA
Manganese	507 J	NA	NA	NA	NA	NA
Mercury	0.11 U	NA	NA	NA	NA	NA
Nickel	6 J	NA	NA	NA	NA	NA
Potassium	742	NA	NA	NA	NA	NA
Selenium	0.71 J	NA	NA	NA	NA	NA
Silver	1.1 U	NA	NA	NA	NA	NA
Sodium	539 U	NA	NA	NA	NA	NA
Thallium	0.54 U	NA	NA	NA	NA	NA
Vanadium	61.3 J	NA	NA	NA	NA	NA
Zinc	20.2 J	NA	NA	NA	NA	NA
Wet Chemistry (mg/kg)						
Total organic carbon (TOC)	NA	5,160	8,210	41,600	5,350	15,600

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Notes:
Shading indicates detections
NA - Not analyzed
J - Analyte present, value may or may not be accurate or precise
R - Rejected Result
U - Nondetect
UJ - Analyte not detected, quantitation limit may be inaccurate
mg/kg - Milligrams per kilogram
µg/kg - Micrograms per kilogram

TABLE H-3
Unvalidated Groundwater Raw Analytical Data 2013
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-DP01	EPI04-DP02	EPI04-DP03	EPI04-DP04	EPI04-DP05	EPI04-DP06	EPI04-DP07	EPI04-DP08
Sample ID	VEP4-GP01-2530-073013	VEP4-GP02-2529-073113	VEP4-GP03-2024-080113	VEP4-GP04-2024-073113	VEP4-GP05-2024-080113	VEP4-GP06-2125-080713	VEP4-GP07-2529-080713	VEP4-GP08-2024-080913
Sample Date	07/30/13	07/31/13	08/01/13	07/31/13	08/01/13	08/07/13	08/07/13	08/09/13
Chemical Name								
Volatile Organic Compounds (µg/l)								
1,1-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	NA	NA	NA	NA	NA	NA	NA	NA
trans-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	1.83	3.34	21.3	2.62	0.8	40	28.5	3.16
Vinyl chloride	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (µg/l)								
1,4-Dioxane	NA	NA	NA	NA	NA	NA	NA	NA

\\Tampa\Proj\USNAVFACENGCOM\433193CTO0013\SWMU_20_RI_Report_draft\Appendix H - Analytical Data Summary\native files\[Table 4-3 - Unvalidated Grab Groundwater Data.xlsx], Dean, Juliana/VBO, 05/18/2015

Notes:

Shading indicates detections

NA - Not analyzed

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

Q - One or more quality control criteria outside acceptance limits

U - The material was analyzed for, but not detected

µg/l - Micrograms per liter

TABLE H-3
Unvalidated Groundwater Raw Analytical Data 2013
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-DP09	EPI04-DP10	EPI04-DP11	EPI04-MW13D	EPI04-MW15	EPI04-MW16	EPI04-MW17	EPI04-MW17D
Sample ID	VEP4-GP09-2024-081213	VEP4-GP10-2024-081313	VEP4-GP11-2024-081413	VEP4-GW13D-062613	VEP4-GW15-052313	VEP4-GW16-051613	VEP4-GW17-052913	VEP4-GW17D-062613
Sample Date	08/12/13	08/13/13	08/14/13	06/26/13	05/23/13	05/16/13	05/29/13	06/26/13
Chemical Name								
Volatile Organic Compounds (µg/l)								
1,1-Dichloroethene	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.33 J	0.5 U
cis-1,2-Dichloroethene	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.59 J
Tetrachloroethene	NA	NA	NA	0.69 J	0.5 U	0.27 J	2.76	1.06
trans-1,2-Dichloroethene	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene	0.63	5.18	0.5 U	44.4	1.5	12.2	112	63.9
Vinyl chloride	NA	NA	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Semivolatile Organic Compounds (µg/l)								
1,4-Dioxane	NA	NA	NA	NA	0.481 U	0.463 U	0.5 U	NA

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Notes:

Shading indicates detections

NA - Not analyzed

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

Q - One or more quality control criteria outside acceptance limits

U - The material was analyzed for, but not detected

µg/l - Micrograms per liter

TABLE H-3
Unvalidated Groundwater Raw Analytical Data 2013
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW18	EPI04-MW19	EPI04-MW20	EPI04-MW21	EPI04-MW22	EPI04-MW23	EPI04-MW24
Sample ID	VEP4-GW18-052113	VEP4-GW19-051413	VEP4-GW20-061013	VEP4-GW21-062113	VEP4-GW22-061913	VEP4-GW23-061913	VEP4-GW24-062013
Sample Date	05/21/13	05/14/13	06/10/13	06/21/13	06/19/13	06/19/13	06/20/13
Chemical Name							
Volatile Organic Compounds (µg/l)							
1,1-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.38 J	1.06
cis-1,2-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.59	0.6 J
Tetrachloroethene	0.5 U	0.5 U	1.22	0.5 U	0.5 U	0.47 J	3.38
trans-1,2-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene	2.87	2.74	45.9	4.07	0.94	51.4	166 D
Vinyl chloride	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Semivolatile Organic Compounds (µg/l)							
1,4-Dioxane	0.467 U	0.463 U	0.472 QU	NA	0.476 U	0.481 U	NA

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Notes:

Shading indicates detections

NA - Not analyzed

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

Q - One or more quality control criteria outside acceptance limits

U - The material was analyzed for, but not detected

µg/l - Micrograms per liter

TABLE H-4
Validated Groundwater Raw Analytical Data
2006-2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW01				EPI04-MW02				EPI04-MW03			
Sample ID	EPI04-GW01-06B	VEP4-GW01-0309	VEP04-GW01-0710	VEP4-GW01-0513	EPI04-GW02-06B	VEP4-GW02-0309	VEP04-GW02-0710	VEP4-GW02-0513	EPI04-GW03-06B	VEP4-GW03-0309	VEP04-GW03-0710	VEP4-GW03-0513
Sample Date	04/04/06	03/25/09	07/28/10	05/14/13	04/04/06	03/25/09	07/29/10	05/16/13	04/04/06	03/26/09	07/29/10	05/16/13
Chemical Name												
Volatile Organic Compounds (µg/l)												
1,1,1-Trichloroethane	0.5 U	1 UJ	0.5 U	NA	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA
1,1,2,2-Tetrachloroethane	0.5 U	0.05 U	0.025 U	NA	0.5 U	0.05 U	0.025 U	NA	0.5 U	0.05 U	0.025 U	NA
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.5 U	2 U	0.5 U	NA	0.5 U	2 U	0.5 U	NA	0.5 U	2 U	0.5 U	NA
1,1,2-Trichloroethane	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA
1,1-Dichloroethane	0.5 U	1 UJ	0.5 U	NA	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA
1,1-Dichloroethene	0.5 U	0.05 U	0.025 U	0.5 U	0.5 U	0.05 U	0.025 U	0.5 U	0.5 U	0.05 U	0.025 U	0.5 U
1,2,3-Trichlorobenzene	0.5 U	1 UJ	0.5 U	NA	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA
1,2,4-Trichlorobenzene	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA
1,2-Dibromo-3-chloropropane	0.5 U	2 U	1 U	NA	0.5 U	2 U	1 U	NA	0.5 U	2 U	1 U	NA
1,2-Dibromoethane	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA
1,2-Dichlorobenzene	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA
1,2-Dichloroethane	0.5 U	0.05 U	0.025 U	NA	0.5 U	0.05 U	0.025 U	NA	0.5 U	0.05 U	0.025 U	NA
1,2-Dichloropropane	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA
1,3-Dichlorobenzene	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA
1,4-Dichlorobenzene	0.5 U	0.05 U	0.025 U	NA	0.5 U	0.05 U	0.025 U	NA	0.5 U	0.05 U	0.025 U	NA
2-Butanone	5 U	5 U	2.5 U	NA	5 U	5 U	2.5 U	NA	5 U	5 U	2.5 U	NA
2-Hexanone	5 U	5 U	2.5 U	NA	5 U	5 U	2.5 U	NA	5 U	5 U	2.5 U	NA
4-Methyl-2-pentanone	5 U	5 U	2.5 U	NA	5 U	5 U	2.5 U	NA	5 U	5 U	2.5 U	NA
Acetone	5 U	6 U	2.7 J	NA	5 U	6 U	3.2 U	NA	5 U	6 U	140 U	NA
Benzene	0.5 U	0.05 U	0.67	NA	0.5 U	0.05 U	0.025 U	NA	0.5 U	0.05 U	0.01 J	NA
Bromochloromethane	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA
Bromodichloromethane	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA
Bromoform	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA
Bromomethane	0.5 U	2 U	1 U	NA	0.5 U	2 U	1 U	NA	0.5 U	2 UJ	1 U	NA
Carbon disulfide	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA
Carbon tetrachloride	0.5 U	0.05 U	0.025 U	NA	0.5 U	0.05 U	0.025 U	NA	0.5 U	0.05 U	0.025 U	NA
Chlorobenzene	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA
Chloroethane	0.5 U	2 UJ	1 U	NA	0.5 U	2 U	1 U	NA	0.5 U	2 UJ	1 U	NA
Chloroform	0.5 U	1 U	0.65 J	NA	0.99	0.4 J	0.5 U	NA	0.5 U	1 U	0.5 U	NA
Chloromethane	0.5 U	2 U	1 U	NA	0.5 U	2 UJ	1 U	NA	0.5 U	2 U	1 U	NA
cis-1,2-Dichloroethene	0.5 UJ	1 U	0.5 U	0.5 U	0.5 U	1 U	0.5 U	0.5 U	0.5 UJ	1 U	0.5 U	0.5 U
cis-1,3-Dichloropropene	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA
Cyclohexane	0.5 U	1 UJ	0.5 U	NA	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA
Dibromochloromethane	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA
Dichlorodifluoromethane (Freon-12)	0.5 U	2 UJ	1 U	NA	0.5 UJ	2 UJ	1 U	NA	0.5 U	2 UJ	1 U	NA
Ethylbenzene	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA
Isopropylbenzene	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA
m- and p-Xylene	NA	2 U	1 U	NA	NA	2 U	1 U	NA	NA	2 U	1 U	NA
Methyl acetate	0.5 R	2 U	0.75 U	NA	0.5 R	2 U	0.75 U	NA	0.5 R	2 U	0.75 U	NA
Methylcyclohexane	0.5 U	1 U	0.5 UJ	NA	0.5 U	1 U	0.5 UJ	NA	0.5 U	1 U	0.5 UJ	NA
Methylene chloride	0.5 U	5 U	2.5 U	NA	0.5 U	5 U	2.5 U	NA	0.5 U	5 U	2.5 U	NA
Methyl-tert-butyl ether (MTBE)	0.5 U	2 U	0.5 U	NA	0.5 UJ	2 U	0.5 U	NA	0.5 U	2 U	0.5 U	NA
o-Xylene	NA	1 U	0.5 U	NA	NA	1 U	0.5 U	NA	NA	1 U	0.5 U	NA
Styrene	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA
Tetrachloroethene	0.5 U	0.05 U	0.025 U	0.5 U	0.5 U	0.05 U	0.025 UJ	0.5 U	0.5 U	0.05 U	0.025 U	0.5 U
Toluene	0.12 J	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA
trans-1,2-Dichloroethene	0.5 UJ	1 U	0.5 U	0.5 U	0.5 U	1 U	0.5 U	0.5 U	0.5 UJ	1 U	0.5 U	0.5 U
trans-1,3-Dichloropropene	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA	0.5 U	1 U	0.5 U	NA
Trichloroethene	0.48 J	1 U	0.5 U	0.2 U	0.5 U	1 U	0.5 U	0.2 U	0.5 U	1 U	0.5 U	0.2 U
Trichlorofluoromethane (Freon-11)	0.5 U	2 UJ	1 U	NA	0.5 U	2 U	1 U	NA	0.5 U	2 U	1 U	NA
Vinyl chloride	0.5 U	0.15 U	0.05 U	0.2 U	0.5 U	0.15 U	0.05 U	0.2 U	0.5 U	0.15 U	0.05 U	0.2 U
Xylene, total	0.5 U	NA	NA	NA	0.5 U	NA	NA	NA	0.5 U	NA	NA	NA

TABLE H-4
Validated Groundwater Raw Analytical Data
2006-2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW01				EPI04-MW02				EPI04-MW03			
Sample ID	EPI04-GW01-06B	VEP4-GW01-0309	VEP04-GW01-0710	VEP4-GW01-0513	EPI04-GW02-06B	VEP4-GW02-0309	VEP04-GW02-0710	VEP4-GW02-0513	EPI04-GW03-06B	VEP4-GW03-0309	VEP04-GW03-0710	VEP4-GW03-0513
Sample Date	04/04/06	03/25/09	07/28/10	05/14/13	04/04/06	03/25/09	07/29/10	05/16/13	04/04/06	03/26/09	07/29/10	05/16/13
Chemical Name												
Semivolatile Organic Compounds (µg/l)												
1,1-Biphenyl	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
1,4-Dioxane	NA	NA	NA	0.49 U	NA	NA	NA	0.481 U	NA	NA	NA	0.481 U
2,2'-Oxybis(1-chloropropane)	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
2,4,5-Trichlorophenol	20 U	NA	NA	NA	20 U	NA	NA	NA	20 U	NA	NA	NA
2,4,6-Trichlorophenol	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
2,4-Dichlorophenol	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
2,4-Dimethylphenol	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
2,4-Dinitrophenol	20 UJ	NA	NA	NA	20 UJ	NA	NA	NA	20 UJ	NA	NA	NA
2,4-Dinitrotoluene	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
2,6-Dinitrotoluene	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
2-Chloronaphthalene	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
2-Chlorophenol	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
2-Methylnaphthalene	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
2-Methylphenol	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
2-Nitroaniline	20 U	NA	NA	NA	20 U	NA	NA	NA	20 U	NA	NA	NA
2-Nitrophenol	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
3,3'-Dichlorobenzidine	5 UJ	NA	NA	NA	5 UJ	NA	NA	NA	5 UJ	NA	NA	NA
3-Nitroaniline	20 U	NA	NA	NA	20 U	NA	NA	NA	20 U	NA	NA	NA
4,6-Dinitro-2-methylphenol	20 U	NA	NA	NA	20 U	NA	NA	NA	20 U	NA	NA	NA
4-Bromophenyl-phenylether	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
4-Chloro-3-methylphenol	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
4-Chloroaniline	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
4-Chlorophenyl-phenylether	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
4-Methylphenol	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
4-Nitroaniline	20 U	NA	NA	NA	20 U	NA	NA	NA	20 U	NA	NA	NA
4-Nitrophenol	20 U	NA	NA	NA	20 U	NA	NA	NA	20 U	NA	NA	NA
Acenaphthene	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Acenaphthylene	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Acetophenone	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Anthracene	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Atrazine	5 U	NA	NA	NA	5 UJ	NA	NA	NA	5 UJ	NA	NA	NA
Benzaldehyde	5 UJ	NA	NA	NA	5 UJ	NA	NA	NA	5 UJ	NA	NA	NA
Benzo(a)anthracene	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Benzo(a)pyrene	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Benzo(b)fluoranthene	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Benzo(g,h,i)perylene	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Benzo(k)fluoranthene	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
bis(2-Chloroethoxy)methane	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
bis(2-Chloroethyl)ether	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
bis(2-Ethylhexyl)phthalate	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Butylbenzylphthalate	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Caprolactam	5 UJ	NA	NA	NA	5 UJ	NA	NA	NA	5 UJ	NA	NA	NA
Chrysene	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Dibenz(a,h)anthracene	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Dibenzofuran	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Diethylphthalate	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Dimethyl phthalate	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Di-n-butylphthalate	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Di-n-octylphthalate	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Fluoranthene	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Fluorene	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Hexachlorobenzene	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Hexachlorobutadiene	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA

TABLE H-4
Validated Groundwater Raw Analytical Data
2006-2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW01				EPI04-MW02				EPI04-MW03			
Sample ID	EPI04-GW01-06B	VEP4-GW01-0309	VEP04-GW01-0710	VEP4-GW01-0513	EPI04-GW02-06B	VEP4-GW02-0309	VEP04-GW02-0710	VEP4-GW02-0513	EPI04-GW03-06B	VEP4-GW03-0309	VEP04-GW03-0710	VEP4-GW03-0513
Sample Date	04/04/06	03/25/09	07/28/10	05/14/13	04/04/06	03/25/09	07/29/10	05/16/13	04/04/06	03/26/09	07/29/10	05/16/13
Chemical Name												
Hexachlorocyclopentadiene	5 UJ	NA	NA	NA	5 UJ	NA	NA	NA	5 UJ	NA	NA	NA
Hexachloroethane	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Indeno(1,2,3-cd)pyrene	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Isophorone	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Naphthalene	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
n-Nitroso-di-n-propylamine	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
n-Nitrosodiphenylamine	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Nitrobenzene	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Pentachlorophenol	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Phenanthrene	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Phenol	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Pyrene	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Pesticide/Polychlorinated Biphenyls (µg/l)												
4,4'-DDD	0.02 U	NA	NA	NA	0.02 U	NA	NA	NA	0.02 U	NA	NA	NA
4,4'-DDE	0.02 U	NA	NA	NA	0.02 U	NA	NA	NA	0.02 U	NA	NA	NA
4,4'-DDT	0.02 U	NA	NA	NA	0.02 U	NA	NA	NA	0.02 U	NA	NA	NA
Aldrin	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA
alpha-BHC	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA
alpha-Chlordane	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA
Aroclor-1016	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA
Aroclor-1221	0.4 U	NA	NA	NA	0.4 U	NA	NA	NA	0.4 U	NA	NA	NA
Aroclor-1232	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA
Aroclor-1242	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA
Aroclor-1248	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA
Aroclor-1254	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA
Aroclor-1260	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA
beta-BHC	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA
delta-BHC	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA
Dieldrin	0.02 U	NA	NA	NA	0.02 U	NA	NA	NA	0.02 U	NA	NA	NA
Endosulfan I	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA
Endosulfan II	0.02 U	NA	NA	NA	0.02 U	NA	NA	NA	0.02 U	NA	NA	NA
Endosulfan sulfate	0.02 U	NA	NA	NA	0.02 U	NA	NA	NA	0.02 U	NA	NA	NA
Endrin	0.02 U	NA	NA	NA	0.02 U	NA	NA	NA	0.02 U	NA	NA	NA
Endrin aldehyde	0.02 U	NA	NA	NA	0.02 U	NA	NA	NA	0.02 U	NA	NA	NA
Endrin ketone	0.02 U	NA	NA	NA	0.02 U	NA	NA	NA	0.02 U	NA	NA	NA
gamma-BHC (Lindane)	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA
gamma-Chlordane	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA
Heptachlor	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA
Heptachlor epoxide	0.035 R	NA	NA	NA	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA
Methoxychlor	0.1 U	NA	NA	NA	0.1 U	NA	NA	NA	0.1 U	NA	NA	NA
Toxaphene	1 U	NA	NA	NA	1 U	NA	NA	NA	1 U	NA	NA	NA
Total Metals (µg/l)												
Aluminum	200 U	NA	NA	NA	265	NA	NA	NA	200 U	NA	NA	NA
Antimony	60 U	NA	NA	NA	60 U	NA	NA	NA	60 U	NA	NA	NA
Arsenic	10 U	NA	NA	NA	10 U	NA	NA	NA	10 U	NA	NA	NA
Barium	200 U	NA	NA	NA	200 U	NA	NA	NA	200 U	NA	NA	NA
Beryllium	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Cadmium	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Calcium	110,000	NA	NA	NA	111,000	NA	NA	NA	80,500	NA	NA	NA
Chromium	1.3 J	NA	NA	NA	1.3 J	NA	NA	NA	1.8 J	NA	NA	NA
Cobalt	50 U	NA	NA	NA	0.41 J	NA	NA	NA	0.41 J	NA	NA	NA
Copper	11.7 J	NA	NA	NA	25 U	NA	NA	NA	25 U	NA	NA	NA
Cyanide	10 U	NA	NA	NA	10 U	NA	NA	NA	10 U	NA	NA	NA

TABLE H-4
Validated Groundwater Raw Analytical Data
2006-2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW01				EPI04-MW02				EPI04-MW03			
Sample ID	EPI04-GW01-06B	VEP4-GW01-0309	VEP04-GW01-0710	VEP4-GW01-0513	EPI04-GW02-06B	VEP4-GW02-0309	VEP04-GW02-0710	VEP4-GW02-0513	EPI04-GW03-06B	VEP4-GW03-0309	VEP04-GW03-0710	VEP4-GW03-0513
Sample Date	04/04/06	03/25/09	07/28/10	05/14/13	04/04/06	03/25/09	07/29/10	05/16/13	04/04/06	03/26/09	07/29/10	05/16/13
Chemical Name												
Iron	100 U	NA	NA	NA	205	NA	NA	NA	100 U	NA	NA	NA
Lead	10 U	NA	NA	NA	10 U	NA	NA	NA	10 U	NA	NA	NA
Magnesium	86,800	NA	NA	NA	83,800	NA	NA	NA	51,500	NA	NA	NA
Manganese	86.9	NA	NA	NA	21.2	NA	NA	NA	8.1 J	NA	NA	NA
Mercury	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA
Nickel	1.7 J	NA	NA	NA	1.3 J	NA	NA	NA	1.6 J	NA	NA	NA
Potassium	2,260 J	NA	NA	NA	5,000 U	NA	NA	NA	5,000 U	NA	NA	NA
Selenium	2.7 J	NA	NA	NA	2.1 J	NA	NA	NA	2.3 J	NA	NA	NA
Silver	10 U	NA	NA	NA	10 U	NA	NA	NA	10 U	NA	NA	NA
Sodium	260,000	NA	NA	NA	273,000	NA	NA	NA	245,000	NA	NA	NA
Thallium	1 U	NA	NA	NA	1 U	NA	NA	NA	1 U	NA	NA	NA
Vanadium	22.1 J	NA	NA	NA	50 U	NA	NA	NA	50 U	NA	NA	NA
Zinc	60 U	NA	NA	NA	60 U	NA	NA	NA	60 U	NA	NA	NA
Dissolved Metals (µg/l)												
Aluminum, Dissolved	200 U	NA	NA	NA	235	NA	NA	NA	200 U	NA	NA	NA
Antimony, Dissolved	60 U	NA	NA	NA	60 U	NA	NA	NA	60 U	NA	NA	NA
Arsenic, Dissolved	10 U	NA	NA	NA	10 U	NA	NA	NA	10 U	NA	NA	NA
Barium, Dissolved	56.7 J	NA	NA	NA	87.2 J	NA	NA	NA	91.1 J	NA	NA	NA
Beryllium, Dissolved	5 U	NA	NA	NA	5 U	NA	NA	NA	5 U	NA	NA	NA
Cadmium, Dissolved	5 U	NA	NA	NA	0.15 J	NA	NA	NA	5 U	NA	NA	NA
Calcium, Dissolved	114,000	NA	NA	NA	120,000	NA	NA	NA	82,100	NA	NA	NA
Chromium, Dissolved	0.88 J	NA	NA	NA	0.81 J	NA	NA	NA	0.77 J	NA	NA	NA
Cobalt, Dissolved	50 U	NA	NA	NA	0.49 J	NA	NA	NA	50 U	NA	NA	NA
Copper, Dissolved	8.8 J	NA	NA	NA	25 U	NA	NA	NA	25 U	NA	NA	NA
Iron, Dissolved	100 U	NA	NA	NA	118	NA	NA	NA	100 U	NA	NA	NA
Lead, Dissolved	10 U	NA	NA	NA	10 U	NA	NA	NA	10 U	NA	NA	NA
Magnesium, Dissolved	89,200	NA	NA	NA	90,200	NA	NA	NA	53,000	NA	NA	NA
Manganese, Dissolved	79.2	NA	NA	NA	18.8	NA	NA	NA	4.1 J	NA	NA	NA
Mercury, Dissolved	0.2 U	NA	NA	NA	0.051 J	NA	NA	NA	0.2 U	NA	NA	NA
Nickel, Dissolved	1.6 J	NA	NA	NA	1.2 J	NA	NA	NA	1 J	NA	NA	NA
Potassium, Dissolved	2,310 J	NA	NA	NA	2,510 J	NA	NA	NA	1,380 J	NA	NA	NA
Selenium, Dissolved	3.6 J	NA	NA	NA	3.2 J	NA	NA	NA	1.9 J	NA	NA	NA
Silver, Dissolved	10 U	NA	NA	NA	10 U	NA	NA	NA	10 U	NA	NA	NA
Sodium, Dissolved	262,000	NA	NA	NA	285,000	NA	NA	NA	248,000	NA	NA	NA
Thallium, Dissolved	1 U	NA	NA	NA	1 U	NA	NA	NA	1 U	NA	NA	NA
Vanadium, Dissolved	22.4 J	NA	NA	NA	19 J	NA	NA	NA	25.2 J	NA	NA	NA
Zinc, Dissolved	60 U	NA	NA	NA	60 U	NA	NA	NA	60 U	NA	NA	NA
Wet Chemistry (mg/l)												
Acetate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Alkalinity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butyrate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloride	NA	270	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Formic acid	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lactic Acid	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrite	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propionic Acid	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyruvate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE H-4
Validated Groundwater Raw Analytical Data
2006-2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW01				EPI04-MW02				EPI04-MW03			
Sample ID	EPI04-GW01-06B	VEP4-GW01-0309	VEP04-GW01-0710	VEP4-GW01-0513	EPI04-GW02-06B	VEP4-GW02-0309	VEP04-GW02-0710	VEP4-GW02-0513	EPI04-GW03-06B	VEP4-GW03-0309	VEP04-GW03-0710	VEP4-GW03-0513
Sample Date	04/04/06	03/25/09	07/28/10	05/14/13	04/04/06	03/25/09	07/29/10	05/16/13	04/04/06	03/26/09	07/29/10	05/16/13
Chemical Name												
Total dissolved solids (TDS)	1,370	1,100	NA	NA	1,380	NA	NA	NA	1,100	NA	NA	NA
Total organic carbon (TOC)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dechlorinating Bacteria (cells/ml)												
Dehalococcoides	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Functioning Genes (cells/ml)												
BAV1 R-Dase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TCE R-Dase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VC R-Dase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

\\Tampa\Proj\USNAVFACENGCOM\433193CTO0013\SWMU_20_RI_Report_draft\Appendix H - Analytical Data Summary\native files\[Table 4-4 - Validated Groundwater Data.xlsx], Dean, Juliana/VBO, 05/19/2015

Notes:

Shading indicates detections

NA - Not analyzed

D - Result of a dilution (laboratory qualifier)

H1 - Analyzed outside of recommended holding time (laboratory qualifier)

J - Analyte present, value may or may not be accurate or precise

M - Sample matrix interfered with the quantitation of the analyte; the parameters DL/LOD/LOQ have been raised (laboratory qualifier)

N - MS/MSD accuracy and/or precision outside acceptance criteria (laboratory qualifier)

R - Rejected result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
cells/ml - Cells per milliliter
mg/l - Milligrams per liter
µg/l - Micrograms per liter

TABLE H-4
Validated Groundwater Raw Analytical Data
2006-2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW04				EPI04-MW05							
Sample ID	EPI04-GW04-06B	VEP4-GW04-0309	VEP04-GW04-0710	VEP4-GW04-0513	EPI04-GW05-06B	VEP4-GW05-0309	VEP4-GW05P-0309	VEP04-GW05-0710	VEP4-GW05-1111	VEP4-GW05P-1111	VEP4-GW05-0513	VEP4-GW05P-0513
Sample Date	04/05/06	03/24/09	07/29/10	05/20/13	04/05/06	03/24/09	03/24/09	07/13/10	11/18/11	11/18/11	05/15/13	05/15/13
Chemical Name												
Volatile Organic Compounds (µg/l)												
1,1,1-Trichloroethane	0.5 U	1 U	0.5 R	NA	0.5 U	1 U	1 U	0.5 U	0.5 U	0.5 U	NA	NA
1,1,2,2-Tetrachloroethane	0.5 U	0.05 U	0.025 R	NA	0.5 U	0.05 UJ	0.05 U	0.025 UJ	NA	NA	NA	NA
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	0.5 U	2 U	0.5 R	NA	0.5 U	2 U	2 U	0.5 U	NA	NA	NA	NA
1,1,2-Trichloroethane	0.5 U	1 U	0.5 R	NA	0.5 U	1 U	1 U	0.5 U	NA	NA	NA	NA
1,1-Dichloroethane	0.5 U	1 U	0.5 R	NA	0.5 UJ	1 U	1 U	0.5 U	0.5 U	0.5 U	NA	NA
1,1-Dichloroethene	0.5 U	0.05 U	0.025 R	0.5 U	0.5 U	0.017 J	0.018 J	0.084 J	0.5 U	0.5 U	1 U	1 U
1,2,3-Trichlorobenzene	0.5 U	1 U	0.5 R	NA	0.5 U	1 U	1 U	0.5 U	NA	NA	NA	NA
1,2,4-Trichlorobenzene	0.5 U	1 U	0.5 R	NA	0.5 U	1 U	1 U	0.5 U	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	0.5 U	2 U	1 R	NA	0.5 U	2 U	2 U	1 U	NA	NA	NA	NA
1,2-Dibromoethane	0.5 U	1 U	0.5 R	NA	0.5 U	1 U	1 U	0.5 U	NA	NA	NA	NA
1,2-Dichlorobenzene	0.5 U	1 U	0.5 R	NA	0.5 U	1 U	1 U	0.5 U	NA	NA	NA	NA
1,2-Dichloroethane	0.5 U	0.05 U	0.025 R	NA	0.5 U	0.05 UJ	0.05 U	0.025 UJ	0.5 U	0.5 U	NA	NA
1,2-Dichloropropane	0.5 U	1 U	0.5 R	NA	0.5 U	1 U	1 U	0.5 U	NA	NA	NA	NA
1,3-Dichlorobenzene	0.5 U	1 U	0.5 R	NA	0.5 U	1 U	1 U	0.5 U	NA	NA	NA	NA
1,4-Dichlorobenzene	0.5 U	0.05 U	0.025 R	NA	0.5 U	0.05 UJ	0.05 U	0.013 J	NA	NA	NA	NA
2-Butanone	5 U	5 U	2.5 R	NA	5 U	5 U	5 U	2.5 U	NA	NA	NA	NA
2-Hexanone	5 U	5 U	2.5 R	NA	5 U	5 U	5 U	2.5 U	NA	NA	NA	NA
4-Methyl-2-pentanone	5 U	5 U	2.5 R	NA	5 U	5 U	5 U	2.5 U	NA	NA	NA	NA
Acetone	5 U	390	32 J	NA	5 U	6 U	6 U	20 U	NA	NA	NA	NA
Benzene	0.5 U	0.05 U	0.025 R	NA	0.5 U	0.05 U	0.05 U	0.012 J	NA	NA	NA	NA
Bromochloromethane	0.5 U	1 U	0.5 R	NA	0.5 U	1 U	1 U	0.5 U	NA	NA	NA	NA
Bromodichloromethane	0.5 U	1 U	0.5 R	NA	0.5 U	1 U	1 U	0.5 U	NA	NA	NA	NA
Bromoform	0.5 U	1 U	0.5 R	NA	0.5 U	1 U	1 U	0.5 U	NA	NA	NA	NA
Bromomethane	0.5 U	2 U	1 R	NA	0.5 U	2 U	2 U	1 U	NA	NA	NA	NA
Carbon disulfide	0.5 U	1	0.77 J	NA	0.5 U	1 U	1 U	0.5 U	NA	NA	NA	NA
Carbon tetrachloride	0.5 U	0.05 U	0.025 R	NA	0.5 U	0.05 UJ	0.05 U	0.025 UJ	0.5 U	0.5 U	NA	NA
Chlorobenzene	0.5 U	1 U	0.5 R	NA	0.5 U	1 U	1 U	0.5 U	NA	NA	NA	NA
Chloroethane	0.5 U	2 U	1 R	NA	0.5 U	2 U	2 U	1 U	0.5 U	0.5 U	NA	NA
Chloroform	0.5	1 U	0.5 R	NA	0.5 U	1 U	1 U	0.5 U	0.5 U	0.5 U	NA	NA
Chloromethane	0.5 U	2 U	1 R	NA	0.5 U	2 U	2 U	1 U	NA	NA	NA	NA
cis-1,2-Dichloroethene	0.5 U	1 U	0.5 R	0.5 U	0.19 J	1 U	1 U	0.49 J	0.5 U	0.5 U	0.54 J	0.62 J
cis-1,3-Dichloropropene	0.5 U	1 U	0.5 R	NA	0.5 U	1 U	1 U	0.5 U	NA	NA	NA	NA
Cyclohexane	0.5 U	1 U	0.5 R	NA	0.5 U	1 U	1 U	0.5 U	NA	NA	NA	NA
Dibromochloromethane	0.5 U	1 U	0.5 R	NA	0.5 U	1 U	1 U	0.5 U	NA	NA	NA	NA
Dichlorodifluoromethane (Freon-12)	0.5 UJ	2 UJ	1 R	NA	0.5 U	2 UJ	2 UJ	1 U	NA	NA	NA	NA
Ethylbenzene	0.5 U	1 U	0.5 R	NA	0.5 U	1 U	1 U	0.5 U	NA	NA	NA	NA
Isopropylbenzene	0.5 U	1 U	0.5 R	NA	0.5 U	1 U	1 U	0.5 U	NA	NA	NA	NA
m- and p-Xylene	NA	2 U	1 R	NA	NA	2 U	2 U	1 U	NA	NA	NA	NA
Methyl acetate	0.5 R	2 U	0.75 R	NA	0.5 R	2 U	2 U	0.75 U	NA	NA	NA	NA
Methylcyclohexane	0.5 U	1 U	0.5 R	NA	0.5 U	1 U	1 U	0.5 U	NA	NA	NA	NA
Methylene chloride	0.5 U	5 U	2.5 R	NA	0.5 U	5 U	5 U	2.5 U	1 U	1 U	NA	NA
Methyl-tert-butyl ether (MTBE)	0.5 UJ	2 U	0.5 R	NA	0.5 U	2 U	2 U	0.5 U	NA	NA	NA	NA
o-Xylene	NA	1 U	0.5 R	NA	NA	1 U	1 U	0.5 U	NA	NA	NA	NA
Styrene	0.5 U	1 U	0.5 R	NA	0.5 U	1 U	1 U	0.5 U	NA	NA	NA	NA
Tetrachloroethene	0.5 U	0.05 U	0.025 R	0.5 U	0.17 J	0.4 J	0.42	0.28 J	0.5 U	0.271 J	1 U	1 U
Toluene	0.11 J	1 U	0.5 R	NA	0.5 U	1 U	1 U	0.5 U	NA	NA	NA	NA
trans-1,2-Dichloroethene	0.5 U	1 U	0.5 R	0.5 U	0.5 U	1 U	1 U	0.5 U	0.5 U	0.5 U	1 U	1 U
trans-1,3-Dichloropropene	0.5 U	1 U	0.5 R	NA	0.5 U	1 U	1 U	0.5 U	NA	NA	NA	NA
Trichloroethene	0.5 U	1 U	0.5 R	0.2 U	9.3	17	17	14	8.42	7.44	2.5	2.56
Trichlorofluoromethane (Freon-11)	0.5 U	2 U	1 R	NA	0.5 U	2 U	2 U	1 U	NA	NA	NA	NA
Vinyl chloride	0.5 U	0.15 U	0.05 R	0.2 U	0.5 U	0.15 UJ	0.15 U	0.05 UJ	0.5 U	0.5 U	0.4 U	0.4 U
Xylene, total	0.5 U	NA	NA	NA	0.5 U	NA	NA	NA	NA	NA	NA	NA

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Station ID	EPI04-MW04				EPI04-MW05							
Sample ID	EPI04-GW04-06B	VEP4-GW04-0309	VEP04-GW04-0710	VEP4-GW04-0513	EPI04-GW05-06B	VEP4-GW05-0309	VEP4-GW05P-0309	VEP04-GW05-0710	VEP4-GW05-1111	VEP4-GW05P-1111	VEP4-GW05-0513	VEP4-GW05P-0513
Sample Date	04/05/06	03/24/09	07/29/10	05/20/13	04/05/06	03/24/09	03/24/09	07/13/10	11/18/11	11/18/11	05/15/13	05/15/13
Chemical Name												
Semivolatile Organic Compounds (µg/l)												
1,1-Biphenyl	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
1,4-Dioxane	NA	NA	NA	0.472 U	NA	NA	NA	NA	NA	NA	0.463 U	0.49 U
2,2'-Oxybis(1-chloropropane)	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	20 U	NA	NA	NA	20 U	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
2,4-Dichlorophenol	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	20 UJ	NA	NA	NA	20 UJ	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
2-Chlorophenol	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
2-Methylphenol	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
2-Nitroaniline	20 U	NA	NA	NA	20 U	NA	NA	NA	NA	NA	NA	NA
2-Nitrophenol	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	5 UJ	NA	NA	NA	5 UJ	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	20 U	NA	NA	NA	20 U	NA	NA	NA	NA	NA	NA	NA
4,6-Dinitro-2-methylphenol	20 U	NA	NA	NA	20 U	NA	NA	NA	NA	NA	NA	NA
4-Bromophenyl-phenylether	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
4-Chloroaniline	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	20 U	NA	NA	NA	20 U	NA	NA	NA	NA	NA	NA	NA
4-Nitrophenol	20 U	NA	NA	NA	20 U	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Acetophenone	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Anthracene	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Atrazine	5 UJ	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	5 UJ	NA	NA	NA	5 UJ	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
bis(2-Chloroethoxy)methane	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
bis(2-Chloroethyl)ether	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Butylbenzylphthalate	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Caprolactam	5 UJ	NA	NA	NA	5 UJ	NA	NA	NA	NA	NA	NA	NA
Chrysene	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Diethylphthalate	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Dimethyl phthalate	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Di-n-octylphthalate	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Fluorene	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA

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Station ID	EPI04-MW04				EPI04-MW05							
Sample ID	EPI04-GW04-06B	VEP4-GW04-0309	VEP04-GW04-0710	VEP4-GW04-0513	EPI04-GW05-06B	VEP4-GW05-0309	VEP4-GW05P-0309	VEP04-GW05-0710	VEP4-GW05-1111	VEP4-GW05P-1111	VEP4-GW05-0513	VEP4-GW05P-0513
Sample Date	04/05/06	03/24/09	07/29/10	05/20/13	04/05/06	03/24/09	03/24/09	07/13/10	11/18/11	11/18/11	05/15/13	05/15/13
Chemical Name												
Hexachlorocyclopentadiene	5 UJ	NA	NA	NA	5 UJ	NA	NA	NA	NA	NA	NA	NA
Hexachloroethane	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Isophorone	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Naphthalene	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
n-Nitroso-di-n-propylamine	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
n-Nitrosodiphenylamine	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Nitrobenzene	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Phenol	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Pyrene	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyls (µg/l)												
4,4'-DDD	0.02 U	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	0.02 U	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	0.02 U	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA
Aldrin	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA	NA	NA	NA	NA
Aroclor-1016	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	0.4 U	NA	NA	NA	0.4 U	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA	NA	NA	NA	NA
beta-BHC	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA	NA	NA	NA	NA
delta-BHC	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA	NA	NA	NA	NA
Dieldrin	0.02 U	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	0.02 U	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	0.02 U	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA
Endrin	0.02 U	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	0.02 U	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	0.02 U	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA	NA	NA	NA	NA
Heptachlor	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	0.01 U	NA	NA	NA	0.01 U	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	0.1 U	NA	NA	NA	0.1 U	NA	NA	NA	NA	NA	NA	NA
Toxaphene	1 U	NA	NA	NA	1 U	NA	NA	NA	NA	NA	NA	NA
Total Metals (µg/l)												
Aluminum	200 U	NA	NA	NA	794	NA	NA	NA	NA	NA	NA	NA
Antimony	60 U	NA	NA	NA	60 U	NA	NA	NA	NA	NA	NA	NA
Arsenic	10 U	NA	NA	NA	10 U	NA	NA	NA	NA	NA	NA	NA
Barium	200 U	NA	NA	NA	272	NA	NA	NA	NA	NA	NA	NA
Beryllium	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Cadmium	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Calcium	146,000	NA	NA	NA	416,000	NA	NA	NA	NA	NA	NA	NA
Chromium	22.3	NA	NA	NA	11.7	NA	NA	NA	NA	NA	NA	NA
Cobalt	50 U	NA	NA	NA	2.6 J	NA	NA	NA	NA	NA	NA	NA
Copper	25 U	NA	NA	NA	25 U	NA	NA	NA	NA	NA	NA	NA
Cyanide	10 U	NA	NA	NA	10 U	NA	NA	NA	NA	NA	NA	NA

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Station ID	EPI04-MW04				EPI04-MW05							
Sample ID	EPI04-GW04-06B	VEP4-GW04-0309	VEP04-GW04-0710	VEP4-GW04-0513	EPI04-GW05-06B	VEP4-GW05-0309	VEP4-GW05P-0309	VEP04-GW05-0710	VEP4-GW05-1111	VEP4-GW05P-1111	VEP4-GW05-0513	VEP4-GW05P-0513
Sample Date	04/05/06	03/24/09	07/29/10	05/20/13	04/05/06	03/24/09	03/24/09	07/13/10	11/18/11	11/18/11	05/15/13	05/15/13
Chemical Name												
Iron	213	NA	NA	NA	1,280	NA	NA	NA	NA	NA	NA	NA
Lead	10 U	NA	NA	NA	10 U	NA	NA	NA	NA	NA	NA	NA
Magnesium	169,000	NA	NA	NA	346,000	NA	NA	NA	NA	NA	NA	NA
Manganese	64.6	NA	NA	NA	62.6	NA	NA	NA	NA	NA	NA	NA
Mercury	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA	NA	NA	NA	NA
Nickel	18.1 J	NA	NA	NA	7.2 J	NA	NA	NA	NA	NA	NA	NA
Potassium	5,000 U	NA	NA	NA	5,000 U	NA	NA	NA	NA	NA	NA	NA
Selenium	2.8 J	NA	NA	NA	35 U	NA	NA	NA	NA	NA	NA	NA
Silver	10 U	NA	NA	NA	10 U	NA	NA	NA	NA	NA	NA	NA
Sodium	344,000	NA	NA	NA	477,000	NA	NA	NA	NA	NA	NA	NA
Thallium	1 U	NA	NA	NA	1 U	NA	NA	NA	NA	NA	NA	NA
Vanadium	50 U	NA	NA	NA	50 U	NA	NA	NA	NA	NA	NA	NA
Zinc	60 U	NA	NA	NA	60 U	NA	NA	NA	NA	NA	NA	NA
Dissolved Metals (µg/l)												
Aluminum, Dissolved	200 U	NA	NA	NA	200 U	NA	NA	NA	NA	NA	NA	NA
Antimony, Dissolved	60 U	NA	NA	NA	60 U	NA	NA	NA	NA	NA	NA	NA
Arsenic, Dissolved	10 U	NA	NA	NA	10 U	NA	NA	NA	NA	NA	NA	NA
Barium, Dissolved	191 J	NA	NA	NA	273	NA	NA	NA	NA	NA	NA	NA
Beryllium, Dissolved	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Cadmium, Dissolved	5 U	NA	NA	NA	5 U	NA	NA	NA	NA	NA	NA	NA
Calcium, Dissolved	151,000	NA	NA	NA	422,000	NA	NA	NA	NA	NA	NA	NA
Chromium, Dissolved	2.4 J	NA	NA	NA	1.2 J	NA	NA	NA	NA	NA	NA	NA
Cobalt, Dissolved	50 U	NA	NA	NA	50 U	NA	NA	NA	NA	NA	NA	NA
Copper, Dissolved	25 U	NA	NA	NA	25 U	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	100 U	NA	NA	NA	66.6 J	NA	NA	NA	NA	NA	NA	NA
Lead, Dissolved	10 U	NA	NA	NA	10 U	NA	NA	NA	NA	NA	NA	NA
Magnesium, Dissolved	177,000	NA	NA	NA	358,000	NA	NA	NA	NA	NA	NA	NA
Manganese, Dissolved	31.4	NA	NA	NA	13.3 J	NA	NA	NA	NA	NA	NA	NA
Mercury, Dissolved	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA	NA	NA	NA	NA
Nickel, Dissolved	5.7 J	NA	NA	NA	3.1 J	NA	NA	NA	NA	NA	NA	NA
Potassium, Dissolved	1,620 J	NA	NA	NA	3,260 J	NA	NA	NA	NA	NA	NA	NA
Selenium, Dissolved	35 U	NA	NA	NA	35 U	NA	NA	NA	NA	NA	NA	NA
Silver, Dissolved	10 U	NA	NA	NA	10 U	NA	NA	NA	NA	NA	NA	NA
Sodium, Dissolved	355,000	NA	NA	NA	493,000	NA	NA	NA	NA	NA	NA	NA
Thallium, Dissolved	1 U	NA	NA	NA	1 U	NA	NA	NA	NA	NA	NA	NA
Vanadium, Dissolved	14.3 J	NA	NA	NA	13.5 J	NA	NA	NA	NA	NA	NA	NA
Zinc, Dissolved	60 U	NA	NA	NA	60 U	NA	NA	NA	NA	NA	NA	NA
Wet Chemistry (mg/l)												
Acetate	NA	NA	NA	NA	NA	NA	NA	NA	1 U	NA	NA	NA
Alkalinity	NA	NA	NA	NA	NA	NA	NA	NA	346	NA	NA	NA
Butyrate	NA	NA	NA	NA	NA	NA	NA	NA	1 U	NA	NA	NA
Chloride	NA	NA	NA	NA	NA	NA	NA	NA	2,020	NA	NA	NA
Ethane	NA	NA	NA	NA	NA	NA	NA	NA	0.002 U	NA	NA	NA
Ethene	NA	NA	NA	NA	NA	NA	NA	NA	0.002 U	NA	NA	NA
Formic acid	NA	NA	NA	NA	NA	NA	NA	NA	1 U	NA	NA	NA
Lactic Acid	NA	NA	NA	NA	NA	NA	NA	NA	1 U	NA	NA	NA
Methane	NA	NA	NA	NA	NA	NA	NA	NA	0.00555	NA	NA	NA
Nitrate	NA	NA	NA	NA	NA	NA	NA	NA	0.35	NA	NA	NA
Nitrite	NA	NA	NA	NA	NA	NA	NA	NA	0.1 U	NA	NA	NA
Propionic Acid	NA	NA	NA	NA	NA	NA	NA	NA	1 U	NA	NA	NA
Pyruvate	NA	NA	NA	NA	NA	NA	NA	NA	1 U	NA	NA	NA
Sulfate	NA	NA	NA	NA	NA	NA	NA	NA	234	NA	NA	NA
Sulfide	NA	NA	NA	NA	NA	NA	NA	NA	1.85 U	NA	NA	NA

TABLE H-4
Validated Groundwater Raw Analytical Data
2006-2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW04				EPI04-MW05							
Sample ID	EPI04-GW04-06B	VEP4-GW04-0309	VEP04-GW04-0710	VEP4-GW04-0513	EPI04-GW05-06B	VEP4-GW05-0309	VEP4-GW05P-0309	VEP04-GW05-0710	VEP4-GW05-1111	VEP4-GW05P-1111	VEP4-GW05-0513	VEP4-GW05P-0513
Sample Date	04/05/06	03/24/09	07/29/10	05/20/13	04/05/06	03/24/09	03/24/09	07/13/10	11/18/11	11/18/11	05/15/13	05/15/13
Chemical Name												
Total dissolved solids (TDS)	1,980	NA	NA	NA	4,560	NA	NA	NA	4,000	NA	NA	NA
Total organic carbon (TOC)	NA	NA	NA	NA	NA	NA	NA	NA	1.04	NA	NA	NA
Dechlorinating Bacteria (cells/ml)												
Dehalococcoides	NA	NA	NA	NA	NA	NA	NA	NA	0.2 J	NA	NA	NA
Functioning Genes (cells/ml)												
BAV1 R-Dase	NA	NA	NA	NA	NA	NA	NA	NA	0.4 U	NA	NA	NA
TCE R-Dase	NA	NA	NA	NA	NA	NA	NA	NA	0.4 U	NA	NA	NA
VC R-Dase	NA	NA	NA	NA	NA	NA	NA	NA	0.4 U	NA	NA	NA

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Notes:

Shading indicates detections

NA - Not analyzed

D - Result of a dilution (laboratory qualifier)

H1 - Analyzed outside of recommended holding time (laboratory qualifier)

J - Analyte present, value may or may not be accurate or precise

M - Sample matrix interfered with the quantitation of the analyte; the parameters DL/LOD/LOQ have been raised (laboratory qualifier)

N - MS/MSD accuracy and/or precision outside acceptance criteria (laboratory qualifier)

R - Rejected result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
cells/ml - Cells per milliliter
mg/l - Milligrams per liter
µg/l - Micrograms per liter

TABLE H-4
Validated Groundwater Raw Analytical Data
2006-2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW06				EPI04-MW07					EPI04-MW08		
Sample ID	VEP4-GW06-0309	VEP04-GW06-0710	VEP4-GW06-1111	VEP4-GW06-0513	VEP4-GW07-0409	VEP04-GW07-0710	VEP04-GW07P-0710	VEP4-GW07-1111	VEP4-GW07-0513	VEP4-GW08-1111	VEP4-GW08-0513	VEP4-GW08P-0513
Sample Date	03/26/09	07/14/10	11/17/11	05/15/13	04/03/09	07/13/10	07/13/10	11/17/11	05/17/13	11/15/11	05/20/13	05/20/13
Chemical Name												
Volatile Organic Compounds (µg/l)												
1,1,1-Trichloroethane	1 U	0.5 U	0.5 U	NA	1 U	0.5 U	0.5 U	0.5 U	NA	0.5 U	NA	NA
1,1,2,2-Tetrachloroethane	0.05 U	0.025 UJ	NA	NA	0.05 U	0.025 UJ	0.025 UJ	NA	NA	NA	NA	NA
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	2 U	0.5 U	NA	NA	2 U	0.5 U	0.5 U	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	1 U	0.5 U	NA	NA	1 U	0.5 U	0.5 U	NA	NA	NA	NA	NA
1,1-Dichloroethane	1 U	0.5 U	0.5 U	NA	1 U	0.5 U	0.5 U	0.5 U	NA	0.5 U	NA	NA
1,1-Dichloroethene	0.05 U	0.025 U	0.5 U	0.5 U	0.05 U	0.025 U	0.025 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichlorobenzene	1 U	0.5 U	NA	NA	1 U	0.5 U	0.5 U	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1 U	0.5 U	NA	NA	1 U	0.5 U	0.5 U	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	2 U	1 U	NA	NA	2 U	1 U	1 U	NA	NA	NA	NA	NA
1,2-Dibromoethane	1 U	0.5 U	NA	NA	1 U	0.5 U	0.5 U	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	1 U	0.5 U	NA	NA	1 U	0.5 U	0.5 U	NA	NA	NA	NA	NA
1,2-Dichloroethane	0.05 U	0.025 U	0.5 U	NA	0.05 U	0.025 U	0.025 U	0.5 U	NA	0.5 U	NA	NA
1,2-Dichloropropane	1 U	0.5 U	NA	NA	1 U	0.5 U	0.5 U	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	1 U	0.5 U	NA	NA	1 U	0.5 U	0.5 U	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	0.05 U	0.011 J	NA	NA	0.05 U	0.012 J	0.011 J	NA	NA	NA	NA	NA
2-Butanone	5 U	2.5 U	NA	NA	5 U	2.5 U	2.5 U	NA	NA	NA	NA	NA
2-Hexanone	5 U	2.5 U	NA	NA	5 U	2.5 U	2.5 U	NA	NA	NA	NA	NA
4-Methyl-2-pentanone	5 U	2.5 U	NA	NA	5 U	2.5 U	2.5 U	NA	NA	NA	NA	NA
Acetone	10 U	10 U	NA	NA	22	2.6 U	3.7 U	NA	NA	NA	NA	NA
Benzene	0.05 U	0.033 J	NA	NA	0.05 U	0.043 J	0.039 J	NA	NA	NA	NA	NA
Bromochloromethane	1 U	0.5 U	NA	NA	1 U	0.5 U	0.5 U	NA	NA	NA	NA	NA
Bromodichloromethane	1 U	0.5 U	NA	NA	1 U	0.5 U	0.5 U	NA	NA	NA	NA	NA
Bromoform	1 U	0.5 U	NA	NA	1 U	0.5 U	0.5 U	NA	NA	NA	NA	NA
Bromomethane	2 U	1 U	NA	NA	2 U	1 U	1 U	NA	NA	NA	NA	NA
Carbon disulfide	1 U	0.51 U	NA	NA	1 U	0.5 U	0.5 U	NA	NA	NA	NA	NA
Carbon tetrachloride	0.05 U	0.025 U	0.5 U	NA	0.05 U	0.025 U	0.025 U	0.5 U	NA	0.5 U	NA	NA
Chlorobenzene	1 U	0.5 U	NA	NA	1 U	0.5 U	0.5 U	NA	NA	NA	NA	NA
Chloroethane	2 U	1 U	0.5 U	NA	2 U	1 U	1 U	0.5 U	NA	0.5 U	NA	NA
Chloroform	1 U	0.5 U	0.5 U	NA	1 U	0.5 U	0.5 U	0.5 U	NA	0.5 U	NA	NA
Chloromethane	2 U	1 U	NA	NA	2 U	1 U	0.37 J	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	1 U	0.5 U	0.5 U	0.5 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.38 J	0.44 J
cis-1,3-Dichloropropene	1 U	0.5 U	NA	NA	1 U	0.5 U	0.5 U	NA	NA	NA	NA	NA
Cyclohexane	1 U	0.5 U	NA	NA	1 U	0.5 U	0.5 U	NA	NA	NA	NA	NA
Dibromochloromethane	1 U	0.5 U	NA	NA	1 U	0.5 U	0.5 U	NA	NA	NA	NA	NA
Dichlorodifluoromethane (Freon-12)	2 U	1 U	NA	NA	2 U	1 U	1 U	NA	NA	NA	NA	NA
Ethylbenzene	1 U	0.5 U	NA	NA	1 U	0.5 U	0.5 U	NA	NA	NA	NA	NA
Isopropylbenzene	1 U	0.5 U	NA	NA	1 U	0.5 U	0.5 U	NA	NA	NA	NA	NA
m- and p-Xylene	2 U	1 U	NA	NA	2 U	1 U	1 U	NA	NA	NA	NA	NA
Methyl acetate	2 U	0.75 U	NA	NA	2 U	0.75 U	0.75 U	NA	NA	NA	NA	NA
Methylcyclohexane	1 U	0.5 U	NA	NA	1 U	0.5 U	0.5 U	NA	NA	NA	NA	NA
Methylene chloride	5 U	2.5 U	1 U	NA	5 U	2.5 U	2.5 U	1 U	NA	1 U	NA	NA
Methyl-tert-butyl ether (MTBE)	2 U	0.5 U	NA	NA	2 U	0.5 U	0.5 U	NA	NA	NA	NA	NA
o-Xylene	1 U	0.5 U	NA	NA	1 U	0.5 U	0.5 U	NA	NA	NA	NA	NA
Styrene	1 U	0.5 U	NA	NA	1 U	0.5 U	0.5 U	NA	NA	NA	NA	NA
Tetrachloroethene	0.025 J	0.017 J	0.5 U	0.5 U	0.05 U	0.025 U	0.025 U	0.5 U	0.5 U	1.03	0.5 U	0.5 U
Toluene	1 U	0.5 U	NA	NA	1 U	0.5 U	0.5 U	NA	NA	NA	NA	NA
trans-1,2-Dichloroethene	1 U	0.5 U	0.5 U	0.5 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene	1 U	0.5 U	NA	NA	1 U	0.5 U	0.5 U	NA	NA	NA	NA	NA
Trichloroethene	1 U	0.5 U	0.5 U	0.2 U	1 U	0.5 U	0.5 U	0.5 U	0.2 U	41.4	2.44	2.31
Trichlorofluoromethane (Freon-11)	2 U	1 U	NA	NA	2 U	1 U	1 U	NA	NA	NA	NA	NA
Vinyl chloride	0.027 J	0.05 U	0.5 U	0.2 U	0.15 U	0.05 U	0.05 U	0.5 U	0.2 U	0.5 U	0.2 U	0.2 U
Xylene, total	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE H-4
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Vieques, Puerto Rico

Station ID	EPI04-MW06				EPI04-MW07					EPI04-MW08		
Sample ID	VEP4-GW06-0309	VEP04-GW06-0710	VEP4-GW06-1111	VEP4-GW06-0513	VEP4-GW07-0409	VEP04-GW07-0710	VEP04-GW07P-0710	VEP4-GW07-1111	VEP4-GW07-0513	VEP4-GW08-1111	VEP4-GW08-0513	VEP4-GW08P-0513
Sample Date	03/26/09	07/14/10	11/17/11	05/15/13	04/03/09	07/13/10	07/13/10	11/17/11	05/17/13	11/15/11	05/20/13	05/20/13
Chemical Name												
Semivolatile Organic Compounds (µg/l)												
1,1-Biphenyl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dioxane	NA	NA	NA	0.5 U	NA	NA	NA	NA	0.5 U	NA	0.495 U	0.481 U
2,2'-Oxybis(1-chloropropane)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,6-Dinitro-2-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Bromophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetophenone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Atrazine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Chloroethoxy)methane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Chloroethyl)ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butylbenzylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Caprolactam	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diethylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dimethyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-octylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE H-4
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Vieques, Puerto Rico

Station ID	EPI04-MW06				EPI04-MW07					EPI04-MW08		
Sample ID	VEP4-GW06-0309	VEP04-GW06-0710	VEP4-GW06-1111	VEP4-GW06-0513	VEP4-GW07-0409	VEP04-GW07-0710	VEP04-GW07P-0710	VEP4-GW07-1111	VEP4-GW07-0513	VEP4-GW08-1111	VEP4-GW08-0513	VEP4-GW08P-0513
Sample Date	03/26/09	07/14/10	11/17/11	05/15/13	04/03/09	07/13/10	07/13/10	11/17/11	05/17/13	11/15/11	05/20/13	05/20/13
Chemical Name												
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isophorone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Nitroso-di-n-propylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Nitrosodiphenylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyls (µg/l)												
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beta-BHC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
delta-BHC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toxaphene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Metals (µg/l)												
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE H-4
Validated Groundwater Raw Analytical Data
2006-2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW06				EPI04-MW07					EPI04-MW08		
Sample ID	VEP4-GW06-0309	VEP04-GW06-0710	VEP4-GW06-1111	VEP4-GW06-0513	VEP4-GW07-0409	VEP04-GW07-0710	VEP04-GW07P-0710	VEP4-GW07-1111	VEP4-GW07-0513	VEP4-GW08-1111	VEP4-GW08-0513	VEP4-GW08P-0513
Sample Date	03/26/09	07/14/10	11/17/11	05/15/13	04/03/09	07/13/10	07/13/10	11/17/11	05/17/13	11/15/11	05/20/13	05/20/13
Chemical Name												
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Metals (µg/l)												
Aluminum, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wet Chemistry (mg/l)												
Acetate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Alkalinity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butyrate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloride	NA	NA	NA	NA	3,100	NA	NA	NA	NA	NA	NA	NA
Ethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Formic acid	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lactic Acid	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrite	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propionic Acid	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyruvate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE H-4
Validated Groundwater Raw Analytical Data
2006-2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW06				EPI04-MW07					EPI04-MW08		
Sample ID	VEP4-GW06-0309	VEP04-GW06-0710	VEP4-GW06-1111	VEP4-GW06-0513	VEP4-GW07-0409	VEP04-GW07-0710	VEP04-GW07P-0710	VEP4-GW07-1111	VEP4-GW07-0513	VEP4-GW08-1111	VEP4-GW08-0513	VEP4-GW08P-0513
Sample Date	03/26/09	07/14/10	11/17/11	05/15/13	04/03/09	07/13/10	07/13/10	11/17/11	05/17/13	11/15/11	05/20/13	05/20/13
Chemical Name												
Total dissolved solids (TDS)	NA	NA	NA	NA	2,300	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (TOC)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dechlorinating Bacteria (cells/ml)												
Dehalococcoides	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Functioning Genes (cells/ml)												
BAV1 R-Dase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TCE R-Dase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VC R-Dase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Notes:

Shading indicates detections

NA - Not analyzed

D - Result of a dilution (laboratory qualifier)

H1 - Analyzed outside of recommended holding time (laboratory qualifier)

J - Analyte present, value may or may not be accurate or precise

M - Sample matrix interfered with the quantitation of the analyte; the parameters DL/LOD/LOQ have been raised (laboratory qualifier)

N - MS/MSD accuracy and/or precision outside acceptance criteria (laboratory qualifier)

R - Rejected result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
cells/ml - Cells per milliliter
mg/l - Milligrams per liter
µg/l - Micrograms per liter

TABLE H-4
Validated Groundwater Raw Analytical Data
2006-2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW09		EPI04-MW10			EPI04-MW11		EPI04-MW12		EPI04-MW13		
Sample ID	VEP4-GW09-1111	VEP4-GW09-0513	VEP4-GW10-1111	VEP4-GW10-0513	VEP4-GW10-0914	VEP4-GW11-1111	VEP4-GW11-0513	VEP4-GW12-1111	VEP4-GW12-0513	VEP4-GW13-1211	VEP4-GW13-0513	VEP4-GW13P-0513
Sample Date	11/18/11	05/22/13	11/20/11	05/21/13	09/16/14	11/21/11	05/23/13	11/21/11	05/23/13	12/07/11	05/22/13	05/22/13
Chemical Name												
Volatile Organic Compounds (µg/l)												
1,1,1-Trichloroethane	0.5 U	NA	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	NA
1,1,2,2-Tetrachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	0.5 U	NA	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	NA
1,1-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromoethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	0.5 U	NA	0.5 UJ	NA	NA	0.5 UJ	NA	0.5 UJ	NA	0.5 U	NA	NA
1,2-Dichloropropane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Butanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Hexanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methyl-2-pentanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromochloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromomethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	0.5 U	NA	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	NA
Chlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	0.5 U	NA	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	NA
Chloroform	0.5 U	NA	0.5 U	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	NA
Chloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	0.5 U	0.5 U	0.43 J	0.51 J	0.674 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.47 J	0.47 J
cis-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibromochloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane (Freon-12)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
m- and p-Xylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl acetate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylcyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	1 U	NA	1 U	NA	NA	1 U	NA	1 U	NA	1 U	NA	NA
Methyl-tert-butyl ether (MTBE)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
o-Xylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	0.5 U	0.5 U	0.51 J	0.5 U	0.72 J	0.5 U	0.5 U	0.61 J	0.5 U	1.96	1.25 J	1.59 J
Toluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
trans-1,2-Dichloroethene	0.5 U	0.5 U	0.5 U	0.5 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	2.76	0.9	21.1	6.71	23.3	0.265 J	0.2 U	16.6	1.8	87.7	61.9	64.9
Trichlorofluoromethane (Freon-11)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride	0.5 U	0.2 U	0.5 U	0.2 U	0.4 U	0.5 U	0.2 U	0.5 U	0.2 U	0.5 U	0.2 U	0.2 U
Xylene, total	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE H-4
Validated Groundwater Raw Analytical Data
2006-2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW09		EPI04-MW10			EPI04-MW11		EPI04-MW12		EPI04-MW13		
Sample ID	VEP4-GW09-1111	VEP4-GW09-0513	VEP4-GW10-1111	VEP4-GW10-0513	VEP4-GW10-0914	VEP4-GW11-1111	VEP4-GW11-0513	VEP4-GW12-1111	VEP4-GW12-0513	VEP4-GW13-1211	VEP4-GW13-0513	VEP4-GW13P-0513
Sample Date	11/18/11	05/22/13	11/20/11	05/21/13	09/16/14	11/21/11	05/23/13	11/21/11	05/23/13	12/07/11	05/22/13	05/22/13
Chemical Name												
Semivolatile Organic Compounds (µg/l)												
1,1-Biphenyl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dioxane	NA	0.481 U	NA	0.5 U	NA	NA	0.5 U	NA	0.526 U	NA	0.481 U	0.481 U
2,2'-Oxybis(1-chloropropane)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,6-Dinitro-2-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Bromophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetophenone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Atrazine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Chloroethoxy)methane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Chloroethyl)ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butylbenzylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Caprolactam	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diethylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dimethyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-octylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE H-4
Validated Groundwater Raw Analytical Data
2006-2014
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Vieques, Puerto Rico

Station ID	EPI04-MW09		EPI04-MW10			EPI04-MW11		EPI04-MW12		EPI04-MW13		
Sample ID	VEP4-GW09-1111	VEP4-GW09-0513	VEP4-GW10-1111	VEP4-GW10-0513	VEP4-GW10-0914	VEP4-GW11-1111	VEP4-GW11-0513	VEP4-GW12-1111	VEP4-GW12-0513	VEP4-GW13-1211	VEP4-GW13-0513	VEP4-GW13P-0513
Sample Date	11/18/11	05/22/13	11/20/11	05/21/13	09/16/14	11/21/11	05/23/13	11/21/11	05/23/13	12/07/11	05/22/13	05/22/13
Chemical Name												
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isophorone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Nitroso-di-n-propylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Nitrosodiphenylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyls (µg/l)												
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beta-BHC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
delta-BHC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toxaphene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Metals (µg/l)												
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE H-4
Validated Groundwater Raw Analytical Data
2006-2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW09		EPI04-MW10			EPI04-MW11		EPI04-MW12		EPI04-MW13		
Sample ID	VEP4-GW09-1111	VEP4-GW09-0513	VEP4-GW10-1111	VEP4-GW10-0513	VEP4-GW10-0914	VEP4-GW11-1111	VEP4-GW11-0513	VEP4-GW12-1111	VEP4-GW12-0513	VEP4-GW13-1211	VEP4-GW13-0513	VEP4-GW13P-0513
Sample Date	11/18/11	05/22/13	11/20/11	05/21/13	09/16/14	11/21/11	05/23/13	11/21/11	05/23/13	12/07/11	05/22/13	05/22/13
Chemical Name												
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Metals (µg/l)												
Aluminum, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wet Chemistry (mg/l)												
Acetate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Alkalinity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butyrate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Formic acid	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lactic Acid	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrite	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propionic Acid	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyruvate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE H-4
Validated Groundwater Raw Analytical Data
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SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW09		EPI04-MW10			EPI04-MW11		EPI04-MW12		EPI04-MW13		
Sample ID	VEP4-GW09-1111	VEP4-GW09-0513	VEP4-GW10-1111	VEP4-GW10-0513	VEP4-GW10-0914	VEP4-GW11-1111	VEP4-GW11-0513	VEP4-GW12-1111	VEP4-GW12-0513	VEP4-GW13-1211	VEP4-GW13-0513	VEP4-GW13P-0513
Sample Date	11/18/11	05/22/13	11/20/11	05/21/13	09/16/14	11/21/11	05/23/13	11/21/11	05/23/13	12/07/11	05/22/13	05/22/13
Chemical Name												
Total dissolved solids (TDS)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (TOC)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dechlorinating Bacteria (cells/ml)												
Dehalococcoides	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Functioning Genes (cells/ml)												
BAV1 R-Dase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TCE R-Dase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VC R-Dase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Notes:

Shading indicates detections

NA - Not analyzed

D - Result of a dilution (laboratory qualifier)

H1 - Analyzed outside of recommended holding time (laboratory qualifier)

J - Analyte present, value may or may not be accurate or precise

M - Sample matrix interfered with the quantitation of the analyte; the parameters DL/LOD/LOQ have been raised (laboratory qualifier)

N - MS/MSD accuracy and/or precision outside acceptance criteria (laboratory qualifier)

R - Rejected result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
cells/ml - Cells per milliliter
mg/l - Milligrams per liter
µg/l - Micrograms per liter

TABLE H-4
Validated Groundwater Raw Analytical Data
2006-2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW13		EPI04-MW13D		EPI04-MW14			EPI04-MW15	EPI04-MW16		EPI04-MW17		
Sample ID	VEP4-GW13-0914	VEP4-GW13P-0914	VEP4-GW13D-0713	VEP4-GW13D-0914	VEP4-GW14-1211	VEP4-GW14-0513	VEP4-GW14-0914	VEP4-GW15-0613	VEP4-GW16-0613	VEP4-GW16-0914	VEP4-GW17-0613	VEP4-GW17P-0613	VEP4-GW17-0914
Sample Date	09/16/14	09/16/14	07/02/13	09/16/14	12/07/11	05/24/13	09/15/14	06/05/13	06/10/13	09/11/14	06/10/13	06/10/13	09/17/14
Chemical Name													
Volatile Organic Compounds (µg/l)													
1,1,1-Trichloroethane	NA	NA	NA	NA	0.5 U	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	NA	NA	NA	NA	0.5 U	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	1 U	1 U	0.5 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	0.3 J	1 U	1 U
1,2,3-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromoethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	NA	NA	NA	NA	0.5 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Butanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Hexanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methyl-2-pentanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromochloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromomethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	NA	NA	NA	NA	0.5 U	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	NA	NA	NA	NA	0.5 U	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	NA	NA	NA	NA	0.5 U	NA	NA	NA	NA	NA	NA	NA	NA
Chloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	0.986 J	1.05 J	0.5 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	0.28 J	1 U	1 U
cis-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibromochloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane (Freon-12)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
m- and p-Xylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl acetate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylcyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	NA	NA	NA	NA	1 U	NA	NA	NA	NA	NA	NA	NA	NA
Methyl-tert-butyl ether (MTBE)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
o-Xylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	0.576 J	0.644 J	0.78 J	0.725 J	0.5 U	0.5 U	0.5 U	0.5 UJ	0.34 J	1 U	2.4 J	1.92 J	2.14
Toluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
trans-1,2-Dichloroethene	1 U	1 U	0.5 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1 U	0.5 U	1 U	1 U
trans-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	32.3	32.6	48.8	35.3	5.47	0.3 J	0.2 U	2.3	14.7	9.17	114 J	92.7 J	98.1
Trichlorofluoromethane (Freon-11)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride	0.4 U	0.4 U	0.2 U	0.4 U	0.5 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.4 U	0.2 U	0.4 U	0.4 U
Xylene, total	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE H-4
Validated Groundwater Raw Analytical Data
2006-2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW13		EPI04-MW13D		EPI04-MW14			EPI04-MW15	EPI04-MW16		EPI04-MW17		
Sample ID	VEP4-GW13-0914	VEP4-GW13P-0914	VEP4-GW13D-0713	VEP4-GW13D-0914	VEP4-GW14-1211	VEP4-GW14-0513	VEP4-GW14-0914	VEP4-GW15-0613	VEP4-GW16-0613	VEP4-GW16-0914	VEP4-GW17-0613	VEP4-GW17P-0613	VEP4-GW17-0914
Sample Date	09/16/14	09/16/14	07/02/13	09/16/14	12/07/11	05/24/13	09/15/14	06/05/13	06/10/13	09/11/14	06/10/13	06/10/13	09/17/14
Chemical Name													
Semivolatile Organic Compounds (µg/l)													
1,1-Biphenyl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dioxane	NA	NA	0.481 U	NA	NA	0.481 U	NA	0.472 U	0.463 U	NA	0.463 U	0.463 U	NA
2,2'-Oxybis(1-chloropropane)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,6-Dinitro-2-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Bromophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetophenone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Atrazine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Chloroethoxy)methane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Chloroethyl)ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butylbenzylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Caprolactam	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diethylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dimethyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-octylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE H-4
Validated Groundwater Raw Analytical Data
2006-2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW13		EPI04-MW13D		EPI04-MW14			EPI04-MW15	EPI04-MW16		EPI04-MW17		
Sample ID	VEP4-GW13-0914	VEP4-GW13P-0914	VEP4-GW13D-0713	VEP4-GW13D-0914	VEP4-GW14-1211	VEP4-GW14-0513	VEP4-GW14-0914	VEP4-GW15-0613	VEP4-GW16-0613	VEP4-GW16-0914	VEP4-GW17-0613	VEP4-GW17P-0613	VEP4-GW17-0914
Sample Date	09/16/14	09/16/14	07/02/13	09/16/14	12/07/11	05/24/13	09/15/14	06/05/13	06/10/13	09/11/14	06/10/13	06/10/13	09/17/14
Chemical Name													
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isophorone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Nitroso-di-n-propylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Nitrosodiphenylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyls (µg/l)													
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beta-BHC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
delta-BHC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toxaphene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Metals (µg/l)													
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE H-4
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Vieques, Puerto Rico

Station ID	EPI04-MW13		EPI04-MW13D		EPI04-MW14			EPI04-MW15	EPI04-MW16		EPI04-MW17		
Sample ID	VEP4-GW13-0914	VEP4-GW13P-0914	VEP4-GW13D-0713	VEP4-GW13D-0914	VEP4-GW14-1211	VEP4-GW14-0513	VEP4-GW14-0914	VEP4-GW15-0613	VEP4-GW16-0613	VEP4-GW16-0914	VEP4-GW17-0613	VEP4-GW17P-0613	VEP4-GW17-0914
Sample Date	09/16/14	09/16/14	07/02/13	09/16/14	12/07/11	05/24/13	09/15/14	06/05/13	06/10/13	09/11/14	06/10/13	06/10/13	09/17/14
Chemical Name													
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Metals (µg/l)													
Aluminum, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wet Chemistry (mg/l)													
Acetate	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	NA	NA	NA	NA
Alkalinity	NA	NA	NA	NA	NA	NA	NA	507 N	456	NA	NA	NA	NA
Butyrate	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	NA	NA	NA	NA
Chloride	NA	NA	NA	NA	NA	NA	NA	941 MD	1,320 MD	NA	NA	NA	NA
Ethane	NA	NA	NA	NA	NA	NA	NA	0.002 U	0.002 U	NA	NA	NA	NA
Ethene	NA	NA	NA	NA	NA	NA	NA	0.002 U	0.002 U	NA	NA	NA	NA
Formic acid	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lactic Acid	NA	NA	NA	NA	NA	NA	NA	1 U	5 U	NA	NA	NA	NA
Methane	NA	NA	NA	NA	NA	NA	NA	0.00115 NJ	0.002 U	NA	NA	NA	NA
Nitrate	NA	NA	NA	NA	NA	NA	NA	2.29	4.16	NA	NA	NA	NA
Nitrite	NA	NA	NA	NA	NA	NA	NA	0.1 NU	0.1 U	NA	NA	NA	NA
Propionic Acid	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	NA	NA	NA	NA
Pyruvate	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	NA	NA	NA	NA
Sulfate	NA	NA	NA	NA	NA	NA	NA	167	196	NA	NA	NA	NA
Sulfide	NA	NA	NA	NA	NA	NA	NA	1.69 U	1.85 U	NA	NA	NA	NA

TABLE H-4
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Station ID	EPI04-MW13		EPI04-MW13D		EPI04-MW14			EPI04-MW15	EPI04-MW16		EPI04-MW17		
Sample ID	VEP4-GW13-0914	VEP4-GW13P-0914	VEP4-GW13D-0713	VEP4-GW13D-0914	VEP4-GW14-1211	VEP4-GW14-0513	VEP4-GW14-0914	VEP4-GW15-0613	VEP4-GW16-0613	VEP4-GW16-0914	VEP4-GW17-0613	VEP4-GW17P-0613	VEP4-GW17-0914
Sample Date	09/16/14	09/16/14	07/02/13	09/16/14	12/07/11	05/24/13	09/15/14	06/05/13	06/10/13	09/11/14	06/10/13	06/10/13	09/17/14
Chemical Name													
Total dissolved solids (TDS)	NA	NA	NA	NA	NA	NA	NA	2,320	2,690	NA	NA	NA	NA
Total organic carbon (TOC)	NA	NA	NA	NA	NA	NA	NA	1.6 J	1.32 J	NA	NA	NA	NA
Dechlorinating Bacteria (cells/ml)													
Dehalococcoides	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Functioning Genes (cells/ml)													
BAV1 R-Dase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TCE R-Dase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VC R-Dase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Notes:

Shading indicates detections

NA - Not analyzed

D - Result of a dilution (laboratory qualifier)

H1 - Analyzed outside of recommended holding time (laboratory qualifier)

J - Analyte present, value may or may not be accurate or precise

M - Sample matrix interfered with the quantitation of the analyte; the parameters DL/LOD/LOQ have been raised (laboratory qualifier)

N - MS/MSD accuracy and/or precision outside acceptance criteria (laboratory qualifier)

R - Rejected result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
cells/ml - Cells per milliliter
mg/l - Milligrams per liter
µg/l - Micrograms per liter

TABLE H-4
Validated Groundwater Raw Analytical Data
2006-2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW17D		EPI04-MW18		EPI04-MW19		EPI04-MW20		EPI04-MW21		EPI04-MW22		
Sample ID	VEP4-GW17D-0713	VEP4-GW17D-0914	VEP4-GW18-0613	VEP4-GW18-0914	VEP4-GW19-0613	VEP4-GW19-0914	VEP4-GW20-0613	VEP4-GW20-0914	VEP4-GW21-0713	VEP4-GW21-0914	VEP4-GW22-0713	VEP4-GW22-0914	VEP4-GW22P-0914
Sample Date	07/01/13	09/17/14	06/07/13	09/15/14	06/06/13	09/15/14	06/17/13	09/12/14	07/16/13	09/11/14	07/17/13	09/11/14	09/11/14
Chemical Name													
Volatile Organic Compounds (µg/l)													
1,1,1-Trichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	0.5 U	1 U	0.5 U	1 U	0.5 U	1 U	0.5 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromoethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Butanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Hexanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methyl-2-pentanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromochloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromomethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	0.6 J	0.651 J	0.5 U	1 U	0.5 U	1 U	0.5 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibromochloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane (Freon-12)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
m- and p-Xylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl acetate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylcyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl-tert-butyl ether (MTBE)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
o-Xylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	1.07	1.01 J	0.5 U	1 U	0.5 U	1 U	1.06	0.574 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
trans-1,2-Dichloroethene	0.5 U	1 U	0.5 U	1 U	0.5 U	1 U	0.5 U	1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
trans-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	58.8	47.6	2.24	2.3	2.7	3.27	52.2	30.6	6.8	2.1	1.73	0.613	0.525
Trichlorofluoromethane (Freon-11)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride	0.2 U	0.4 U	0.2 U	0.4 U	0.2 U	0.4 U	0.2 U	0.4 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U
Xylene, total	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE H-4
Validated Groundwater Raw Analytical Data
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Station ID	EPI04-MW17D		EPI04-MW18		EPI04-MW19		EPI04-MW20		EPI04-MW21		EPI04-MW22		
Sample ID	VEP4-GW17D-0713	VEP4-GW17D-0914	VEP4-GW18-0613	VEP4-GW18-0914	VEP4-GW19-0613	VEP4-GW19-0914	VEP4-GW20-0613	VEP4-GW20-0914	VEP4-GW21-0713	VEP4-GW21-0914	VEP4-GW22-0713	VEP4-GW22-0914	VEP4-GW22P-0914
Sample Date	07/01/13	09/17/14	06/07/13	09/15/14	06/06/13	09/15/14	06/17/13	09/12/14	07/16/13	09/11/14	07/17/13	09/11/14	09/11/14
Chemical Name													
Semivolatile Organic Compounds (µg/l)													
1,1-Biphenyl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dioxane	0.49 U	NA	0.49 U	NA	0.463 U	NA	0.467 U	NA	0.495 U	NA	0.472 U	NA	NA
2,2'-Oxybis(1-chloropropane)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,6-Dinitro-2-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Bromophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetophenone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Atrazine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Chloroethoxy)methane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Chloroethyl)ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butylbenzylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Caprolactam	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diethylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dimethyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-octylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Station ID	EPI04-MW17D		EPI04-MW18		EPI04-MW19		EPI04-MW20		EPI04-MW21		EPI04-MW22		
Sample ID	VEP4-GW17D-0713	VEP4-GW17D-0914	VEP4-GW18-0613	VEP4-GW18-0914	VEP4-GW19-0613	VEP4-GW19-0914	VEP4-GW20-0613	VEP4-GW20-0914	VEP4-GW21-0713	VEP4-GW21-0914	VEP4-GW22-0713	VEP4-GW22-0914	VEP4-GW22P-0914
Sample Date	07/01/13	09/17/14	06/07/13	09/15/14	06/06/13	09/15/14	06/17/13	09/12/14	07/16/13	09/11/14	07/17/13	09/11/14	09/11/14
Chemical Name													
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isophorone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Nitroso-di-n-propylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Nitrosodiphenylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyls (µg/l)													
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beta-BHC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
delta-BHC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toxaphene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Metals (µg/l)													
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Station ID	EPI04-MW17D		EPI04-MW18		EPI04-MW19		EPI04-MW20		EPI04-MW21		EPI04-MW22		
Sample ID	VEP4-GW17D-0713	VEP4-GW17D-0914	VEP4-GW18-0613	VEP4-GW18-0914	VEP4-GW19-0613	VEP4-GW19-0914	VEP4-GW20-0613	VEP4-GW20-0914	VEP4-GW21-0713	VEP4-GW21-0914	VEP4-GW22-0713	VEP4-GW22-0914	VEP4-GW22P-0914
Sample Date	07/01/13	09/17/14	06/07/13	09/15/14	06/06/13	09/15/14	06/17/13	09/12/14	07/16/13	09/11/14	07/17/13	09/11/14	09/11/14
Chemical Name													
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Metals (µg/l)													
Aluminum, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wet Chemistry (mg/l)													
Acetate	NA	NA	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Alkalinity	NA	NA	364	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butyrate	NA	NA	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloride	NA	NA	3,110 H1MD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethane	NA	NA	0.002 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethene	NA	NA	0.002 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Formic acid	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lactic Acid	NA	NA	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methane	NA	NA	0.00248 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate	NA	NA	2.47	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrite	NA	NA	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propionic Acid	NA	NA	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyruvate	NA	NA	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	NA	NA	235	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfide	NA	NA	1.85 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Station ID	EPI04-MW17D		EPI04-MW18		EPI04-MW19		EPI04-MW20		EPI04-MW21		EPI04-MW22		
Sample ID	VEP4-GW17D-0713	VEP4-GW17D-0914	VEP4-GW18-0613	VEP4-GW18-0914	VEP4-GW19-0613	VEP4-GW19-0914	VEP4-GW20-0613	VEP4-GW20-0914	VEP4-GW21-0713	VEP4-GW21-0914	VEP4-GW22-0713	VEP4-GW22-0914	VEP4-GW22P-0914
Sample Date	07/01/13	09/17/14	06/07/13	09/15/14	06/06/13	09/15/14	06/17/13	09/12/14	07/16/13	09/11/14	07/17/13	09/11/14	09/11/14
Chemical Name													
Total dissolved solids (TDS)	NA	NA	6,570	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (TOC)	NA	NA	2.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dechlorinating Bacteria (cells/ml)													
Dehalococcoides	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Functioning Genes (cells/ml)													
BAV1 R-Dase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TCE R-Dase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VC R-Dase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Notes:

Shading indicates detections

NA - Not analyzed

D - Result of a dilution (laboratory qualifier)

H1 - Analyzed outside of recommended holding time (laboratory qualifier)

J - Analyte present, value may or may not be accurate or precise

M - Sample matrix interfered with the quantitation of the analyte; the parameters DL/LOD/LOQ have been raised (laboratory qualifier)

N - MS/MSD accuracy and/or precision outside acceptance criteria (laboratory qualifier)

R - Rejected result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
cells/ml - Cells per milliliter
mg/l - Milligrams per liter
µg/l - Micrograms per liter

TABLE H-4
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Station ID	EPI04-MW23		EPI04-MW24			EPI04-MW24D	EPI04-MW25		EPI04-MW25D	EPI04-MW26		EPI04-MW27	
Sample ID	VEP4-GW23-0713	VEP4-GW23-0914	VEP4-GW24-0713	VEP4-GW24-0914	VEP4-GW24P-0914	VEP4-GW24D-0914	VEP4-GW25-0913	VEP4-GW25-0914	VEP4-GW25D-0914	VEP4-GW26-0913	VEP4-GW26-0914	VEP4-GW27-0913	VEP4-GW27-0914
Sample Date	07/23/13	09/17/14	07/24/13	09/23/14	09/23/14	09/26/14	09/26/13	09/18/14	09/23/14	09/24/13	09/12/14	09/26/13	09/10/14
Chemical Name													
Volatile Organic Compounds (µg/l)													
1,1,1-Trichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	0.34 J	0.754 J	1.06 J	1.15 J	1.29 J	1 U	1 U	0.527 J	1 U	0.5 U	1 U	0.5 U	1 U
1,2,3-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromoethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Butanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Hexanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methyl-2-pentanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromochloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromomethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	1.04	1.33 J	1 U	0.719 J	0.648 J	1 U	1 U	1 U	1 U	0.73 J	0.507 J	1.43	0.666 J
cis-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibromochloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane (Freon-12)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
m- and p-Xylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl acetate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylcyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl-tert-butyl ether (MTBE)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
o-Xylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	1.32	1.62 J	5.14	5.87	5.33	1.52 J	2.84	2.35	1.5 J	0.5 U	1 U	0.5 U	1 U
Toluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
trans-1,2-Dichloroethene	0.5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.5 U	1 U	0.5 U	1 U
trans-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	71	84.1	246	334	317	98.2	143	157	101	12.6	6.52	7.45	2.81
Trichlorofluoromethane (Freon-11)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride	0.2 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.2 U	0.4 U	0.23 J	0.4 U
Xylene, total	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Station ID	EPI04-MW23		EPI04-MW24			EPI04-MW24D	EPI04-MW25		EPI04-MW25D	EPI04-MW26		EPI04-MW27	
Sample ID	VEP4-GW23-0713	VEP4-GW23-0914	VEP4-GW24-0713	VEP4-GW24-0914	VEP4-GW24P-0914	VEP4-GW24D-0914	VEP4-GW25-0913	VEP4-GW25-0914	VEP4-GW25D-0914	VEP4-GW26-0913	VEP4-GW26-0914	VEP4-GW27-0913	VEP4-GW27-0914
Sample Date	07/23/13	09/17/14	07/24/13	09/23/14	09/23/14	09/26/14	09/26/13	09/18/14	09/23/14	09/24/13	09/12/14	09/26/13	09/10/14
Chemical Name													
Semivolatile Organic Compounds (µg/l)													
1,1-Biphenyl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dioxane	0.49 U	NA	0.481 U	NA	NA	NA	0.463 UJ	NA	NA	0.463 U	NA	0.463 UJ	NA
2,2'-Oxybis(1-chloropropane)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,6-Dinitro-2-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Bromophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetophenone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Atrazine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Chloroethoxy)methane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Chloroethyl)ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butylbenzylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Caprolactam	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diethylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dimethyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-octylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Station ID	EPI04-MW23		EPI04-MW24			EPI04-MW24D	EPI04-MW25		EPI04-MW25D	EPI04-MW26		EPI04-MW27	
Sample ID	VEP4-GW23-0713	VEP4-GW23-0914	VEP4-GW24-0713	VEP4-GW24-0914	VEP4-GW24P-0914	VEP4-GW24D-0914	VEP4-GW25-0913	VEP4-GW25-0914	VEP4-GW25D-0914	VEP4-GW26-0913	VEP4-GW26-0914	VEP4-GW27-0913	VEP4-GW27-0914
Sample Date	07/23/13	09/17/14	07/24/13	09/23/14	09/23/14	09/26/14	09/26/13	09/18/14	09/23/14	09/24/13	09/12/14	09/26/13	09/10/14
Chemical Name													
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isophorone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Nitroso-di-n-propylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Nitrosodiphenylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyls (µg/l)													
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beta-BHC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
delta-BHC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toxaphene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Metals (µg/l)													
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Station ID	EPI04-MW23		EPI04-MW24			EPI04-MW24D	EPI04-MW25		EPI04-MW25D	EPI04-MW26		EPI04-MW27	
Sample ID	VEP4-GW23-0713	VEP4-GW23-0914	VEP4-GW24-0713	VEP4-GW24-0914	VEP4-GW24P-0914	VEP4-GW24D-0914	VEP4-GW25-0913	VEP4-GW25-0914	VEP4-GW25D-0914	VEP4-GW26-0913	VEP4-GW26-0914	VEP4-GW27-0913	VEP4-GW27-0914
Sample Date	07/23/13	09/17/14	07/24/13	09/23/14	09/23/14	09/26/14	09/26/13	09/18/14	09/23/14	09/24/13	09/12/14	09/26/13	09/10/14
Chemical Name													
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Metals (µg/l)													
Aluminum, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wet Chemistry (mg/l)													
Acetate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Alkalinity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butyrate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Formic acid	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lactic Acid	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrite	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propionic Acid	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyruvate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Station ID	EPI04-MW23		EPI04-MW24			EPI04-MW24D	EPI04-MW25		EPI04-MW25D	EPI04-MW26		EPI04-MW27	
Sample ID	VEP4-GW23-0713	VEP4-GW23-0914	VEP4-GW24-0713	VEP4-GW24-0914	VEP4-GW24P-0914	VEP4-GW24D-0914	VEP4-GW25-0913	VEP4-GW25-0914	VEP4-GW25D-0914	VEP4-GW26-0913	VEP4-GW26-0914	VEP4-GW27-0913	VEP4-GW27-0914
Sample Date	07/23/13	09/17/14	07/24/13	09/23/14	09/23/14	09/26/14	09/26/13	09/18/14	09/23/14	09/24/13	09/12/14	09/26/13	09/10/14
Chemical Name													
Total dissolved solids (TDS)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (TOC)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dechlorinating Bacteria (cells/ml)													
Dehalococcoides	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Functioning Genes (cells/ml)													
BAV1 R-Dase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TCE R-Dase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VC R-Dase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Notes:

Shading indicates detections

NA - Not analyzed

D - Result of a dilution (laboratory qualifier)

H1 - Analyzed outside of recommended holding time (laboratory qualifier)

J - Analyte present, value may or may not be accurate or precise

M - Sample matrix interfered with the quantitation of the analyte; the parameters DL/LOD/LOQ have been raised (laboratory qualifier)

N - MS/MSD accuracy and/or precision outside acceptance criteria (laboratory qualifier)

R - Rejected result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
cells/ml - Cells per milliliter
mg/l - Milligrams per liter
µg/l - Micrograms per liter

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Station ID	EPI04-MW28		EPI04-MW28D	EPI04-MW29		EPI04-MW30		EPI04-MW31	EPI04-MW32	EPI04-MW33
Sample ID	VEP4-GW28-1013	VEP4-GW28-0914	VEP4-GW28D-0914	VEP4-GW29-1013	VEP4-GW29-0914	VEP4-GW30-0913	VEP4-GW30-0914	VEP4-GW31-0914	VEP4-GW32-0914	VEP4-GW33-0914
Sample Date	10/02/13	09/09/14	09/26/14	10/02/13	09/10/14	09/24/13	09/10/14	09/26/14	09/23/14	09/26/14
Chemical Name										
Volatile Organic Compounds (µg/l)										
1,1,1-Trichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	0.5 U	1 U	1 U	0.5 U	1 U	0.5 U	1 U	1 U	1 U	1 U
1,2,3-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromoethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Butanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Hexanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methyl-2-pentanone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromochloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromomethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	0.78 J	1 U	1 U	0.36 J	1 U	0.5 U	1 U	1 U	1 U	1 U
cis-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibromochloromethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane (Freon-12)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
m- and p-Xylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl acetate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylcyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl-tert-butyl ether (MTBE)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
o-Xylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	0.5 U	1 U	1 U	0.5 U	1 U	0.5 U	1 U	1 U	1 U	1 U
Toluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
trans-1,2-Dichloroethene	0.5 U	1 U	1 U	0.5 U	1 U	0.5 U	1 U	1 U	1 U	1 U
trans-1,3-Dichloropropene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	20.5	11.9	1.01	4.15	2.56	1.88	1.32	0.4 U	0.4 U	0.4 U
Trichlorofluoromethane (Freon-11)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride	0.2 U	0.4 U	0.4 U	0.2 U	0.4 U	0.2 U	0.4 U	0.4 U	0.4 U	0.4 U
Xylene, total	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE H-4
Validated Groundwater Raw Analytical Data
2006-2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW28		EPI04-MW28D	EPI04-MW29		EPI04-MW30		EPI04-MW31	EPI04-MW32	EPI04-MW33
Sample ID	VEP4-GW28-1013	VEP4-GW28-0914	VEP4-GW28D-0914	VEP4-GW29-1013	VEP4-GW29-0914	VEP4-GW30-0913	VEP4-GW30-0914	VEP4-GW31-0914	VEP4-GW32-0914	VEP4-GW33-0914
Sample Date	10/02/13	09/09/14	09/26/14	10/02/13	09/10/14	09/24/13	09/10/14	09/26/14	09/23/14	09/26/14
Chemical Name										
Semivolatile Organic Compounds (µg/l)										
1,1-Biphenyl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4,5-Tetrachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dioxane	0.463 U	NA	NA	0.481 U	NA	0.463 U	NA	NA	NA	NA
2,2'-Oxybis(1-chloropropane)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,6-Dinitro-2-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Bromophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetophenone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Atrazine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Chloroethoxy)methane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Chloroethyl)ether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butylbenzylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Caprolactam	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diethylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dimethyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-octylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE H-4
Validated Groundwater Raw Analytical Data
2006-2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW28		EPI04-MW28D	EPI04-MW29		EPI04-MW30		EPI04-MW31	EPI04-MW32	EPI04-MW33
Sample ID	VEP4-GW28-1013	VEP4-GW28-0914	VEP4-GW28D-0914	VEP4-GW29-1013	VEP4-GW29-0914	VEP4-GW30-0913	VEP4-GW30-0914	VEP4-GW31-0914	VEP4-GW32-0914	VEP4-GW33-0914
Sample Date	10/02/13	09/09/14	09/26/14	10/02/13	09/10/14	09/24/13	09/10/14	09/26/14	09/23/14	09/26/14
Chemical Name										
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isophorone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Nitroso-di-n-propylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Nitrosodiphenylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenol	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticide/Polychlorinated Biphenyls (µg/l)										
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beta-BHC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
delta-BHC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toxaphene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Metals (µg/l)										
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE H-4
Validated Groundwater Raw Analytical Data
2006-2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW28		EPI04-MW28D	EPI04-MW29		EPI04-MW30		EPI04-MW31	EPI04-MW32	EPI04-MW33
Sample ID	VEP4-GW28-1013	VEP4-GW28-0914	VEP4-GW28D-0914	VEP4-GW29-1013	VEP4-GW29-0914	VEP4-GW30-0913	VEP4-GW30-0914	VEP4-GW31-0914	VEP4-GW32-0914	VEP4-GW33-0914
Sample Date	10/02/13	09/09/14	09/26/14	10/02/13	09/10/14	09/24/13	09/10/14	09/26/14	09/23/14	09/26/14
Chemical Name										
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Metals (µg/l)										
Aluminum, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc, Dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wet Chemistry (mg/l)										
Acetate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Alkalinity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butyrate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Formic acid	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lactic Acid	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrite	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propionic Acid	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyruvate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE H-4
Validated Groundwater Raw Analytical Data
2006-2014
SWMU 20 Remedial Investigation
Vieques, Puerto Rico

Station ID	EPI04-MW28		EPI04-MW28D	EPI04-MW29		EPI04-MW30		EPI04-MW31	EPI04-MW32	EPI04-MW33
Sample ID	VEP4-GW28-1013	VEP4-GW28-0914	VEP4-GW28D-0914	VEP4-GW29-1013	VEP4-GW29-0914	VEP4-GW30-0913	VEP4-GW30-0914	VEP4-GW31-0914	VEP4-GW32-0914	VEP4-GW33-0914
Sample Date	10/02/13	09/09/14	09/26/14	10/02/13	09/10/14	09/24/13	09/10/14	09/26/14	09/23/14	09/26/14
Chemical Name										
Total dissolved solids (TDS)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (TOC)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dechlorinating Bacteria (cells/ml)										
Dehalococcoides	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Functioning Genes (cells/ml)										
BAV1 R-Dase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TCE R-Dase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VC R-Dase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Notes:

Shading indicates detections

NA - Not analyzed

D - Result of a dilution (laboratory qualifier)

H1 - Analyzed outside of recommended holding time (laboratory qualifier)

J - Analyte present, value may or may not be accurate or precise

M - Sample matrix interfered with the quantitation of the analyte; the parameters DL/LOD/LOQ have been raised (laboratory qualifier)

N - MS/MSD accuracy and/or precision outside acceptance criteria (laboratory qualifier)

R - Rejected result
U - The material was analyzed for, but not detected
UJ - Analyte not detected, quantitation limit may be inaccurate
cells/ml - Cells per milliliter
mg/l - Milligrams per liter
µg/l - Micrograms per liter

Appendix I
Data Validation Report

VOLATILE DATA VALIDATION SUMMARY

Site Name: Vieques CTO-111
Project Number: 617.90.01
Sampling Date(s): 7/28 & 7/29/2010

SCAN & SIM

Laboratory: Katahdin
Case/Order No. SD4622

Compound List: ☑ TCL ☐ Priority Pollutant ☐ Appendix IX ☐ Other ___

Method: ☐ CLP SOW ☐ 40 CFR 136 ☑ SW-846 Method 8260B ☐ Other ___

The following table indicates the data validation criteria examined, any problems identified, and the QA action applied.

Data Validation Criteria:	Accept	FYI	Qualify	Comments
Holding Times	✓			
GC/MS Tuning	✓			
Initial Calibrations	✓			
Continuing Calibrations			✓	PQL cmpd methylcyclohexane (UJ) in some samples
Blank Analysis Results			✓	acetone (U) in some samples
System Monitoring/Surrogate Results	✓			
MS/MSD Results	✓			
Field Duplicate Results NA				
Internal Standard Areas/RT	✓			
Target Compound Identification	✓			
TIC Identification NA				
Quantitation/Detection Limits	✓			
System Performance	✓			
Overall Assessment of Data	✓			
Other			✓	head space found in TB (R) all nondetects

General Comments:

Accept – No qualification required.
FYI – For your information only, no qualification necessary
Qualify – Qualify as rejected, estimated or biased
NA – Not applicable.
NR – Not reviewed.

QA Scientist
Date

Revised 12/11/2000

crowshan

From: crowshan [crowshan@voicenet.com]
Sent: Wednesday, October 27, 2010 2:13 PM
To: 'kperkins@katahdinlab.com'
Cc: Leslie Dimond; 'Shawne M. Rodgers'; MZamboni@ch2m.com; 'Juan.Acaron@CH2M.com'; Rebekha Shaw (Rebekha.Shaw@CH2M.com)
Subject: Data Validation Inquiry - Vieques CTO-111 - Katahdin Sample Delivery Group SD4622

Hi Kelly,

We are currently completing a validation review of data generated for the above referenced project. The following issues have arisen as a result of this review:

VOA:

1) The case narrative should present the non-conformance of the trip blank that had head space for all vials. Please revise and resubmit.

VOA SIM:

1) The data package is missing the second page of the quantitation report for continuing calibration standard file ID D6938 analyzed on 8/12/10. Please provide

Thank you for your assistance,

Caroline

Caroline Rowshan
Environmental Data Quality, Inc.
967 East Swedesford Road, Suite 404
Exton, PA 19341
Phone: (610) 719-1981
Fax: (610) 725-1781
crowshan@voicenet.com

crowshan

From: Deb Nadeau [dnadeau@katahdinlab.com]
Sent: Monday, November 01, 2010 3:59 PM
To: crowshan@voicenet.com
Cc: kperkins@katahdinlab.com; jobrin@katahdinlab.com
Subject: RE: Data Validation Inquiry - Vieques CTO-111 - Katahdin Sample Delivery Group SD4622
Attachments: doc06337220101101152936.pdf; doc06337420101101152958.pdf

Caroline,

Here is the revised narrative for SD4622 and the missing second page of file D6938.

Thank you,
Deb

Deborah Nadeau
Laboratory Operations Manager
Katahdin Analytical Services
A Woman-Owned Small Business Enterprise
600 Technology Way
Scarborough, Maine 04074
Direct - 207.874.2400 x19
Fax - 207.775.4029
www.katahdinlab.com

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From: Kelly Perkins [mailto:kperkins@katahdinlab.com]
Sent: Monday, November 01, 2010 9:27 AM
To: dnadeau@katahdinlab.com
Subject: FW: Data Validation Inquiry - Vieques CTO-111 - Katahdin Sample Delivery Group SD4622
Importance: High

Kelly Perkins
Project Manager
Katahdin Analytical Services
600 Technology Way
Scarborough, ME 04074
(207) 874-2400 Ext. 17

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Data File: \\target_server\gg\chem\gcms-d.i\D081210.b\D6938.D
Report Date: 22-Aug-2010 07:34

received
CK 11/10

Compounds	QUANT SIO MASS	RT	REF RT	REL RT	RESPONSE	AMOUNTS: CAL-AMT (ug/l)	ON-COL- (ug/l)	REVIEW CODE
59 Tetrachloroethene	164	12.268	12.269	(0.861)	16751	0.50000	0.46	
60 trans-1,3-Dichloropropene	75	12.323	12.325	(1.339)	5807	0.50000	0.40	
62 Dibromochloromethane	129	12.931	12.932	(0.967)	5641	0.50000	0.54	
63 1,3-Dichloropropane	76	13.097	13.098	(0.919)	7399	0.50000	0.40	
64 1,2-Dibromoethane	107	13.318	13.319	(1.443)	4385	0.50000	0.49	
65 2-Hexanone	43	13.815	13.816	(0.969)	3006	0.50000	0.45	
* 68 Chlorobenzene-D5	117	14.257	14.258	(1.000)	52326	1.00000		
69 1,1,1,2-Tetrachloroethane	131	14.423	14.424	(1.012)	5173	0.50000	0.46	
73 Isopropylbenzene	105	16.087	16.088	(0.853)	51824	0.50000	0.43	
§ 76 4-Bromofluorobenzene	174	16.552	16.553	(1.161)	9521	0.50000	0.46	
81 1,1,2,2-Tetrachloroethane	83	16.971	16.972	(0.804)	4867	0.50000	0.47	
84 1,2,3-Trichloropropane	75	17.223	17.224	(0.817)	3181	0.50000	0.48	
88 1,2,4-Trimethylbenzene	105	17.976	17.978	(0.998)	33782	0.50000	0.40	
90 1,3-Dichlorobenzene	146	18.607	18.607	(0.991)	36136	0.50000	0.52	
* 91 1,4-Dichlorobenzene-D4	152	18.774	18.775	(1.000)	19418	1.00000		
92 1,4-Dichlorobenzene	146	18.774	18.775	(1.000)	39521	0.50000	0.48	
95 1,2-Dichlorobenzene	146	19.529	19.530	(1.040)	18571	0.50000	0.47	
98 Hexachlorobutadiene	225	21.877	21.878	(1.165)	5557	0.50000	0.53	

RESUBMITTAL

Katahdin ANALYTICAL SERVICES

Cert. No. 98766

SDG NARRATIVE
KATAHDIN ANALYTICAL SERVICES
CH2M HILL
CTO-111 NTR VIEQUES
SD4622

Sample Receipt

The following samples were received on July 30, 2010 and were logged in under Katahdin Analytical Services work order number SD4622 for a hardcopy due date of August 23, 2009.

KATAHDIN Sample No.	CH2M HILL Sample Identification
SD4622-1	VEP04-EB01-072810
SD4622-2	VEP04-GW01-0710
SD4622-3	VEP04-EB01-072910
SD4622-4	VEP04-GW02-0710
SD4622-5	VEP04-TB01-072910
SD4622-6	VEP04-GW03-0710

The samples were logged in for the analyses specified on the chain of custody form. All problems encountered and resolved during sample receipt have been documented on the applicable chain of custody forms.

We certify that the test results provided in this report meet all the requirements of the NELAC standards unless otherwise noted in this narrative or in the Report of Analysis.

Sample analyses have been performed by the methods as noted herein.

Should you have any questions or comments concerning this Report of Analysis, please do not hesitate to contact your Katahdin Analytical Services Project Manager, **Ms. Kelly Perkins**. This narrative is an integral part of the Report of Analysis.

Organics Analysis

The samples of Work Order SD4622 were analyzed in accordance with "Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods." SW-846, 2nd edition, 1982 (revised 1984), 3rd edition, 1986, and Updates I, II, IIA, III, IIIA, and IIIB 1996, 1998 & 2004, Office of Solid Waste and Emergency Response, U.S. EPA, and/or for the specific methods listed below or on the Report of Analysis.

The reported percent recovery acceptance limits for the surrogates are based on laboratory established acceptance limits.

Sample SD4622-2 was used for the matrix spike (MS) and matrix spike duplicate (MSD), as requested by the client.

8260B SCAN Analysis

Sample SD4622-4 was manually integrated for the analyte acetone. The specific reason for the manual integration is indicated on the raw data by the manual integration codes (M1-M11). These codes are further explained in the attachment following this narrative.

The independent check standard (file S1291) associated with the initial calibration analyzed on the S instrument on 08/06/10 had high responses for dichlorodifluoromethane, bromomethane, acetone and 2-butanone, which resulted in %D's that were greater than 20%. Since the check standard is the same source as the LCS, and the LCS's (WG80727-1 and WG80847-1) had acceptable recoveries of these analytes, the associated samples were not reanalyzed. The independent check standard recovery report consists of the full list of spiked analytes, but only the client's list of target analytes are evaluated.

The calibration verification standard (CV) (file S1397) had a high response for the target compound methylcyclohexane, which resulted in a %D that was greater than the DoD acceptance limit of 20%. Since a high response would indicate a high bias and this analyte was not detected above the PQL in the associated samples, the samples were not reanalyzed.

All vials for sample SD4622-5, VEP04-TB01-072910, were received with headspace larger than pea-size. Analysis for this sample was conducted from a vial with headspace.

8260B SIM Analysis

The initial calibration analyzed on the D instrument on 08/05/10 had a %RSD value for the analyte vinyl chloride that exceeded, and failed for both the linear and quadratic models in the initial calibration curve due to the correlation coefficient and the coefficient of determination being less than the method acceptance criteria of 0.995 and 0.990, respectively. This compound was calibrated using the average model. The independent check standard (file D6835A) associated with this initial calibration had a low response for the analyte 1,4-dichlorobenzene, which resulted in a recovery that was greater than 20%.

All vials for sample SD4622-5, VEP04-TB01-072910, were received with headspace larger than pea-size. Analysis for this sample was conducted from a vial with headspace.

Sample SD4622-2 had high recoveries for two surrogates which were outside of the laboratory established acceptance limits. The sample was re-analyzed and had acceptable surrogate recoveries. Both analyses are included.

The QC sample blank WG80849-2 was inadvertently not spiked with surrogate standards, and consequently had no recoveries. Since the LCS WG80849-1 and all associated samples and had acceptable surrogate recoveries, the samples were not reanalyzed.

The calibration verification standard (CV) (file D6938) had a high response for the analyte tetrachloroethene, and a low % recovery for the surrogate toluene-d8, which resulted in a %D's that were greater than the DoD acceptance limit of 20%. Since a high response for tetrachloroethene would indicate a high bias, and this analyte was not detected above the PQL in the associated samples, the samples were not reanalyzed.

There were no other protocol deviations or observations noted by the organics laboratory staff.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Operations Manager or the Quality Assurance Officer as verified by the following signature.

Deborah J. Kadean for 11/1/10

Leslie Dimond
Quality Assurance Officer

SOP # HW-24
Revision # 2
August 2008

USEPA
Hazardous Waste Support Branch
Validating Volatile Organic Compounds
By Gas Chromatography/Mass Spectrometry
SW-846 Method 8260B

Prepared by: George Karras Date: 8/22/08
George Karras, Chemist
Hazardous Waste Support Section

Prepared by: Russell Armond Date: 8/25/08
Russell Armond, Chemist
Hazardous Waste Support Section

Concurred by: Linda Mouel Date: 8/26/08
Linda Mouel, Chief
Hazardous Waste Support Section

Approved by: Robert Runyon Date: 8/26/08
Robert Runyon, Chief
Hazardous Waste Support Branch

Annual Review

Reviewed by: Russell Armond Date: 08/11/09
Name

Reviewed by: _____ Date: _____
Name

Scope and Applicability

This SOP offers detailed guidance in evaluating laboratory data generated according to the USEPA SW-846, Method 8260B December 1996. The validation methods and actions discussed in this document are based on the requirements set forth in USEPA SW-846, Method 8260B and Method 8000C, Rev 3, March 2003; and "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review," January, 2005. This document covers technical as well as method specific problems; however situations may arise where data limitations must be assessed based on the reviewer's own professional judgement.

Summary

To ensure a thorough evaluation of each result in a data case, the reviewer must complete the checklist within this SOP, answering specific questions while performing the prescribed "ACTIONS" in each section. Qualifiers (or flags) are applied to questionable or unusable results as instructed. The data qualifiers discussed in this document are defined on page 4.

The reviewer must prepare a detailed data assessment to be submitted along with the complete SOP checklist. The Data Assessment must list all data qualifications, reasons for qualifications, instances of missing data, and contract non-compliance.

DEFINITIONS

Acronyms

BNA - base neutral acid(another name for Semi Volatiles)
CLP - Contract Laboratory Program
CRQL - Contract Required Quantitation Limit
CF - calibration factor
%D - percent difference
DCB -decachlorobiphenyl
DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenylethane
DDT - dichlorodiphenyltrichloroethane
DoC - Date of Collection
GC - gas chromatography
GC/ECD - gas chromatography/electron capture detector
GC/MS - gas chromatography/mass spectrometer
GPC - gel permeation chromatography
IS - internal standard
kg - kilogram
µg - microgram
MS - matrix spike
MSD - matrix spike duplicate
ℓ - liter
mℓ - milliliter
PCB - Polychlorinated biphenyl
PE - performance evaluation
PEM - Performance Evaluation Mixture
QC - quality control
RAS - Routine Analytical Services
RIC - reconstructed ion chromatogram
RPD - relative percent difference
RRF - relative response factor
RRF - average relative response factor (from initial calibration)
RRT - relative retention time
RSD - relative standard deviation
RT - retention time
RSCC - Regional Sample Control Center
SDG - sample delivery group
SMC - system monitoring compound
SOP - standard operating procedure
SOW - Statement of Work
SVOA - semivolatile organic acid
TCL - Target Compound List
TCLP - Toxicity Characteristics Leachate Procedure
TCX -tetrachloro-m-xylene
TIC - tentatively identified compound

TOPO - Task Order Project Officer
TPO - Technical Project Officer
VOA - Volatile organic
VTSR - Validated Time of Sample Receipt

Data Qualifiers

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The analyte was positively identified: the associated numerical value is the approximate concentration of the analyte in the sample.

N - The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."

NJ - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

LAB QUALIFIERS:

D - The positive value is the result of an analysis at a secondary dilution factor.

B - The analyte is present in the associated method blank as well as in the sample. This qualifier has a different meaning when validating inorganic data.

E - The concentration of this analyte exceeds the calibration range of the instrument.

A - Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: _____ LAB: Katahdin

SITE NAME: Vieques - CTO-111

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? [✓] ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? [✓] ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? [✓] ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. VOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? [✓] ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? [✓] ___ ___

1.3 Sample Conditions/Problems

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? [✓] ___ ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ [✓] ___

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

Katahdin Analytical Services, Inc. — **Sample Receipt Condition Report**

Client:	CH2M Hill	KAS PM:	KEZ	Sampled By:	Client
Project:		KIMS Entry By:	GN	Delivered By:	Fed Ex
KAS Work Order#:	SD4622	KIMS Review By:		Received By:	DD
SDG #:	Cooler: 1 of 1			Date/Time Rec.:	7/30/10 0945

Receipt Criteria	Y	N	EX*	NA	Comments and/or Resolution
1. Custody seals present / intact?	✓				
2. Chain of Custody present in cooler?	✓				
3. Chain of Custody signed by client?	✓				
4. Chain of Custody matches samples?	✓				
5. Temperature Blanks present? If not, take temperature of any sample w/ IR gun.	✓				Temp (°C): 0.4
Samples received at <6 °C w/o freezing?	✓				Note: Not required for metals analysis.
Ice packs or ice present?	✓				The lack of ice or ice packs (i.e. no attempt to begin cooling process) may not meet certain regulatory requirements and may invalidate certain data.
If temp. out, has the cooling process begun (i.e. ice or packs present) and sample collection times <6hrs., but samples are not yet cool?				✓	Note: No cooling process required for metals analysis.
6. Volatiles free of headspace: **Aqueous:** No bubble larger than a pea	✓				
Soil/Sediment: Received in airtight container?				✓	
Received in methanol?				✓	
Methanol covering soil?				✓	
7. Trip Blank present in cooler?	✓				*
8. Proper sample containers and volume?	✓				
9. Samples within hold time upon receipt?	✓				
10. Aqueous samples properly preserved? Metals, COD, NH3, TKN, O/G, phenol, TPO4, N+N, TOC, DRO, TPH – pH <2				✓	
Sulfide - >9				✓	
Cyanide – pH >12				✓	

* Log-In Notes to Exceptions: document any problems with samples or discrepancies or pH adjustments

* All Trip Blanks have headspace.

00000006

Sample_Name	Lab_Sample_ID	Date/Time	Extraction	Analysis_D	EHT	AHT	Analytical_Method	SDG
VEP04-EB01-072810	SD4622-1	7/28/2010	8/9/2010	8/9/2010		11	8260B	SD4622
VEP04-GW01-0710	SD4622-2	7/28/2010	8/11/2010	8/11/2010		13	8260B	SD4622
VEP04-EB01-072910	SD4622-3	7/29/2010	8/11/2010	8/11/2010		13	8260B	SD4622
VEP04-GW02-0710	SD4622-4	7/29/2010	8/11/2010	8/11/2010		13	8260B	SD4622
VEP04-TB01-072910	SD4622-5	7/29/2010	8/11/2010	8/11/2010		13	8260B	SD4622
VEP04-GW03-0710	SD4622-6	7/29/2010	8/11/2010	8/11/2010		13	8260B	SD4622
VEP04-GW01-0710	WG80727-3	7/28/2010	8/10/2010	8/10/2010		12	8260B	SD4622
VEP04-GW01-0710	WG80727-4	7/28/2010	8/10/2010	8/10/2010		12	8260B	SD4622
VEP04-EB01-072810	SD4622-1	7/28/2010	8/7/2010	8/7/2010		9	8260B_SIM	SD4622
VEP04-GW01-0710	SD4622-2	7/28/2010	8/7/2010	8/7/2010		9	8260B_SIM	SD4622
VEP04-GW01-0710	SD4622-3RA	7/28/2010	8/11/2010	8/11/2010		13	8260B_SIM	SD4622
VEP04-EB01-072910	SD4622-3	7/29/2010	8/7/2010	8/7/2010		9	8260B_SIM	SD4622
VEP04-GW02-0710	SD4622-4	7/29/2010	8/12/2010	8/12/2010		14	8260B_SIM	SD4622
VEP04-TB01-072910	SD4622-5	7/29/2010	8/12/2010	8/12/2010		14	8260B_SIM	SD4622
VEP04-GW03-0710	SD4622-6	7/29/2010	8/7/2010	8/7/2010		9	8260B_SIM	SD4622
VEP04-GW01-0710	WG80849-3	7/28/2010	8/12/2010	8/12/2010		14	8260B_SIM	SD4622
VEP04-GW01-0710	WG80849-4	7/28/2010	8/12/2010	8/12/2010		14	8260B_SIM	SD4622

01/19/10

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water [✓] ___ ___

b. Soil [ ] ___ ✓

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water [✓] ___ ___

b. Soil [ ] ___ ✓

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. [✓] ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [✓] ___ ___

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2 [✓] ___ ___

If yes, were samples reanalyzed? [ ] ___ ✓

Were method blanks reanalyzed? [ ] ✓ ___

FORM 2
WATER VOLATILE SYSTEM MONITORING COMPOUND RECOVERY

SIM

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: CTO-111 NTR VIEQUES SDG No.: SD4622

	CLIENT SAMPLE ID	LAB SAMPLE ID	SMC1 DBF#	SMC2 DCA#	SMC3 TOL#	SMC4 BFB#	TOT OUT
01	WG80688-LCS	WG80688-1	92	96	80	74	0
02	WG80688-BLANK	WG80688-2	121	121	98	82	0
03	VEP04-EB01-072810	SD4622-1	122	121	90	75	0
04	VEP04-GW01-0710	SD4622-2	133*	133*	97	81	2
05	VEP04-EB01-072910	SD4622-3	129	126	96	80	0
06	VEP04-GW03-0710	SD4622-6	125	119	93	79	0
07	WG80849-LCS	WG80849-1	110	110	98	89	0
08	WG80849-BLANK	WG80849-2	0*	0*	0*	1*	4
09	VEP04-GW01-0710	SD4622-2RA	119	123	103	91	0
10	VEP04-GW01-0710MS	WG80849-3	106	109	90	93	0
11	VEP04-GW01-0710MSD	WG80849-4	110	112	95	98	0
12	WG80903-LCS	WG80903-1	94	95	93	78	0
13	WG80903-BLANK	WG80903-2	105	104	88	83	0
14	VEP04-TB01-072910	SD4622-5	128	124	105	86	0
15	VEP04-GW02-0710	SD4622-4	126	127	105	92	0
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							

		QC LIMITS
SMC1 (DBF)	= Dibromofluoromethane	(70-130)
SMC2 (DCA)	= 1,2-Dichloroethane-D4	(70-130)
SMC3 (TOL)	= Toluene-D8	(70-130)
SMC4 (BFB)	= P-Bromofluorobenzene	(70-130)

Column to be used to flag recovery values

* Values outside of contract required QC limits

0 System Monitoring Compound diluted out

page 1 of 1 FORM II VOA-1

CR 10/27/10

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

all other SS recoveries met

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] ✓ ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ✓

C. Med Soil [ ] ___ ✓

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [ ] ✓ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [✓] ___ ___

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] ✓ ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent)

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [✓] ___ ___

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [✓] ___ ___

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month [page 8000C, section 9.5.])

a. Water [✓] ___ ___

b. Waste [ ] ___ ✓

c. Soil/Solid [ ] ___ ✓

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7) for each matrix. [✓] ___ ___

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [✓] ___ ___

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

KATAHDIN ANALYTICAL SERVICES
MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Client: CH2MHill
Project: CTO-111 HTA Vieques
PO No:
Sample Date: 07/28/10
Received Date: 07/30/10
Extraction Date:
Analysis Date: 08/12/10
Report Date: 08/21/2010
Matrix: WATER

Lab ID: WG80849-3 & WG80849-4
Client ID: VEP04-GW01-0710MS & VEP04-GW01-0710MSD
SDG: SD4622
Extracted by:
Extraction Method: SW846 5030
Analyst: FTC
Analysis Method: WG80849,D6917,SD4622
Lab Prep Batch: WG80849
Units: ug/l

COMPOUND	MS SPIKE	MSD SPIKE	SAMPLE CONC.	MS CONC.	MSD CONC.	MS %REC.	MSD %REC.	%RPD	%RPD LIMIT	QC. LIMITS
Vinyl chloride	0.50	0.50	0.00	0.52	0.41	104	82	24	40	70-130
1,1-Dichloroethene	0.50	0.50	0.00	0.58	0.55	116	110	5	40	70-130
Carbon Tetrachloride	0.50	0.50	0.00	0.61	0.57	122	114	7	40	70-130
Benzene	0.50	0.50	0.67	1.3	1.3	126	106	8	40	70-130
1,2-Dichloroethane	0.50	0.50	0.00	0.67	0.63	134	126	6	40	70-130
Tetrachloroethene	0.50	0.50	0.00	0.66	0.61	132	122	8	40	70-130
1,1,2,2-Tetrachlorethane	0.50	0.50	0.00	0.55	0.56	110	112	2	40	70-130
1,4-Dichlorobenzene	0.50	0.50	0.00	0.54	0.54	108	108	0.0	40	70-130

No qual necessary, LCS OK

CR
12/31/10

PAGE 1 OF 1 FORM III VOA-3 D6931.D & D6932.D

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? [✓] ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? [✓] ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? [✓] ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? [✓] ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. [✓] ___ ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? [✓] [ ] ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone
** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

Environmental Data Quality, Inc.

BLANK ANALYSIS RESULTS FOR TARGET ORGANIC COMPOUNDS

VOA SIM

Date / Time	Fraction V/SV	Fraction P	MATRIX Aqu.	MATRIX Solid	BLANK TYPE TB	BLANK TYPE MB	BLANK TYPE EB	BLANK TYPE FB	Sample I.D. Number	Assoc. Samples	Contaminant	Conc. µg/L	Conc. µg/Kg	Qualification Limit 5X	Qualification Limit 10X
8/7/10			✓			✓			W680688		ND				
8/11/10			✓			✓			W680849		ND				
8/12/10			✓			✓			W680903		ND				
8/7/10			✓					✓	P801-0780 6W01		PCE	0.097			
8/7/10			✓					✓	P801-0780 6W02	6W02 6W03	ND				
8/12/10			✓			✓			P801-0780 6W03	6W01 6W02 6W03	ND				

Notes: PCE ND in sample

No qual necessary

CR 10/27/10

Environmental Data Quality, Inc.

BLANK ANALYSIS RESULTS FOR TARGET ORGANIC COMPOUNDS

Date / Time	Fraction V/SV	Fraction P	MATRIX Aqu.	MATRIX Solid	BLANK TYPE TB	BLANK TYPE MB	BLANK TYPE EB	BLANK TYPE FB	Sample I.D. Number	Assoc. Samples	Contaminant	Conc. µg/L	Conc. µg/Kg	Qualification Limit 5X	Qualification Limit 10X
8/9/10	✓		✓			✓			W680747		ND				
8/11/10	✓		✓			✓			W680849		ND				
8/9/10	✓		✓				✓		P801-0780 6W01		ND				
8/11/10	✓		✓				✓		P801-0780 6W02	6W01 6W03	acetone	28		28	
8/11/10	✓		✓			✓			P801-0780 6W03	6W01 6W02 6W03	ND				

Notes:

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? [✓] ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. [✓] ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? [✓] ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? [✓] ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) [✓] ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? [✓] ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? [✓] ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ [✓] ___

9.7 Have the appropriate number of significant figures (two) been reported? [✓] ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. [✓] ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates [✓] ___ ___

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) [✓] ___ ___

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? [✓] ___ ___

YES NO N/A

Resolution? [✓] ___ ___

Peak shape? [✓] ___ ___

Full-scale graph (attenuation)? [✓] ___ ___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

Not Reported

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ [✓]

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ ___

b. Blanks [ ] ___ ___

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ [✓]

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ ___

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ___

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] [✓] ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [✓] ___ ___

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > ~~20%~~ 25, (8000C-39) qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? [✓] ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. [ ] [✓] ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

FORM 6
VOLATILE INITIAL CALIBRATION DATA

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project CTO-111 NTR VIEQUES SDG No.: SD4622

Instrument ID: GCMS-D Calibration Date(s): 08/05/10 08/05/10

Column: RTX-VMS ID: 0.18 (mm) Calibration Time(s): 1111 1423

LAB FILE ID: RF0.65: D4834 RF0.875: D4833 RF0.1: D4832
RF0.5: D4829 RF1: D4831 RF2: D4830

COMPOUND	RF0.65	RF0.875	RF0.1	RF0.5	RF1	RF2	COEFF. (COD/QD)	A1	% RSD OR R^2	MAX %RSD OR R^2
Vinyl chloride	0.772	0.418	0.864	0.895	0.654	0.741	AVRG	0.76747279	16.934	15.000
1,1-Dichloroethene	0.527	0.518	0.705	0.618	0.512	0.528	AVRG	0.57115181	13.497	15.000
Carbon Tetrachloride	0.419	0.437	0.532	0.558	0.452	0.488	AVRG	0.48105712	11.502	15.000
Benzene	1.355	1.527	1.654	1.539	1.464	1.549	AVRG	1.55308534	3.570	15.000
1,2-Dichloroethane	0.288	0.277	0.264	0.244	0.258	0.272	AVRG	0.26607159	4.889	15.000
Tetrachloroethene	0.628	0.612	0.701	0.672	0.565	0.576	AVRG	0.63244682	3.338	15.000
1,1,2,2-Tetrachloroethane	0.505	0.511	0.556	0.497	0.565	0.537	AVRG	0.53784918	4.518	15.000
1,4-Dichlorobenzene	3.719	3.679	4.067	3.369	3.341	3.490	AVRG	3.63881069	7.874	15.000
Dibromofluoromethane	0.531	0.465	0.447	0.426	0.437	0.383	AVRG	0.44761797	10.450	15.000
P-Bromofluorobenzene	0.593	0.539	0.473	0.468	0.475	0.447	AVRG	0.49928739	11.071	15.000
Toluene-D8	1.202	1.187	1.164	1.120	1.109	0.989	AVRG	1.14177114	8.726	15.000
1,2-Dichloroethane-D4	0.425	0.462	0.374	0.312	0.347	0.301	AVRG	0.36350214	12.614	15.000

(1)

Assoc Samples: EB01-072810
GW01-0710
EB01-072910
GW03-0710

(1) ND in assoc samples, no qual necessary
CR 10/31/10

FORM VI VOA

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) [ ] [✓] ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? [✓] ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? [✓] ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). [✓] ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? [✓] ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? [✓] ___ ___

FORM 7B
VOLATILE CALIBRATION VERIFICATION SUMMARY

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: CTO-111 NTR VIEQUES SDG No.: SD4622

Instrument ID: GCMS-D Calibration Date: 08/12/10 Time: 1024

Lab File ID: D6938 Init. Calib. Date(s): 08/11/10 08/11/10

Init. Calib. Times: 1533 1835

GC Column: RTX-VMS ID: 0.18 (mm)

COMPOUND	RRF or AMOUNT	RRF0.5000 or AMOUNT	CCAL RRF0.5000	MIN RRF	%D or %DRIFT	MAX %D or %DRIFT	CURV TYPE
Vinyl chloride	0.4608800	0.5000000	0.6485500	0.01	-7.98	20.00	2RDR
1,1-Dichloroethene	0.5028000	0.5000000	0.5571400	0.1	0.56	20.00	LINR
Carbon Tetrachloride	0.5322400	0.5000000	0.3315000	0.01	6.45	20.00	2RDR
Benzene	0.5379600	0.5000000	1.3392000	0.01	7.59	20.00	LINR
1,2-Dichloroethane	0.2390000	0.2650600	0.2650600	0.01	10.90	20.00	AVRG
Tetrachloroethene	0.6496800	0.5000000	0.6398900	0.01	29.94	20.00	2RDR <- (1)
1,1,2,2-Tetrachloroethane	0.5300000	0.5014900	0.5014900	0.3	-5.38	20.00	AVRG
1,4-Dichlorobenzene	3.1530000	3.0418000	3.0418000	0.01	-3.53	20.00	AVRG
Dibromofluoromethane	0.4950000	0.4355100	0.4355100	0.01	-12.02	20.00	AVRG
P-Bromofluorobenzene	0.3970000	0.3637000	0.3637000	0.01	-8.39	20.00	AVRG
Toluene-D8	0.9720000	0.7592200	0.7592200	0.01	-21.89	20.00	AVRG <-
1,2-Dichloroethane-D4	0.4200000	0.3583800	0.3583800	0.01	-14.67	20.00	AVRG

assoc samples:
TB01-072910
GW02-0710

(1) (US) in GW02; prev (R) in TB01

FORM VII PEST

CR 10/31/10

FORM 7B
VOLATILE CALIBRATION VERIFICATION SUMMARY

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: CTO-111 NTR VIEQUES SDG No.: SD4622

Instrument ID: GCMS-S Calibration Date: 08/11/10 Time: 1351

Lab File ID: S1397 Init. Calib. Date(s): 08/06/10 08/06/10

Init. Calib. Times: 1535 1813

GC Column: RTX-VMS ID: 0.18 (mm)

COMPOUND	RRF or AMOUNT	RRF50.000 or AMOUNT	CCAL RRF50.000	MIN RRF	%D or %DRIFT	MAX %D or %DRIFT	CURV TYPE
Chlorobenzene	0.9820000	0.9887800	0.9887800	0.3	0.69	20.00	AVRG
Ethylbenzene	0.4580000	0.4876800	0.4876800	0.01	6.48	20.00	AVRG
m+p-Xylenes	0.5460000	0.5875600	0.5875600	0.01	7.61	20.00	AVRG
o-Xylene	0.5380000	0.5679300	0.5679300	0.01	5.56	20.00	AVRG
Styrene	47.450000	50.000000	0.9324500	0.01	-5.10	20.00	LINR
Bromoform	0.3040000	0.3070300	0.3070300	0.1	1.00	20.00	AVRG
Isopropylbenzene	2.6770000	2.8646000	2.8646000	0.01	7.01	20.00	AVRG
1,3-Dichlorobenzene	1.4830000	1.5916000	1.5916000	0.01	7.32	20.00	AVRG
1,2-Dichlorobenzene	1.4650000	1.5089000	1.5089000	0.01	3.00	20.00	AVRG
1,2-Dibromo-3-Chloropropane	0.1530000	0.1413000	0.1413000	0.01	-7.65	20.00	AVRG
1,2,4-Trichlorobenzene	45.588000	50.000000	0.7183900	0.01	-8.82	20.00	LINR
1,2,3-Trichlorobenzene	46.100000	50.000000	0.7026300	0.01	-7.80	20.00	LINR
Methyl Acetate	0.5070000	0.5557600	0.5557600	0.01	9.62	20.00	AVRG
Methylcyclohexane	0.6110000	0.7759400	0.7759400	0.01	27.00	20.00	AVRG <- (1)
Dibromofluoromethane	0.5770000	0.5587800	0.5587800	0.01	-3.16	20.00	AVRG
1,2-Dichloroethane-D4	0.6140000	0.5629900	0.5629900	0.01	-8.31	20.00	AVRG
Toluene-D8	0.9850000	0.9517000	0.9517000	0.01	-3.38	20.00	AVRG
P-Bromofluorobenzene	0.3690000	0.3400100	0.3400100	0.01	-7.86	20.00	AVRG

assoc samples: GW01-0710
GW02-0710
GW03-0710
EB01-072910
TB01-072910

page 2 of 2

FORM VII PEST

(1) (US) in assoc samples; except TB01-prev (R)

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:
1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.
2. Do not qualify non-detects when the associated IS are counts area > + 100%.
3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".
4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ✓ ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

VOLATILE DATA VALIDATION SUMMARY

Site Name: Vieques CTO-111
Project Number: 617.90.01
Sampling Date(s): 7/29/2010
Laboratory: Katahdin
Case/Order No. SD4693

Compound List: ☑ TCL ☐ Priority Pollutant ☐ Appendix IX ☐ Other ___

Method: ☐ CLP SOW ☐ 40 CFR 136 ☑ SW-846 Method 8260B ☐ Other ___

The following table indicates the data validation criteria examined, any problems identified, and the QA action applied.

Data Validation Criteria:	Accept	FYI	Qualify	Comments
Holding Times	✓			
GC/MS Tuning	✓			
Initial Calibrations	✓			
Continuing Calibrations	✓			
Blank Analysis Results	✓			
System Monitoring/Surrogate Results	✓			
MS/MSD Results NA				
Field Duplicate Results NA				
Internal Standard Areas/RT	✓			
Target Compound Identification	✓			
TIC Identification NA				
Quantitation/Detection Limits	✓			
System Performance	✓			
Overall Assessment of Data	✓			
Other			✓	headspace in VOA vials J/R

General Comments:

Accept – No qualification required.
FYI – For your information only, no qualification necessary
Qualify – Qualify as rejected, estimated or biased
NA – Not applicable.
NR – Not reviewed.

QA Scientist
Date

Revised 12/11/2000

crowshan

From: crowshan [crowshan@voicenet.com]
Sent: Wednesday, October 27, 2010 12:38 PM
To: 'kperkins@katahdinlab.com'
Cc: Leslie Dimond; 'Shawne M. Rodgers'; 'Juan Acaron@CH2M.com'; MZamboni@ch2m.com; Rebekha Shaw (Rebekha.Shaw@CH2M.com)
Subject: Data Validation Inquiry - Vieques CTO-111 - Katahdin Sample Delivery Group SD4693

Hi Kelly,

We are currently completing a validation review of data generated for the above referenced project. The following issues have arisen as a result of this review:

VOA:

1) The COC indicates that 6 vials were received for sample VEP04-GW04-0710 and 2 were received for VEP04-TB01-073010. The sample Login COC Report indicates that "3 of 4 vials have headspace" for sample VEP04-GW04-0710; please provide confirmation that the VOA scan and VOA SIM analyses were performed on the vials with no headspace and why the COC lists 6 vials and the login report indicates 4 vials. Also the sample Login COC Report indicates that "vials have headspace" for VEP04-TB01-073010 , so please confirm that the VOA scan and VOA SIM analyses had to be performed on vials with headspace. This non-conformance was not noted in the case narrative and needs to be added along with the confirmations above. Region II requires qualification due to headspace, so this information is needed.

Thank you for your assistance,

Caroline

Caroline Rowshan
Environmental Data Quality, Inc.
987 East Swedesford Road, Suite 404
Exton, PA 19341
Phone: (610) 719-1981
Fax: (610) 725-1781
crowshan@voicenet.com

crowshan

From: Deb Nadeau [dnadeau@katahdinlab.com]
Sent: Wednesday, October 27, 2010 2:58 PM
To: crowshan@voicenet.com
Cc: kperkins@katahdinlab.com
Subject: FW: Data Validation Inquiry - Vieques CTO-111 - Katahdin Sample Delivery Group SD4693

Hi Caroline,

The COC appears to have been incorrect and was not noted by our log-in department. According to our custody records (we scan all samples into storage), we did receive 6 vials for VEP04-GW04-0710 as the COC indicates, but we received 4 vials for VEP04-TB01-073010. We believe that the sample log-in report should have read that 3 of 6 vials had headspace. Three of six vials were used for sample VEP04-GW04-0710. Two of the remaining unused vials have a pea size bubble in them. The third untouched vial does not have headspace. Based on this, it is possible that one of three used vials had a pea size bubble in it. Based on the log-in notes for VEP04-TB01-073010, we did use vials which contained headspace.

It is our policy to note headspace larger than pea size on the sample receipt information. The VOA lab usually also notes this in the logbook. I do not see any notations in the logbook. I have reminded all analysts to do this.

Did you want the narrative reissued stating that the trip blank was analyzed using vials with headspace?

Thank you,
Deb Nadeau

Deborah Nadeau
Laboratory Operations Manager
Katahdin Analytical Services
A Woman-Owned Small Business Enterprise
600 Technology Way
Scarborough, Maine 04074
Direct - 207.874.2400 x19
Fax - 207.775.4029
www.katahdinlab.com

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From: Kelly Perkins [mailto:kperkins@katahdinlab.com]
Sent: Wednesday, October 27, 2010 12:49 PM
To: dnadeau@katahdinlab.com
Subject: FW: Data Validation Inquiry - Vieques CTO-111 - Katahdin Sample Delivery Group SD4693

Kelly Perkins
Project Manager
Katahdin Analytical Services
600 Technology Way
Scarborough, ME 04074
(207) 874-2400 Ext: 17

crowshan

From: crowshan [crowshan@voicenet.com]
Sent: Wednesday, October 27, 2010 12:38 PM
To: 'kperkins@katahdinlab.com'
Cc: Leslie Dimond; 'Shawne M. Rodgers'; 'Juan.Acaron@CH2M.com'; MZamboni@ch2m.com; Rebekha Shaw (Rebekha.Shaw@CH2M.com)
Subject: Data Validation Inquiry - Vieques CTO-111 - Katahdin Sample Delivery Group SD4693

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967 East Swedesford Road, Suite 404
Exton, PA 19341
Phone: (610) 719-1981
Fax: (610) 725-1781
crowshan@voicenet.com

crowshan

From: crowshan [crowshan@voicenet.com]
Sent: Thursday, October 28, 2010 8:46 AM
To: 'Deb Nadeau'
Cc: 'kperkins@katahdinlab.com'; 'Shawne M. Rodgers'; MZamboni@ch2m.com; 'Juan.Acaron@CH2M.com'; Rebekha Shaw (Rebekha.Shaw@CH2M.com)
Subject: RE: Data Validation Inquiry - Vieques CTO-111 - Katahdin Sample Delivery Group SD4693

Hi Deb,
Yes, please revise the narrative to indicate that the TB vial had headspace and that there is a possibility that the vial used for sample VEP04-GW04-0710 also had headspace.
Thanks,
Caroline

Caroline Rowshan
Environmental Data Quality, Inc.
967 East Swedesford Road, Suite 404
Exton, PA 19341
Phone: (610) 719-1981
Fax: (610) 725-1781
crowshan@voicenet.com

From: Deb Nadeau [mailto:dnadeau@katahdinlab.com]
Sent: Wednesday, October 27, 2010 2:58 PM
To: crowshan@voicenet.com
Cc: kperkins@katahdinlab.com
Subject: FW: Data Validation Inquiry - Vieques CTO-111 - Katahdin Sample Delivery Group SD4693

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Fax - 207.775.4029
www.katahdinlab.com

crowshan

From: Deb Nadeau [dnadeau@katahdinlab.com]
Sent: Monday, November 01, 2010 4:03 PM
To: 'crowshan'
Cc: kperkins@katahdinlab.com; jobrin@katahdinlab.com
Subject: RE: Data Validation Inquiry - Vieques CTO-111 - Katahdin Sample Delivery Group SD4693
Attachments: doc06337520101101153010.pdf

Caroline,

Here is the revised narrative for SD4693. Please let us know how you would like us to proceed with hardcopy reissues.

Thanks.
Deb

Deborah Nadeau
Laboratory Operations Manager
Katahdin Analytical Services
A Woman-Owned Small Business Enterprise
600 Technology Way
Scarborough, Maine 04074
Direct - 207.874.2400 x19
Fax - 207.775.4029
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From: crowshan [mailto:crowshan@voicenet.com]
Sent: Thursday, October 28, 2010 8:46 AM
To: 'Deb Nadeau'
Cc: kperkins@katahdinlab.com; 'Shawne M. Rodgers'; MZamboni@ch2m.com; Juan.Acaron@CH2M.com; Rebekha Shaw
Subject: RE: Data Validation Inquiry - Vieques CTO-111 - Katahdin Sample Delivery Group SD4693

Hi Deb,
Yes, please revise the narrative to indicate that the TB vial had headspace and that there is a possibility that the vial used for sample VEP04-GW04-0710 also had headspace.
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To: crowshan@voicenet.com
Cc: kperkins@katahdinlab.com
Subject: FW: Data Validation Inquiry - Vieques CTO-111 - Katahdin Sample Delivery Group SD4693

Hi Caroline,

RESUBMITTAL

SDG NARRATIVE
KATAHDIN ANALYTICAL SERVICES
CH2M HILL
CTO-111 NTR VIEQUES
SD4693

Sample Receipt

The following sample was received on August 03, 2010 and was logged in under Katahdin Analytical Services work order number SD4693 for a hardcopy due date of August 23, 2009.

KATAHDIN Sample No.	CH2M HILL Sample Identification
SD4693-1	VEP04-GW04-0710
SD4693-2	VEP04-TB01-073010

The sample was logged in for the analyses specified on the chain of custody form. All problems encountered and resolved during sample receipt have been documented on the applicable chain of custody forms.

We certify that the test results provided in this report meet all the requirements of the NELAC standards unless otherwise noted in this narrative or in the Report of Analysis.

Sample analyses have been performed by the methods as noted herein.

Should you have any questions or comments concerning this Report of Analysis, please do not hesitate to contact your Katahdin Analytical Services Project Manager, **Ms. Kate Zaleski**. This narrative is an integral part of the Report of Analysis.

Organics Analysis

The samples of Work Order SD4693 were analyzed in accordance with "Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods." SW-846, 2nd edition, 1982 (revised 1984), 3rd edition, 1986, and Updates I, II, IIA, III, IIIA, and IIIB 1996, 1998 & 2004, Office of Solid Waste and Emergency Response, U.S. EPA, and/or for the specific methods listed below or on the Report of Analysis.

8260B SCAN Analysis

The reported percent recovery acceptance limits for the surrogates are based on laboratory established acceptance limits.

The independent check standard (file S1291) associated with the initial calibration analyzed on the S instrument on 08/06/10 had high responses for dichlorodifluoromethane, bromomethane, acetone and 2-butanone, which resulted in %D's that were greater than 20%. Since the check standard is the same source as the LCS, and the LCS (WG80884-1) had acceptable recoveries of these analytes, the associated samples were not reanalyzed. The independent check standard

recovery report consists of the full list of spiked analytes, but only the client's list of target analytes are evaluated.

The calibration verification standard (CV) (file S1422) had a high response for the target compound methylcyclohexane, which resulted in a %D that was greater than the DoD acceptance limit of 20%. Since a high response would indicate a high bias and this analyte was not detected above the PQL in the associated samples, the samples were not reanalyzed.

The reported percent recovery acceptance limits for the Laboratory Control Samples (LCSs) are statistically derived for the full list of spiked compounds. The recoveries of the spiked analytes in the LCS, Matrix Spike (MS) and Matrix Spike Duplicate (MSD) are compared to these acceptance limits. Katahdin standard operating procedure is to take corrective action only if the number of spiked analytes in the LCS that are outside of the QC limits is greater than the DoD QSM allowable number of exceedances. The LCS report consists of the full list of spiked analytes, but only the client's list of target analytes are evaluated. If the associated MS/MSD has greater than the allowable number of exceedances, no corrective action is taken, as long as the LCS is acceptable.

Three of the six vials received for sample SD4693-1, VEP04-GW04-0710, were received with headspace larger than pea-size. Analysis for this sample may have been conducted from a vial with headspace.

All of the vials received for sample SD4693-2, VEP04-TB01-073010, were received with headspace larger than pea-size. Analysis for this sample was conducted from a vial with headspace.

8260B SIM Analysis

The reported percent recovery acceptance limits for the surrogates are based on nominal acceptance limits.

The calibration verification standard (CV) (file D6939) had a high response for the analyte tetrachloroethene and a low % recovery for the surrogate toluene-d8, which resulted in a %D that was greater than the DoD acceptance limit of 20%. Since a high response for tetrachloroethene would indicate a high bias, and this analyte was not detected above the PQL in the associated samples, the samples were not reanalyzed.

Three of the six vials received for sample SD4693-1, VEP04-GW04-0710, were received with headspace larger than pea-size. Analysis for this sample may have been conducted from a vial with headspace.

All of the vials received for sample SD4693-2, VEP04-TB01-073010, were received with headspace larger than pea-size. Analysis for this sample was conducted from a vial with headspace.

There were no other protocol deviations or observations noted by the organics laboratory staff.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Operations Manager or the Quality Assurance Officer as verified by the following signature.

Deborah Hadeau for 11/1/10
Leslie Dimond
Quality Assurance Officer

SOP # HW-24
Revision # 2
August 2008

USEPA
Hazardous Waste Support Branch
Validating Volatile Organic Compounds
By Gas Chromatography/Mass Spectrometry
SW-846 Method 8260B

Prepared by: George Karras Date: 8/22/08
George Karras, Chemist
Hazardous Waste Support Section

Prepared by: Russell Amore Date: 8/25/08
Russell Amore, Chemist
Hazardous Waste Support Section

Concurred by: Linda M. Maupin Date: 8/26/08
Linda Maupin, Chief
Hazardous Waste Support Section

Approved by: Robert M. Runyon Date: 8/26/08
Robert Runyon, Chief
Hazardous Waste Support Branch

Annual Review

Reviewed by: Russell Amore Date: 08/11/09
Name

Reviewed by: _____ Date: _____
Name

Scope and Applicability

This SOP offers detailed guidance in evaluating laboratory data generated according to the USEPA SW-846, Method 8260B December 1996. The validation methods and actions discussed in this document are based on the requirements set forth in USEPA SW-846, Method 8260B and Method 8000C, Rev 3, March 2003; and "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review," January, 2005. This document covers technical as well as method specific problems; however situations may arise where data limitations must be assessed based on the reviewer's own professional judgement.

Summary

To ensure a thorough evaluation of each result in a data case, the reviewer must complete the checklist within this SOP, answering specific questions while performing the prescribed "ACTIONS" in each section. Qualifiers (or flags) are applied to questionable or unusable results as instructed. The data qualifiers discussed in this document are defined on page 4.

The reviewer must prepare a detailed data assessment to be submitted along with the complete SOP checklist. The Data Assessment must list all data qualifications, reasons for qualifications, instances of missing data, and contract non-compliance.

DEFINITIONS

Acronyms

BNA - base neutral acid(another name for Semi Volatiles)
CLP - Contract Laboratory Program
CRQL - Contract Required Quantitation Limit
CF - calibration factor
%D - percent difference
DCB -decachlorobiphenyl
DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenylethane
DDT - dichlorodiphenyltrichloroethane
DoC - Date of Collection
GC - gas chromatography
GC/ECD - gas chromatography/electron capture detector
GC/MS - gas chromatography/mass spectrometer
GPC - gel permeation chromatography
IS - internal standard
kg - kilogram
ug - microgram
MS - matrix spike
MSD - matrix spike duplicate
ℓ - liter
mℓ - milliliter
PCB - Polychlorinated biphenyl
PE - performance evaluation
PEM - Performance Evaluation Mixture
QC - quality control
RAS - Routine Analytical Services
RIC - reconstructed ion chromatogram
RPD - relative percent difference
RRF - relative response factor
RRF - average relative response factor (from initial calibration)
RRT - relative retention time
RSD - relative standard deviation
RT - retention time
RSCC - Regional Sample Control Center
SDG - sample delivery group
SMC - system monitoring compound
SOP - standard operating procedure
SOW - Statement of Work
SVOA - semivolatile organic acid
TCL - Target Compound List
TCLP - Toxicity Characteristics Leachate Procedure
TCX -tetrachloro-m-xylene
TIC - tentatively identified compound

TOPO - Task Order Project Officer
TPO - Technical Project Officer
VOA - Volatile organic
VTSR - Validated Time of Sample Receipt

Data Qualifiers

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

N - The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."

NJ - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

LAB QUALIFIERS:

D - The positive value is the result of an analysis at a secondary dilution factor.

B - The analyte is present in the associated method blank as well as in the sample. This qualifier has a different meaning when validating inorganic data.

E - The concentration of this analyte exceeds the calibration range of the instrument.

A - Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: _____ LAB: Katahdin

SITE NAME: Vieques - CTO-111

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. VOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓ ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓ ___ ___

1.3 Sample Conditions/Problems

Katahdin Analytical Services, Inc. — **Sample Receipt Condition Report**

Client: CH2 M Hill	KAS PM: KEZ	Sampled By: Client	
Project: Camp Garcia	KIMS Entry By: GN	Delivered By: Fed Ex	
KAS Work Order#: SD4693	KIMS Review By:	Received By: DD	
SDG #:	Cooler: 1 of 1	Date/Time Rec.: 8/3/10	

Receipt Criteria	Y	N	EX*	NA	Comments and/or Resolution
1. Custody seals present / intact?	✓				
2. Chain of Custody present in cooler?	✓				
3. Chain of Custody signed by client?	✓				
4. Chain of Custody matches samples?	✓				
5. Temperature Blanks present? If not, take temperature of any sample w/ IR gun.		✓			Temp (°C): 1.0
Samples received at <6 °C w/o freezing?	✓				Note: Not required for metals analysis.
Ice packs or ice present?	✓				The lack of ice or ice packs (i.e. no attempt to begin cooling process) may not meet certain regulatory requirements and may invalidate certain data.
If temp. out, has the cooling process begun (i.e. ice or packs present) and sample collection times <6hrs., but samples are not yet cool?				✓	Note: No cooling process required for metals analysis.
6. Volatiles free of headspace: **Aqueous:** No bubble larger than a pea		✓			
Soil/Sediment: Received in airtight container?	✓				
Received in methanol?				✓	
Methanol covering soil?				✓	
7. Trip Blank present in cooler?	✓				
8. Proper sample containers and volume?	✓				
9. Samples within hold time upon receipt?	✓				
10. Aqueous samples properly preserved? Metals, COD, NH3, TKN, O/G, phenol, TPO4, N+N, TOC, DRO, TPH – pH <2				✓	
Sulfide - >9				✓	
Cyanide – pH >12				✓	

* Log-In Notes to Exceptions: document any problems with samples or discrepancies or pH adjustments

0000005

Katahdin ANALYTICAL SERVICES

Katahdin Analytical Services
Login Chain of Custody Report (lno1)
Aug. 03, 2010
04:18 PM

Page: 1 of 1

Login Number: SD4693
Account: CH2MVA001
CH2MHill
Project: CH2MVACTO111
CTO-111 Vieques

NoWeb

Quote#Incoming: CHCTO111VQ

Primary Report Address:
Juan Acaron
CH2M Hill
3011 S.W. Williston Rd.

Gainesville,FL 32608-3928
juan.acaron@ch2m.com

Primary Invoice Address:
Accounts Payable
CH2M Hill, Inc.
PO Box 241329

Denver,CO 80224

Report CC Addresses:
Invoice CC Addresses:

Login Information

ANALYSIS INSTRUCTIONS	DoD QSM. Note limits are a combination of lab, QSM, and special. Note special QC limits and PQLs. VOA soils are encores. Pres DI and MeOH. SVOA: only AppIX compound is 1,2,4,5-tetrachlorobenzene. Ext for SVOA SIM and scan
CHECK NO.	
CLIENT PO#	939575, N62470-08-D-1000, 404422
COOLER TEMPERATURE	1.0
DELIVERY SERVICES	fedex
EDD FORMAT	KAS106QC-XLS
LOGIN INITIALS	GN
PM	KEZ
PROJECT NAME	CTO-111 NTR Vieques
QC LEVEL	IV
REGULATORY LIST	
REPORT INSTRUCTIONS	ND to LOD. Data summary needs all forms. Send CD.
SDG ID	
SDG STATUS	

Laboratory Sample ID	Client Sample Number	Collect Date/Time	Receive Date	PR	Verbal Date	Due Date	Mailed
SD4693-1	VEP04-GW04-0710	29-JUL-10 15:50	03-AUG-10			23-AUG-10	
Matrix: Aqueous	Product: S SW8260-S	Hold Date (elapsed): 12-AUG-10	Bottle Type: 40mL Vial+HCl		Bottle Count:	Comments: 3 of 4 vials have headspace	
Aqueous	S SW8260SIM-S	12-AUG-10	40mL Vial+HCl				
SD4693-2	VEP04-TB01-073010	30-JUL-10 08:00	03-AUG-10			23-AUG-10	
Matrix: Aqueous	Product: S SW8260-S	Hold Date (elapsed): 13-AUG-10	Bottle Type: 40mL Vial+HCl		Bottle Count:	Comments: vials have headspace	
Aqueous	S SW8260SIM-S	13-AUG-10	40mL Vial+HCl				

Total Samples: 2 *Total Analyses:* 4

0000007

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YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ✓ ___ ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R". all samples

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ ✓ ___

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

Sample_Name	Lab_Sample_ID	DateTime_Extraction	Analysis_DEHT	AHT	Analytical_Method	SDG
VEP04-GW04-0710	SD4693-1	7/29/2010 8/12/2010	8/12/2010		13 8260B	SD4693
VEP04-TB01-073010	SD4693-2	7/30/2010 8/12/2010	8/12/2010		13 8260B	SD4693
LABQC	WG60684-1	8/12/2010 8/12/2010	8/12/2010		0 8260B	SD4693
LABQC	WG60684-2	8/12/2010 8/12/2010	8/12/2010		0 8260B	SD4693
VEP04-GW04-0710	SD4693-1RA	7/29/2010 8/12/2010	8/12/2010		13 8260B_SIM	SD4693
VEP04-TB01-073010	SD4693-2RA	7/30/2010 8/12/2010	8/12/2010		13 8260B_SIM	SD4693

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water [ ] ✓ ___ ___

b. Soil [ ] ___ ✓

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water [ ] ✓ ___ ___

b. Soil [ ] ___ ✓

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. [ ] ✓ ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ ✓

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] ✓ ___

If yes, were samples reanalyzed? [ ] ___ ✓

Were method blanks reanalyzed? [ ] ___ ✓

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] ✓ ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [ ] ___ ___

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YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [✓] ___ ___

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [✓] ___ ___

Katahdin ANALYTICAL SERVICES

nelac Cert No EK004

LCS Recovery Report

Client:
Lab ID: WG80884-1
Client ID: LCS
Project:
SDG: SD4693

Sample Date:
Received Date: 12-AUG-10
Extract Date: 12-AUG-10
Extracted By: TTC
Extraction Method:
Lab Prep Batch: WG80884

Analysis Date: 12-AUG-10
Analyst: TTC
Analysis Method: SW846 8260B
Matrix: AQ
% Solids: NA
Report Date: 21-AUG-10

Compound	Recovery (%)	Conc Added	Conc Recovered	Conc Units	Limits
Dichlorodifluoromethane	148.	50.0	73.9	ug/L	29-164
Chloromethane	113.	50.0	56.4	ug/L	59-123
Bromomethane	117.	50.0	58.4	ug/L	57-135
Chloroethane	115.	50.0	57.5	ug/L	53-157
Trichlorofluoromethane	125.	50.0	62.7	ug/L	70-149
Carbon Disulfide	113.	50.0	56.4	ug/L	71-129
Freon-113	114.	50.0	56.9	ug/L	73-126
Methylene Chloride	110.	50.0	54.8	ug/L	72-129
Acetone	127.	50.0	63.3	ug/L	62-172
trans-1,2-Dichloroethene	107.	50.0	53.6	ug/L	78-125
Methyl tert-butyl Ether	116.	100.	116.	ug/L	81-125
1,1-Dichloroethane	111.	50.0	55.4	ug/L	76-130
cis-1,2-Dichloroethene	116.	50.0	58.0	ug/L	85-123
Bromochloromethane	110.	50.0	55.2	ug/L	85-117
Chloroform	112.	50.0	55.8	ug/L	78-128
1,1,1-Trichloroethane	112.	50.0	55.8	ug/L	77-129
2-Butanone	121.	50.0	60.4	ug/L	71-132
Cyclohexane	122.	50.0	61.2	ug/L	71-133
Trichloroethene	105.	50.0	52.5	ug/L	79-121
1,2-Dichloropropane	102.	50.0	50.9	ug/L	84-118
Bromodichloromethane	104.	50.0	52.0	ug/L	85-122
cis-1,3-Dichloropropene	107.	50.0	53.4	ug/L	83-119
Toluene	104.	50.0	52.2	ug/L	84-118
4-Methyl-2-Pentanone	104.	50.0	52.2	ug/L	83-122
trans-1,3-Dichloropropene	118.	50.0	59.0	ug/L	85-135
1,1,2-Trichloroethane	108.	50.0	54.1	ug/L	84-115
Dibromochloromethane	105.	50.0	52.4	ug/L	85-119
1,2-Dibromoethane	105.	50.0	52.3	ug/L	84-116
2-Hexanone	108.	50.0	54.1	ug/L	80-124
Chlorobenzene	104.	50.0	51.9	ug/L	89-113
Ethylbenzene	107.	50.0	53.5	ug/L	88-113
m+p-Xylenes	109.	100.	109.	ug/L	88-116
o-Xylene	109.	50.0	54.7	ug/L	90-116
Styrene	97.6	50.0	48.8	ug/L	88-117
Bromoform	105.	50.0	52.7	ug/L	86-117

600 Technology Way
P.O. Box 540, Scarborough, ME 04070
Tel:(207) 874-2400 Fax:(207) 775-4029

http://www.katahdinlab.com

CR 10/27/10

Katahdin ANALYTICAL SERVICES

nelac Cert No EK004

LCS Recovery Report

Client:
Lab ID: WG80884-1
Client ID: LCS
Project:
SDG: SD4693

Sample Date:
Received Date: 12-AUG-10
Extract Date: 12-AUG-10
Extracted By: TTC
Extraction Method:
Lab Prep Batch: WG80884

Analysis Date: 12-AUG-10
Analyst: TTC
Analysis Method: SW846 8260B
Matrix: AQ
% Solids: NA
Report Date: 21-AUG-10

Compound	Recovery (%)	Conc Added	Conc Recovered	Conc Units	Limits
Isopropylbenzene	122.	50.0	61.1	ug/L	96-136
1,3-Dichlorobenzene	102.	50.0	51.2	ug/L	86-110
1,2-Dichlorobenzene	102.	50.0	51.0	ug/L	86-113
1,2-Dibromo-3-Chloropropane	96.8	50.0	48.4	ug/L	67-124
1,2,4-Trichlorobenzene	99.8	50.0	49.9	ug/L	76-126
1,2,3-Trichlorobenzene	95.2	50.0	47.6	ug/L	85-119
Methyl Acetate	121.	50.0	60.3	ug/L	70-132
Methylcyclohexane	132.*	50.0	65.8	ug/L	73-125 (1)
1,2-Dichloroethane-d4	94.2				67-135
P-Bromofluorobenzene	96.7				58-133
Toluene-d8	96.9				65-128
Dibromofluoromethane	98.6				68-128

(1) ND in sample; no qual necessary

CR 10/27/10

600 Technology Way
P.O. Box 540, Scarborough, ME 04070
Tel:(207) 874-2400 Fax:(207) 775-4029

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USEPA Region II
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Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent)

not reported

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] ___ ___

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] ___ ___

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month [page 8000C, section 9.5.1])

a. Water [ ] ___ ___

b. Waste [ ] ___ ___

c. Soil/Solid [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7) for each matrix. [ ] ___ ___

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ ___

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? [✓] ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? [ ] ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? [✓] ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? [✓] ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. [✓] ___ ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ [ ] ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

Environmental Data Quality, Inc.

BLANK ANALYSIS RESULTS FOR TARGET ORGANIC COMPOUNDS

VOA SCAN

Date / Time	Fraction V	Fraction SV	Fraction P	MATRIX Aqu.	MATRIX Solid	BLANK TYPE TB	BLANK TYPE MB	BLANK TYPE EB	BLANK TYPE FB	Sample I.D. Number	Assoc. Samples	Contaminant	Conc. µg/L	Conc. µg/Kg	Qualification Limit 5X	Qualification Limit 10X
8/21/10	✓			✓			✓			WBG638	all	N/D				
8/21/10	✓			✓			✓			FB01	all	DCM	1.9			
												acetone	3.0			
8/21/10	✓			✓				✓		EB-MBW		acetone	28			
										for SB						
										SMG22						

Notes: No blank-and reviewed

results previously qualified for MS/MSD

CB 12/3/10

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? [✓] ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. [✓] ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? [✓] ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? [✓] ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) [✓] ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? [✓] ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? [✓] ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ [✓] ___

9.7 Have the appropriate number of significant figures (two) been reported? [✓] ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. [✓] ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates [✗] ___ [✓]

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) [✗] ___ [✓]

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? [✓] ___ ___

YES NO N/A

Resolution? [✓] ___ ___

Peak shape? [✓] ___ ___

Full-scale graph (attenuation)? [✓] ___ ___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

Not Reported

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ [✓]

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ ___

b. Blanks [ ] ___ [✓]

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ [✓]

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ ___

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ___

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] [✓] [✗]

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [✓] ___ ___

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 30%, (8000C-39)qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? [✓] ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. [✓] ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above. qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) [ ] [✓] ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? [✓] ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? [✓] ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). [✓] ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

Previously qualified for headspace

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? [ ] ✓ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? [✓] ___ ___

FORM 7B
VOLATILE CALIBRATION VERIFICATION SUMMARY

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: CTO-111 NTR VIEQUES SDG No.: SD4693

Instrument ID: GCMS-S Calibration Date: 08/12/10 Time: 0818

Lab File ID: S1422 Init. Calib. Date(s): 08/06/10 08/06/10

Init. Calib. Times: 1535 1813

GC Column: RTX-VMS ID: 0.18 (mm)

COMPOUND	RRF or AMOUNT	RRF50.000 or AMOUNT	CCAL RRF50.000	MIN RRF	%D or %DRIFT	MAX %D or %DRIFT	CURV TYPE
Dichlorodifluoromethane	0.5030000	0.5568400	0.5568400	0.01	10.70	20.00	AVRG
Chloromethane	0.9470000	0.9753000	0.9753000	0.1	2.99	20.00	AVRG
Bromomethane	47.634000	50.000000	0.3627800	0.01	-4.73	20.00	LINR
Chloroethane	0.3860000	0.4512000	0.4512000	0.01	16.89	20.00	AVRG
Trichlorofluoromethane	0.6810000	0.7820800	0.7820800	0.01	14.84	20.00	AVRG
Carbon Disulfide	1.7820000	2.0106000	2.0106000	0.01	12.83	20.00	AVRG
Freon-113	0.3160000	0.3709300	0.3709300	0.01	17.38	20.00	AVRG
Methylene Chloride	53.210000	50.000000	0.6596600	0.01	6.42	20.00	LINR
Acetone	0.1850000	0.1501600	0.1501600	0.01	-18.83	20.00	AVRG
trans-1,2-Dichloroethene	0.5420000	0.5585200	0.5585200	0.01	3.05	20.00	AVRG
Methyl tert-butyl ether	1.2490000	1.2937000	1.2937000	0.01	3.58	20.00	AVRG
1,1-Dichloroethane	1.0950000	1.1778000	1.1778000	0.1	7.56	20.00	AVRG
cis-1,2-Dichloroethene	0.5330000	0.5545500	0.5545500	0.01	4.04	20.00	AVRG
Bromochloromethane	0.2870000	0.2965500	0.2965500	0.01	3.33	20.00	AVRG
Chloroform	0.9600000	1.0134000	1.0134000	0.01	5.56	20.00	AVRG
1,1,1-Trichloroethane	0.7020000	0.7691100	0.7691100	0.01	9.56	20.00	AVRG
2-Butanone	0.2730000	0.2417400	0.2417400	0.01	-11.45	20.00	AVRG
Cyclohexane	0.8910000	1.0077000	1.0077000	0.01	13.10	20.00	AVRG
Trichloroethene	0.3390000	0.3636600	0.3636600	0.01	7.27	20.00	AVRG
1,2-Dichloropropane	0.3970000	0.4221000	0.4221000	0.01	6.32	20.00	AVRG
Bromodichloromethane	0.4710000	0.4794700	0.4794700	0.01	1.80	20.00	AVRG
cis-1,3-Dichloropropene	0.5270000	0.5224000	0.5224000	0.01	-0.87	20.00	AVRG
Toluene	0.7320000	0.7616400	0.7616400	0.01	4.05	20.00	AVRG
4-methyl-2-pentanone	0.3750000	0.3351300	0.3351300	0.01	-10.63	20.00	AVRG
trans-1,3-Dichloropropene	0.4260000	0.4209500	0.4209500	0.01	-1.18	20.00	AVRG
1,1,2-Trichloroethane	0.2570000	0.2583500	0.2583500	0.01	0.52	20.00	AVRG
Dibromochloromethane	0.4490000	0.4340200	0.4340200	0.01	-3.34	20.00	AVRG
1,2-Dibromoethane	0.3240000	0.3069600	0.3069600	0.01	-5.26	20.00	AVRG
2-Hexanone	0.3220000	0.2629900	0.2629900	0.01	-18.33	20.00	AVRG

✓ ✓

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FORM VII PEST

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FORM 7B
VOLATILE CALIBRATION VERIFICATION SUMMARY

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: CTO-111 NTR VIEQUES SDG No.: SD4693

Instrument ID: GCMS-S Calibration Date: 08/12/10 Time: 0819

Lab File ID: S1422 Init. Calib. Date(s): 08/06/10 08/06/10

Init. Calib. Times: 1535 1813

GC Column: RTX-VMS ID: 0.18 (mm)

COMPOUND	RRF or AMOUNT	RRF50.000 or AMOUNT	CCAL RRF50.000	MIN RRF	%D or %DRIFT	MAX %D or %DRIFT	CURV TYPE
Chlorobenzene	0.9820000	0.9442000	0.9442000	0.3	-3.85	20.00	AVRG
Ethylbenzene	0.4560000	0.4750600	0.4750600	0.01	3.72	20.00	AVRG
m+p-Xylenes	0.5460000	0.5669300	0.5669300	0.01	3.83	20.00	AVRG
o-Xylene	0.5380000	0.5510300	0.5510300	0.01	2.42	20.00	AVRG
Styrene	44.955000	50.000000	0.8817200	0.01	-10.09	20.00	LINR
Bromoform	0.3040000	0.2777300	0.2777300	0.1	-8.64	20.00	AVRG
Isopropylbenzene	2.6770000	2.7490000	2.7490000	0.01	2.69	20.00	AVRG
1,3-Dichlorobenzene	1.4830000	1.4476000	1.4476000	0.01	-2.39	20.00	AVRG
1,2-Dichlorobenzene	1.4650000	1.3821000	1.3821000	0.01	-5.66	20.00	AVRG
1,2-Dibromo-3-Chloropropane	0.1530000	0.1228700	0.1228700	0.01	-19.69	20.00	AVRG
1,2,4-Trichlorobenzene	41.303000	50.000000	0.6505400	0.01	-17.39	20.00	LINR
1,2,3-Trichlorobenzene	40.581000	50.000000	0.6194700	0.01	-18.84	20.00	LINR
Methyl Acetate	0.5070000	0.5001000	0.5001000	0.01	-1.36	20.00	AVRG
Methylcyclohexane	0.6110000	0.8073700	0.8073700	0.01	32.14	20.00	AVRG <- (1)
Dibromofluoromethane	0.5770000	0.5983800	0.5983800	0.01	3.70	20.00	AVRG
1,2-Dichloroethane-D4	0.6140000	0.6044700	0.6044700	0.01	-1.55	20.00	AVRG
Toluene-D8	0.9850000	1.0165000	1.0165000	0.01	3.20	20.00	AVRG
P-Bromofluorobenzene	0.3690000	0.3634000	0.3634000	0.01	-1.52	20.00	AVRG

(1) previously qualified for headspace

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FORM VII PEST

FORM 7B
VOLATILE CALIBRATION VERIFICATION SUMMARY

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: CTO-111 NTR VIEQUES SDG No.: SD4693

Instrument ID: GCMS-D Calibration Date: 08/12/10 Time: 1024

Lab File ID: D6938 Init. Calib. Date(s): 08/11/10 08/11/10

Init. Calib. Times: 1533 1835

GC Column: RTX-VMS ID: 0.18 (mm)

COMPOUND	RRF or AMOUNT	RRF0.5000 or AMOUNT	CCAL RRF0.5000	MIN RRF	%D or %DRIFT	MAX %D or %DRIFT	CURV TYPE
Vinyl chloride	0.4600800	0.5000000	0.6485500	0.01	-7.98	20.00	2RDR
1,1-Dichloroethene	0.5028000	0.5000000	0.5571400	0.1	0.56	20.00	LINR
Carbon Tetrachloride	0.5322400	0.5000000	0.3315000	0.01	6.45	20.00	2RDR
Benzene	0.5379600	0.5000000	1.3392000	0.01	7.59	20.00	LINR
1,2-Dichloroethane ✓	0.2390000	0.2650600	0.2650600	0.01	10.90	20.00	AVRG
Tetrachloroethene	0.6496800	0.5000000	0.6398900	0.01	27.94	20.00	2RDR <- (1)
1,1,2,2-Tetrachloroethane	0.5300000	0.5014900	0.5014900	0.3	-5.38	20.00	AVRG
1,4-Dichlorobenzene	3.1530000	3.0418000	3.0418000	0.01	-3.53	20.00	AVRG
Dibromofluoromethane	0.4950000	0.4355100	0.4355100	0.01	-12.02	20.00	AVRG
P-Bromofluorobenzene	0.3970000	0.3637000	0.3637000	0.01	-8.39	20.00	AVRG
Toluene-D8	0.9720000	0.7592200	0.7592200	0.01	-21.89	20.00	AVRG <-
1,2-Dichloroethane-D4	0.4200000	0.3583800	0.3583800	0.01	-14.67	20.00	AVRG

(1) previously qualified for headspace

FORM VII PEST

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YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:
1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.
2. Do not qualify non-detects when the associated IS are counts area > + 100%.
3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".
4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? [✓] ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? [ ] [✓] ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

DataQual
Environmental Services, LLC

CH2M HILL-VBO
15010 Conference Center Drive
Suite 200
Chantilly, VA 20151

February 28, 2012
SDG#s 1111075 and 1111194, Empirical Laboratories
Vieques Island, Puerto Rico

Dear Ms. Ou,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG #s 1111075 and 1111194. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Method 8260B for volatiles (8260B-Rev 2, January 2006- SOP #HW-24) and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA
SDG# 1111075			
VEP4-SB16-1617-1111	1111075-01	soil	X
VEP4-EB01-110311	1111075-02	water	X
VEP4-TB01-110311	1111075-03	water	X
SDG# 1111194			
VEP4-GW10-1111	11111194-01	water	X
VEP4-EB01-112011	11111194-02	water	X
VEP4-GW11-1111	11111194-03	water	X
VEP4-GW12-1111	11111194-04	water	X
VEP4-EB01-112711	11111194-05	water	X
VEP4-TB01-112111	11111194-06	water	X

The following quality control samples were provided with this SDG: samples VEP4-EB01-110311, VEP4-EB01-112011 and VEP4-EB01-112111- equipment blanks; samples VEP4-TB01-110311 and VEP4-TB01-112111- trip blanks.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations
- Blanks *
- Internal Standards *

5830 Amberway Drive • St. Louis, MO 63128 • 314-330-1327 • Fax 314-849-6264

- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Serial Dilutions *
- Field Duplicates NA
- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria.

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

Some sample compounds were qualified as estimated based on high %RSDs and %Ds which were exhibited in the initial and continuing calibrations.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to chain of custody records, sampling was performed on 11/03-21/11 and samples were received on 11/04-22/11. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

Initial/Continuing Calibration

VOA

Calibration standards exhibited %RSDs and %D that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results were qualified as indicated.

SDG# 1111075

Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag	Q Code
IC 10/19/11	methylene chloride	31.14	VEP4-SB16-1617-1111	J/UJ	ICH
CC 11/09/11	carbon tetrachloride chloroethane tetrachloroethene 1,1,1-trichloroethane	26.9 20.5 22.9 22.0	VEP4-EB01-110311, VEP4-TB01-110311	J/UJ	CCH

SDG# 1111094

Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag	Q Code
CC 11/22/11	1,2-dichloroethane	20.8	all samples	J/UJ	CCH

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
VEP4-SB16-1617-1111	methylene chloride	+/-	J/UJ	ICH
VEP4-EB01-110311, VEP4-TB01-110311	carbon tetrachloride chloroethane tetrachloroethene 1,1,1-trichloroethane	-/-	J/UJ	CCH
all samples in SDG# 1111094	1,2-dichloroethane	-/-	J/UJ	CCH

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U not detected above the reported sample quantitation limit
J estimated value
UJ reported quantitation limit is qualified as estimated
N analyte has been tentatively identified
JN analyte has been tentatively identified, estimated value
R result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA The sample result for the blank contaminant is greater than the LOD (2X sample LOD for common laboratory contaminants) when the blank value is less than the LOD. The sample result for the blank contaminant is not qualified with any blank qualifiers.

U* The sample result for the blank contaminant is less than the LOD (2X sample LOD for common laboratory contaminants) but greater than the MDL when the blank value is less than the LOD. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.

LOD** The sample result for the blank contaminant is less than the LOD (2X sample LOD for common laboratory contaminants) but greater than the MDL when the blank value is less than the LOD. The sample result for the blank contaminant is changed to the LOD and qualified as non-detect U.

* This qualifiers is used when the laboratory is reporting non-detects to the MDL. ** This qualifier is used when the laboratory is reporting non-detects to the LOD.

Inorganic Methods

ICB/CCB/PB Action:

No Action - The sample result is greater than the LOD and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the LOD, result is reported as non-detect at the LOD* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the LOD.

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the LOD and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the LOD.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the LOD.

J/UJ - Sample result is less than 10X LOD when blank result is below the negative LOD.

* This qualifier is used when the laboratory is reporting non-detects to the MDL. ** This qualifier is used when the laboratory is reporting non-detects to the LOD.

Field QC Blank action:

Note— Use field blanks to qualify data only if field blank results are greater than prep blank results.
Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the LOD and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the LOD, result is reported as non-detect at the LOD* or at the reported concentration**, when the FB result is less or greater than the LOD.

R - Sample result is greater than the LOD and less than the FB value when the FB value is greater than the LOD.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the LOD.

* This qualifier is used when the laboratory is reporting non-detects to the MDL. ** This qualifier is used when the laboratory is reporting non-detects to the LOD.

General Abbreviations

RL reporting limit
PQL practical quantitation limit
IDL instrument detection limit
MDL method detection limit
CRQL/LOQ contract required quantitation limit
+ positive result
- non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Fit/Fit
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

CH2M HILL
Vieques, Puerto Rico -- CTO-113
SDG#s 1111075 and 1111194

007

SDG# 1111075

008

ANALYSIS DATA SHEET

VEP4-SB16-1617-1111

Laboratory: Empirical Laboratories, LLC SDG: 1111075
Client: CH2M Hill, Inc. Project: Vieques CTO-113
Matrix: Solid Laboratory ID: 1111075-01 File ID: 1107301.D
Sampled: 11/03/11 10:30 Prepared: 11/11/11 00:00 Analyzed: 11/11/11 16:44
Solids: 91.42 Preparation: 5035 Dilution: 1
Batch: IK10021 Sequence: IK31407 Calibration: 1293003 Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC (ug/Kg dry)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		1.11	2.22	4.43	U
75-00-3	Chloroethane		1.11	2.22	4.43	U
67-66-3	Chloroform		1.11	2.22	4.43	U
75-34-3	1,1-Dichloroethane		1.11	2.22	4.43	U
107-06-2	1,2-Dichloroethane		1.11	2.22	4.43	U
75-35-4	1,1-Dichloroethene		1.11	2.22	4.43	U
156-59-2	cis-1,2-Dichloroethene		1.11	2.22	4.43	U
156-60-5	trans-1,2-Dichloroethene		1.11	2.22	4.43	U
75-09-2	Methylene chloride		2.22	4.43	8.86	~~U~~ B ECH
127-18-4	Tetrachloroethene		1.11	2.22	4.43	U
71-55-6	1,1,1-Trichloroethane		1.11	2.22	4.43	U
79-01-6	Trichloroethene		1.11	2.22	4.43	U
75-01-4	Vinyl chloride		1.11	2.22	4.43	U

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
Bromofluorobenzene	26.59	23.74	89.3	85 - 120	
Dibromofluoromethane	26.59	24.06	90.5	80 - 125	
1,2-Dichloroethane-d4	26.59	25.82	97.1	75 - 140	
Toluene-d8	26.59	26.53	99.7	85 - 115	

MM 022112

009

ANALYSIS DATA SHEET

VEP4-EB01-110311

Laboratory: Empirical Laboratories, LLC SDG: 1111075
Client: CH2M Hill, Inc. Project: Vieques CTO-113
Matrix: Water Laboratory ID: 1111075-02 File ID: 1107502.D
Sampled: 11/03/11 10:50 Prepared: 11/09/11 00:00 Analyzed: 11/09/11 21:07
Solids: Preparation: 5030B Dilution: 1
Batch: IK09020 Sequence: IK31401 Calibration: 1258002 Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	~~U~~ ECH
75-00-3	Chloroethane		0.250	0.500	1.00	~~U~~ ECH
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	U
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride	1.36	0.500	1.00	2.00	J
127-18-4	Tetrachloroethene		0.250	0.500	1.00	~~U~~ J ECH
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	~~U~~ J ECH
79-01-6	Trichloroethene		0.250	0.500	1.00	U
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.75	92.5	75 - 120	
Dibromofluoromethane	30.00	26.39	88.0	85 - 115	
1,2-Dichloroethane-d4	30.00	28.12	93.7	70 - 120	
Toluene-d8	30.00	32.33	108	85 - 120	

MM 022112

010

ANALYSIS DATA SHEET

VEP4-TB01-110311

Laboratory: Empirical Laboratories, LLC | SDG: 1111075
Client: CH2M Hill, Inc. | Project: Vieques CTO-113
Matrix: Water | Laboratory ID: 1111075-02 | File ID: 1107503.D
Sampled: 11/03/11 00:00 | Prepared: 11/09/11 00:00 | Analyzed: 11/09/11 23:34
Solids: | Preparation: 5030B | Dilution: 1
Batch: 1K09020 | Sequence: 1K31401 | Calibration: 1258002 | Instrument: MS-VOA8

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	~~V, D, U~~
75-00-3	Chloroethane		0.250	0.500	1.00	~~V, U~~
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	U
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	~~V, U~~
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	~~V, U~~
79-01-6	Trichloroethene		0.250	0.500	1.00	U
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.62	92.0	75 - 120	
Dibromofluoromethane	30.00	25.97	86.6	85 - 115	
1,2-Dichloroethane-d4	30.00	28.48	94.9	70 - 120	
Toluene-d8	30.00	32.37	108	85 - 120	

011

SDG# 1111194

ANALYSIS DATA SHEET

VEP4-GW10-1111

Laboratory: Empirical Laboratories, LLC | SDG: 1111194
Client: CH2M Hill, Inc. | Project: Vieques CTO-113 (24hr rush)
Matrix: Water | Laboratory ID: 1111194-01 | File ID: 1119401.D
Sampled: 11/20/11 17:02 | Prepared: 11/22/11 00:00 | Analyzed: 11/22/11 22:32
Solids: | Preparation: 5030B | Dilution: 1
Batch: 1K22018 | Sequence: 1K32701 | Calibration: 1258002 | Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	~~V, U~~
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene	0.430	0.250	0.500	1.00	J
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene	0.510	0.250	0.500	1.00	J
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene	2.1	0.250	0.500	1.00	
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.65	98.8	75 - 120	
Dibromofluoromethane	30.00	27.16	90.5	85 - 115	
1,2-Dichloroethane-d4	30.00	29.78	99.3	70 - 120	
Toluene-d8	30.00	33.12	110	85 - 120	

013

ANALYSIS DATA SHEET

VEP4-E001-112011

Laboratory: Empirical Laboratories, LLC | SDG: 1111194
Client: CH2M Hill, Inc. | Project: Vieques CTO-113 (24hr rush)
Matrix: Water | Laboratory ID: 1111194-02 | File ID: 1119402.D
Sampled: 11/20/11 18:10 | Prepared: 11/22/11 00:00 | Analyzed: 11/22/11 21:11
Solids: | Preparation: 5030B | Dilution: 1
Batch: 1K22018 | Sequence: 1K32701 | Calibration: 1258002 | Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	~~V, U~~
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.250	0.500	1.00	U
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.79	99.3	75 - 120	
Dibromofluoromethane	30.00	26.70	89.2	85 - 115	
1,2-Dichloroethane-d4	30.00	29.34	97.8	70 - 120	
Toluene-d8	30.00	33.52	112	85 - 120	

014

ANALYSIS DATA SHEET

VEP4-GW11-1111

Laboratory: Empirical Laboratories, LLC | SDG: 1111194
Client: CH2M Hill, Inc. | Project: Vieques CTO-113 (24hr rush)
Matrix: Water | Laboratory ID: 1111194-03 | File ID: 1119403.D
Sampled: 11/21/11 09:30 | Prepared: 11/22/11 00:00 | Analyzed: 11/22/11 22:58
Solids: | Preparation: 5030B | Dilution: 1
Batch: 1K22018 | Sequence: 1K32701 | Calibration: 1258002 | Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	~~Y, U~~ U ZLH
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene	0.265	0.250	0.500	1.00	J
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.32	97.7	75 - 120	
Dibromofluoromethane	30.00	27.21	90.7	85 - 115	
1,2-Dichloroethane-d4	30.00	29.64	98.8	70 - 120	
Toluene-d8	30.00	33.14	110	85 - 120	

015

ANALYSIS DATA SHEET

VEP4-GW12-1111

Laboratory: Empirical Laboratories, LLC | SDG: 1111194
Client: CH2M Hill, Inc. | Project: Vieques CTO-113 (24hr rush)
Matrix: Water | Laboratory ID: 1111194-04 | File ID: 1119404.D
Sampled: 11/21/11 11:55 | Prepared: 11/22/11 00:00 | Analyzed: 11/22/11 23:25
Solids: | Preparation: 5030B | Dilution: 1
Batch: 1K22018 | Sequence: 1K32701 | Calibration: 1258002 | Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	~~Y, U~~ U ZLH
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene	0.610	0.250	0.500	1.00	J
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene	16.6	0.250	0.500	1.00	
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.57	98.6	75 - 120	
Dibromofluoromethane	30.00	26.80	89.3	85 - 115	
1,2-Dichloroethane-d4	30.00	29.28	97.6	70 - 120	
Toluene-d8	30.00	33.73	112	85 - 120	

016

ANALYSIS DATA SHEET

VEP4-EB01-112111

Laboratory: Empirical Laboratories, LLC | SDG: 1111194
Client: CH2M Hill, Inc. | Project: Vieques CTO-113 (24hr rush)
Matrix: Water | Laboratory ID: 1111194-05 | File ID: 1119405.D
Sampled: 11/21/11 12:10 | Prepared: 11/22/11 00:00 | Analyzed: 11/22/11 23:58
Solids: | Preparation: 5030B | Dilution: 1
Batch: 1K22018 | Sequence: 1K32701 | Calibration: 1258002 | Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	~~Y, U~~ U ZLH
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.250	0.500	1.00	U
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.10	100	75 - 120	
Dibromofluoromethane	30.00	26.96	89.9	85 - 115	
1,2-Dichloroethane-d4	30.00	28.21	94.4	70 - 120	
Toluene-d8	30.00	33.74	112	85 - 120	

017

ANALYSIS DATA SHEET

VEP4-TB01-112111

Laboratory: Empirical Laboratories, LLC | SDG: 1111194
Client: CH2M Hill, Inc. | Project: Vieques CTO-113 (24hr rush)
Matrix: Water | Laboratory ID: 1111194-06 | File ID: 1119406.D
Sampled: 11/21/11 00:00 | Prepared: 11/22/11 00:00 | Analyzed: 11/22/11 22:05
Solids: | Preparation: 5030B | Dilution: 1
Batch: 1K22018 | Sequence: 1K32701 | Calibration: 1258002 | Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	~~Y, U~~ U ZLH
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.250	0.500	1.00	U
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.12	100	75 - 120	
Dibromofluoromethane	30.00	26.80	89.3	85 - 115	
1,2-Dichloroethane-d4	30.00	28.94	96.5	70 - 120	
Toluene-d8	30.00	33.98	113	85 - 120	

018

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 1111194 and 1111075 LAB: Empirical

SITE NAME: CTO-113 Vieques

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓ __ __

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓ __ __

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ __ __

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. VOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓ __ __

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓ __ __

1.3 Sample Conditions/Problems

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YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? __ ✓ __

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? __ ✓ __

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

HOLDING TIME SUMMARY
SW8260B

Laboratory: Empirical Laboratories, LLC SDG: 1111075
Client: CH2M Hill, Inc. Project: Vieques CTO-113

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
VEP4-SB16-1617-1111	11/03/11 10:30	11/04/11 08:10	11/11/11 00:00	N/A	14.00	11/11/11 16:44	8.30	14.00	
VEP4-EB01-110111	11/02/11 10:50	11/04/11 09:10	11/09/11 00:00	N/A	14.00	11/09/11 23:07	5.55	14.00	
VEP4-TB01-110111	11/02/11 00:00	11/04/11 08:30	11/09/11 00:00	N/A	14.00	11/09/11 23:34	7.02	14.00	

temp 7.9°C

021

HOLDING TIME SUMMARY
SW8260B

Laboratory: Empirical Laboratories, LLC SDG: 1111194
Client: CH2M Hill, Inc. Project: Vieques CTO-113 [24hr rush]

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
VEP4-GW10-1111	11/20/11 17:07	11/22/11 08:10	11/22/11 00:00	N/A	14.00	11/22/11 22:32	2.27	14.00	
VEP4-EB01-112011	11/20/11 18:10	11/22/11 08:10	11/22/11 00:00	N/A	14.00	11/22/11 21:11	2.17	14.00	
VEP4-GW11-1111	11/21/11 09:30	11/22/11 08:10	11/22/11 00:00	N/A	14.00	11/22/11 22:58	1.60	14.00	
VEP4-GW12-1111	11/21/11 11:55	11/22/11 08:10	11/22/11 00:00	N/A	14.00	11/22/11 23:25	1.52	14.00	
VEP4-EB01-112111	11/21/11 13:10	11/22/11 08:10	11/22/11 00:00	N/A	14.00	11/22/11 21:38	1.44	14.00	
VEP4-TB01-112111	11/21/11 00:00	11/22/11 08:10	11/22/11 00:00	N/A	14.00	11/22/11 22:05	1.98	14.00	

temp 1.4°C

022

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water [✓] ___ ___

b. Soil [✓] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water [✓] ___ ___

b. Soil [✓] ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. [✓] ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ [✓]

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] [✓] ___

If yes, were samples reanalyzed? [ ] ___ [✓]

Were method blanks reanalyzed? [ ] ___ [✓]

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] [✓] ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ [✓]

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [✓] ___ ___

1 LCS rec. low but in for LCSD — no qual required

LCS / LCS DUPLICATE RECOVERY

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	1111075
Client:	CH2M Hill Inc	Project:	Vinyner CTO-113
Matrix:	Water		
Batch:	1K09020	Laboratory ID:	1K09020-BS1
Preparation:	5030B	Initial/Final:	5 mL / 5 mL

ANALYTE	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	LCS % REC	QC LIMITS REC
Carbon tetrachloride	**50.00**	**31.9**	**63.8**	**65 - 140**
Chloroethane	50.00	60.0	120	60 - 135
Chloroform	50.00	41.0	82.0	65 - 135
1,1-Dichloroethane	50.00	46.3	92.5	70 - 135
1,2-Dichloroethane	50.00	40.6	81.1	70 - 130
1,1-Dichloroethene	50.00	48.9	97.8	70 - 130
cis-1,2-Dichloroethene	50.00	43.4	86.9	70 - 125
trans-1,2-Dichloroethene	50.00	41.6	83.3	60 - 140
Methylene chloride	50.00	55.2	110	55 - 140
Tetrachloroethene	50.00	36.4	72.8	45 - 150
1,1,1-Trichloroethane	50.00	36.5	73.1	65 - 130
Trichloroethene	50.00	42.3	85.0	70 - 125
Vinyl chloride	50.00	55.7	111	50 - 145

ANALYTE	SPIKE ADDED (ug/L)	LCSD CONCENTRATION (ug/L)	LCSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC
Carbon tetrachloride	50.00	35.2	70.5	10.0	30	65 - 140
Chloroethane	50.00	64.9	130	7.81	30	60 - 135
Chloroform	50.00	42.1	84.1	2.56	30	65 - 135
1,1-Dichloroethane	50.00	46.8	93.6	1.18	30	70 - 135
1,2-Dichloroethane	50.00	42.8	85.7	5.44	30	70 - 130
1,1-Dichloroethene	50.00	53.4	107	8.74	30	70 - 130
cis-1,2-Dichloroethene	50.00	44.0	88.1	1.39	30	70 - 125
trans-1,2-Dichloroethene	50.00	43.0	86.1	3.32	30	60 - 140
Methylene chloride	50.00	49.2	98.3	11.6	30	55 - 140
Tetrachloroethene	50.00	36.4	72.8	0.00303	30	45 - 150
1,1,1-Trichloroethane	50.00	39.5	79.1	7.92	30	65 - 130
Trichloroethene	50.00	43.7	87.4	2.80	30	70 - 125
Vinyl chloride	50.00	64.6	129	14.7	30	50 - 145

027

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent)

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? ☐ ___ ___

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? ☐ ___ ___

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month (page 8000C, section 9.5.1)

a. Water ☐ ___ ___

b. Waste ☐ ___ ___

c. Soil/Solid ☐ ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7) for each matrix. ☐ ___ ___

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. ☐ ___ ___

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

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YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? ✓ ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? ✓ ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? ✓ ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? ✓ ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ✓ ___ ___

no qual

- 15 VOA - C31

PREPARATION BATCH SUMMARY

SW8260B

Laboratory: Empirical Laboratories, LLC SDG: 1111075
Client: CH2M Hill, Inc. Project: Vieques CTO-113
Batch: 1K10021 Batch Matrix: Solid Preparation: 5035

SAMPLE NAME	LAB SAMPLE ID	DATE PREPARED	INITIAL VOL./WEIGHT	FINAL VOL.
VEP4-SB15-1407-1111	1111075-01	11/11/11 00:00	6.17	5.00
Blank	1K10021-BLK1	11/11/11 00:00	5.00	5.00
LCS	1K10021-BS1	11/11/11 00:00	5.00	5.00
LCS Dup	1K10021-BSD1	11/11/11 00:00	5.00	5.00

no qual

C32

ANALYSIS DATA SHEET

Blank

Laboratory: Empirical Laboratories, LLC SDG: 1111075
Client: CH2M Hill, Inc. Project: Vieques CTO-113
Matrix: Laboratory ID: 1K10021-BLK1 File ID: 1111BLK1.D
Sampled: Prepared: Analyzed: 11/11/11 09:43
Solids: Preparation: 5035 Dilution:
Batch: 1K10021 Sequence: 1K31807 Calibration: 1295001 Instrument: MS-VOA5

CAS NO.	COMPOUND	DNC (ug/Kg wet)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		1.25	2.50	5.00	U
75-00-3	Chloroethane		1.25	2.50	5.00	U
67-66-3	Chloroform		1.25	2.50	5.00	U
75-34-3	1,1-Dichloroethane		1.25	2.50	5.00	U
107-06-2	1,2-Dichloroethane		1.25	2.50	5.00	U
75-35-4	1,1-Dichloroethene		1.25	2.50	5.00	U
156-59-2	cis-1,2-Dichloroethene		1.25	2.50	5.00	U
156-60-5	trans-1,2-Dichloroethene		1.25	2.50	5.00	U
75-09-2	Methylene chloride	1.20	2.50	5.00	10.0	J
127-18-4	Tetrachloroethene		1.25	2.50	5.00	U
71-55-6	1,1,1-Trichloroethane		1.25	2.50	5.00	U
79-01-6	Trichloroethene		1.25	2.50	5.00	U
75-01-4	Vinyl chloride		1.25	2.50	5.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg wet)	CONC (ug/Kg wet)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.28	90.9	85 - 120	
Dibromofluoromethane	30.00	27.20	90.7	80 - 125	
1,2-Dichloroethane-d4	30.00	24.16	80.5	75 - 140	
Toluene-d8	30.00	30.92	103	85 - 115	

C33

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YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

no qual

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

VEP4-EB01-110311
methylene chloride 1.36J
trip blanks not

- 16 VOA - C34

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	≥ CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone
** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ☑ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ☑ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ☑ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ☑ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ☑ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ☑ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ☑ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ☑ ___

9.7 Have the appropriate number of significant figures (two) been reported? ☑ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ☑ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ☑ ___ ___

b. Matrix spikes and matrix spike duplicates ☐ ___ ☑

c. Blanks ☑ ___ ___

d. Laboratory Control Samples ☑ ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ☑ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ☐ ___ ☑

c. Blanks ☑ ___ ___

d. Laboratory Control Samples ☑ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? ☑ ___ ___

YES NO N/A

Resolution? [✓] __ __

Peak shape? [✓] __ __

Full-scale graph (attenuation)? [✓] __ __

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? [✓] __ __

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] __ __

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] __ __

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] __ __

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

No TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] __ [✓]

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] __ [✓]

b. Blanks [ ] __ [✓]

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] __ [✓]

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] __ [✓]

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] __ [✓]

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2 (M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] [✓] __

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] __ [✓]

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] __ __

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? Y ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39)qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? Y ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. Y ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? Y ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) ___ Y ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? Y ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? Y ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? Y ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). Y ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ANALYSIS SEQUENCE SUMMARY
SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	1111075
Client:	CH2M Hill, Inc.	Project:	Vieques CTO-113
Sequence:	1129112	Instrument:	MS-VOA5
Calibration:	1293003		

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
MS Tune	1129112-TUN1	1019TU1.D	10/19/11 06:33
Cal Standard	1129112-CAL1	SEQCAL1.D	10/19/11 07:28
Cal Standard	1129112-CAL2	SEQCAL2.D	10/19/11 07:55
Cal Standard	1129112-CAL4	SEQCAL4.D	10/19/11 08:49
Cal Standard	1129112-CAL5	SEQCAL5.D	10/19/11 09:16
Cal Standard	1129112-CAL6	SEQCAL6.D	10/19/11 09:43
Cal Standard	1129112-CAL7	SEQCAL7.D	10/19/11 10:11
Cal Standard	1129112-CAL8	SEQCAL8.D	10/19/11 10:38
Initial Cal Check	1129112-ICV1	SEQICV1.D	10/19/11 11:32

ANALYSIS SEQUENCE SUMMARY
SW8260B

Laboratory: Empirical Laboratories, LLC
SDG: 1111075
Client: CH2M Hill, Inc.
Project: Vinyard CTO-113
Sequence: 1K31807
Instrument: MS-VOA5
Calibration: 1293003

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
MS Tune	1K31807-TUN1	1111TU1.D	11/11/11 06:25
Calibration Check	1K31807-CCV1	1111CCV1.D	11/11/11 06:52
LCS	1K10021-BS1	1111LCS1.D	11/11/11 07:29
Blank	1K10021-BLK1	1111BLK1.D	11/11/11 09:43
VEP4-SB16-1617-1111	1111075-01	1107501.D	11/11/11 16:44
LCS Dup	1K10021-BSD1	1110LCDE.D	11/11/11 18:09

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INITIAL CALIBRATION DATA (Continued)
SW8260B

Laboratory: Empirical Laboratories, LLC
SDG: 1111075
Client: CH2M Hill, Inc.
Project: Vinyard CTO-113
Calibration: 1293003
Instrument: MS-VOA5
Matrix: Water
Calibration Dates: 10/19/11 7:28 10/19/11 10:38

Compound	Mean RF	RF RSD	Mean RT	RT RSD	Linear r	Quad COD	LIMIT	Q
1,4-Dichlorobenzene	1.418774	6.492571	13.64128	2.930522E-02			15	
Dichlorodifluoromethane	0.4324063	12.89562	3.998286	0.1152172			15	
1,1-Dichloroethane	0.8461116	6.848483	3.714714	6.604556E-02			SPCC (0.1)	
1,2-Dichloroethane	0.5555685	6.589539	7.445837	4.320103E-02			15	
1,1-Dichloroethene	0.3786163	9.832994	4.135857	5.527613E-02			CCC (20)	
cis-1,2-Dichloroethene	0.4107428	7.697906	6.426714	7.538868E-02			15	
trans-1,2-Dichloroethene	0.4082645	6.596422	5.335714	4.217701E-02			15	
1,2-Dichloroethene (total)	0.4056024	8.018725	0	0			15	
1,2-Dichloropropane	0.4615869	7.250834	8.624571	4.986244E-02			CCC (20)	
1,3-Dichloropropane	1.018988	6.992634	10.82214	3.753614E-02			15	
2,2-Dichloropropane	0.6141563	8.423974	9.334	3.709119E-02			15	
1,1-Dichloropropene	0.4150839	10.08812	7.467143	2.374989E-02			15	
cis-1,3-Dichloropropene	0.6100831	10.54339	8.181572	2.819054E-02			15	
trans-1,3-Dichloropropene	1.127868	9.132825	9.625557	0.0269969			15	
Diisopropyl Ether	1.644724	5.48364	6.893286	6.759832E-02			15	
Ethylbenzene	3.200889	6.36378	11.19871	0.0274715			CCC (30)	
Ethyl tert-Butyl Ether	1.131992	8.382719	8.353	5.659846E-02			15	
Ethyl Methacrylate	0.8826671	7.773286	9.844714	3.734317E-02			15	
Hexachlorobutadiene	0.3582879	11.14931	15.75271	1.485464E-02			15	
2-Hexanone	0.5930442	3.684718	9.958837	3.936621E-02			15	
Isobutanol	0.3334894	18.7176	6.381714	6.957318E-02	0.9961557		0.995	
Isopropylbenzene	2.988892	8.161767	12.66929	2.651279E-02			15	
p-Isopropyltoluene	2.660201	7.950729	13.39914	1.520912E-02			15	
Methylene chloride	0.5332896	11.14323	4.668371	5.158066E-02	0.9991833		0.995	
Methyl Acetate	0.2807917	5.122059	4.526666	7.164981E-02			15	
Methylcyclohexane	0.6412842	10.61018	8.260857	3.972253E-02			15	
Naphthalene	0.957916	8.179873	19.63314	2.103848E-02			15	
Methyl Methacrylate	0.5276793	5.876383	7.519943	4.852039E-02			15	
4-Methyl-2-pentanone	0.4686637	5.878383	9.104286	3.798899E-02			15	
Methyl t-Butyl Ether	0.9911912	8.834413	5.330286	0.0853249			15	
n-Propylbenzene	4.508665	6.280256	12.50943	2.805432E-02			15	
Styrene	1.813145	9.394828	11.87457	2.360858E-02			15	

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ANALYSIS SEQUENCE SUMMARY
SW8260B

Laboratory: Empirical Laboratories, LLC
SDG: 1111075
Client: CH2M Hill, Inc.
Project: Vinyard CTO-113
Sequence: 1K31401
Instrument: MS-VOA6
Calibration: 1258002

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
MS Tune	1K31401-TUN1	1109TUNE.D	11/09/11 20:02
Calibration Check	1K31401-CCV1	1109CCVE.D	11/09/11 20:29
LCS	1K09020-BS1	1109LCSE.D	11/09/11 20:55
Blank	1K09020-BLK1	1109BLKE.D	11/09/11 22:14
VEP4-EB01-1103-11	1111075-02	1107502.D	11/09/11 23:07
VEP4-TB01-1103-11	1111075-03	1107503.D	11/09/11 23:34
LCS Dup	1K09020-BSD1	1109LCDE.D	11/10/11 02:14

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CONTINUING CALIBRATION CHECK
SW8260B

Laboratory: Empirical Laboratories, LLC
SDG: 1111075
Client: CH2M Hill, Inc.
Project: Vinyard CTO-113
Instrument ID: MS-VOA6
Calibration: 1258002
Lab File ID: 1109CCVE.D
Calibration Date: 09/23/11 14:57
Sequence: 1K31401
Injection Date: 11/09/11
Lab Sample ID: 1K31401-CCV1
Injection Time: 20:29

		CONC (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT		
COMPOUND	TYPE	STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT (#)	
Carbon tetrachloride	A	100.0	73.12	0.3446436	0.2520194		-26.9	20	* J/UJ
Chloroethane	A	100.0	120.5	0.1625273	0.1958670		20.5	20	* J/UJ
Chloroform	A	100.0	86.52	0.5213466	0.4514841		-13.5	20	
1,1-Dichloroethane	A	100.0	93.54	0.5652557	0.5287369	0.1	-6.5	20	
1,2-Dichloroethane	A	100.0	86.34	0.5270445	0.4550333		-13.7	20	
1,1-Dichloroethene	A	100.0	105.3	0.1954273	0.2057561		5.3	20	
cis-1,2-Dichloroethene	A	100.0	88.68	0.2829685	0.2509371		-11.2	20	
trans-1,2-Dichloroethene	A	100.0	88.85	0.2506448	0.2226886		-11.2	20	
Methylene chloride	A	100.0	101.5	0.2438477	0.2474159		1.5	20	
Tetrachloroethene	A	100.0	77.09	0.4829744	0.372313		-22.9	20	* J/UJ
1,1,1-Trichloroethane	A	100.0	78.03	0.4166082	0.3250701		-22.0	20	* J/UJ
Trichloroethene	A	100.0	91.34	0.2737895	0.2500852		-8.7	20	
Vinyl chloride	A	100.0	118.6	0.2569739	0.3048465		18.6	20	
Bromofluorobenzene	A	30.00	27.73	0.878475	0.8119861		-7.6	20	
Dibromofluoromethane	A	30.00	26.15	0.3115604	0.2716276		-12.8	20	
1,2-Dichloroethane-d4	A	30.00	27.95	6.496203E-02	6.0527466E-02		-6.8	20	
Toluene-d8	A	30.00	31.39	1.972531	2.063814		4.6	20	

Column to be used to flag Response Factor and %DIFF/Drift values with an asterisk
* Values outside of QC limits

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ANALYSIS SEQUENCE SUMMARY
SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	1111194
Client:	CH2M Hill, Inc.	Project:	Vieques CTO-113 (24hr rush)
Sequence:	1K32701	Instrument:	MS-VOA6
Calibration:	1258002		

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
MS Tune	1K32701-TUN1	1122TUNE.D	11/22/11 18:33
Calibration Check	1K32701-CCV1	1122CCVE.D	11/22/11 18:59
LCS	1K22018-BS1	1122LCSE.D	11/22/11 19:26
Blank	1K22018-BLK1	1122BLKE.D	11/22/11 20:45
VEP4-EB01-1120111	1111194-02	1119402.D	11/22/11 21:11
VEP4-EB01-1121111	1111194-05	1119405.D	11/22/11 21:38
VEP4-TB01-1121111	1111194-06	1119406.D	11/22/11 22:05
VEP4-GW10-1111	1111194-01	1119401.D	11/22/11 22:32
VEP4-GW11-1111	1111194-03	1119403.D	11/22/11 22:58
VEP4-GW12-1111	1111194-04	1119404.D	11/22/11 23:25
LCS Dup	1K22018-BSD1	1122LCDE.D	11/22/11 23:52

All samples

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CONTINUING CALIBRATION CHECK
SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	1111194
Client:	CH2M Hill, Inc.	Project:	Vieques CTO-113 (24hr rush)
Instrument ID:	MS-VOA6	Calibration:	1258002
Lab File ID:	1122CCVE.D	Calibration Date:	09/13/11 14:57
Sequence:	1K32701	Injection Date:	11/22/11
Lab Sample ID:	1K32701-CCV1	Injection Time:	18:59

		CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
COMPOUND	TYPE	STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT (#)
Carbon tetrachloride	A	100.0	86.16	0.3446436	0.2969352		-13.8	20
Chloroethane	A	100.0	93.28	0.1625273	0.1515991		-6.7	20
Chloroform	A	100.0	82.66	0.3218466	0.4313631		-17.3	20
1,1-Dichloroethane	A	100.0	87.50	0.3632357	0.4946193	0.1	-12.5	20
1,2-Dichloroethane	A	100.0	79.21	0.5210445	0.4174736		-20.8	20 * J/UJ
1,1-Dichloroethene	A	100.0	90.41	0.1954273	0.1766932		-9.6	20
cis-1,2-Dichloroethene	A	100.0	87.58	0.2829685	0.2478358		-12.4	20
trans-1,2-Dichloroethene	A	100.0	89.47	0.2506448	0.2242601		-10.5	20
Methylene chloride	A	100.0	81.98	0.2438477	0.1999115		-18.0	20
Tetrachloroethene	A	100.0	105.2	0.4829744	0.5081898		5.2	20
1,1,1-Trichloroethane	A	100.0	83.03	0.4166082	0.3459132		-17.0	20
Trichloroethene	A	100.0	88.86	0.2737895	0.2432935		-11.1	20
Vinyl chloride	A	100.0	85.01	0.2569739	0.2184562		-15.0	20
Bromofluorobenzene	A	30.00	30.34	0.878475	0.8885285		1.1	20
Dibromofluoromethane	A	30.00	27.19	0.3115604	0.2823804		-9.4	20
1,2-Dichloroethane-d4	A	30.00	29.00	6.496203E-02	6.279125E-02		-3.3	20
Toluene-d8	A	30.00	33.92	1.972551	2.230157		13.1	20

Column to be used to flag Response Factor and %Diff/Drift values with an asterisk
* Values outside of QC limits

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USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? __ ✓ __

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds in section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? __ ✓ __ __

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USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION: 1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.

2. Do not qualify non-detects when the associated IS are counts area > + 100%.

3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".

4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? __ ✓ __ __

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

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USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ✓

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

-30 VOA-

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DataQual VOA

Initial Calibration Date: 9/13/2011
RRF and %RSD Calculations:

Compound Name: vinyl chloride
Lab Value: 0.2674

Area of Compound	1770768
Area of Internal STD	993357
Conc. of Internal STD	50
Conc. of Compound	200
Calculated RRF	0.267

Compound Name: benzene
Lab Value: 3.42

RRF of STD 1	1.0125
RRF of STD 2	1.0193
RRF of STD 3	1.0122
RRF of STD 4	1.0290
RRF of STD 5	1.0489
RRF of STD 6	1.0734
RRF of STD 7	1.0804
RRF of STD 8	1.0899
RRF of STD 9	1.1063
Calculated % RSD	3.42

Continuing Calibration File ID: 11/22/2011
RRF and %D Calculations:

Compound Name: methylene chloride
Lab Value: 0.200

Area of Compound	593440
Area of Internal STD	890554
Conc. of Internal STD	50
Conc. of Compound	100
Calculated RRF	0.200

Compound Name: carbon tetrachloride
Lab Value: 13.8

Average RRF	0.345
Calibration Check RRF	0.297
Calculated % D	13.8

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SDG# 1111075

057

Sample Delivery Group Case Narrative

Receipt Information
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Changes to the Revision
This is an original submittal of the final report package.

Analytical Information
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:
The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

SW8260B:
The method blank 1K10021-BLK1 has a positive result for Methylene Chloride.

The batch spike associated to batch 1K09020 exceeded recovery criteria with a negative bias for Carbon Tetrachloroide.

The continuing calibration verification exceeded criteria in 1K31401-CCV1 with a negative bias for Carbon Tetrachloride, Tetrachloroethene, and 1,1,1-Trichloroethane and with a positive bias for Chloroethane.

058

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

Wet Chemistry:
Sample 1111075-01 is qualified with an "*" to indicate that the sample and replicate exceeded relative percent difference criteria for Total Organic Carbon.

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

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1111075 Summ Package 4

1111075

EMPIRICAL LABORATORIES, LLC - CHAIN OF CUSTODY RECORD

SHIP TO: 621 Mainstream Drive, Suite 270 • Nashville, TN 37228 • 615-345-1115 • (fax) 615-846-5428

Send Results to:
Name Hilary Ott
Company CH2M HILL
Address
City
State, Zip
Phone
Fax
E-mail hilary.ott@ch2m.com

Send Invoice to:
Name Nancy CLEVELAND CH2-HILL
Company
Address
City
State, Zip
Phone
Fax
E-mail

Project No/Name:
Sampler's (Signature): Lacy Kay
CAR #:

Analysis Requirements:

Lab Use Only:
VOA Headspace Y N NA
Field Filtered Y N NA
Correct Containers Y N NA
Discrepancies Y N NA
Cust. Seals Intact Y N NA
Containers Intact Y N NA
Airbill #:

Lab Use Only Lab #	Date/Time Sampled	Sample Description	Sample Matrix	Comments	No. of Bottles	Lab Use Only: Containers/Pres.
01	11/03/11 1030	VEPA-SB6-1417-111	SO	X X	4	
02	11/03/11 1050	VEPA-EB01-110311	W	X	3	
03	11/03/11	VEPA-TB01-110311	W	X	2	

REMARKS:

Sample Rec'd by: (Signature) Carlene Conners CH2M HILL — Date/Time 11/03/11 1135 — Received By: (Signature)
Relinquished by: (Signature) — Date/Time — Received By: (Signature)
Relinquished by: (Signature) — Date/Time — Received By: (Signature)
Received for Laboratory by: (Signature) — Date/Time 11/4/11 0830 — Temperature 3.9

Details: Page 1 of 1; Cooler No. 1 of 1; Date Shipped 11/03/11; Shipped By CC/KB; Turnaround

Distribution: Original, yellow copies accompany sample shipment to laboratory. Pink retained by samplers.

1111075 Summ Package 10

1111075

Cooler Received/Opened On 11/04/11 @ 0830

1. Tracking # 8710 (last 4 digits, FedEx)

Courier: FED-EX

2. Temperature of rep. sample or temp blank when opened: 3.9 Degrees Celsius + correction factor 0.0 = 3.9

3. If item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA

4. Were custody seals on outside of cooler? YES...NO...NA

If yes, how many and where: 2 - FRONT & BACK

5. Were the seals intact, signed, and dated correctly? YES...NO...NA

6. Were custody papers inside cooler? YES...NO...NA

I certify that I opened the cooler and answered questions 1-6 (initial) [illegible]

7. Were custody seals on containers: YES NO and intact YES...NO...NA

Were these signed and dated correctly? YES...NO...NA

8. Packing mat'l used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Inserts Paper Other None

9. Cooling process: Ice Ice-pack Ice (direct contact) Dry Ice Other None

10. Did all containers arrive in good condition (unbroken)? YES...NO...NA

11. Were all container labels complete (#, date, signed, pres., etc)? YES...NO...NA

12. Did all container labels and tags agree with custody papers? YES...NO...NA

13a. Were VOA vials received? YES...NO...NA

b. Was there any observable headspace present in any VOA vial? YES...NO...NA

14. Was there a Trip Blank in this cooler? YES...NO...NA If multiple coolers, sequence #

I certify that I unloaded the cooler and answered questions 7-14 (initial) [illegible]

15a. On prea'd bottles, did pH test strips suggest preservation reached the correct pH level? YES...NO...NA

b. Did the bottle labels indicate that the correct preservatives were used YES...NO...NA

15. Was residual chlorine present? YES...NO...NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-15b (initial) [illegible]

17. Were custody papers properly filled out (ink, signed, etc)? YES...NO...NA

18. Did you sign the custody papers in the appropriate place? YES...NO...NA

19. Were correct containers used for the analysis requested? YES...NO...NA

20. Was sufficient amount of sample sent in each container? YES...NO...NA

I certify that I entered this project into LIMS and answered questions 17-20 (initial) [illegible]

I certify that I attached a label with the unique LIMS number to each container (initial) [illegible]

21. Were there Non-Conformance issues at login? YES...NO Was a NCR generated? YES...NO...#

Additional Details:

161

1111075 Summ Package 11

SDG# 1111194

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Sample Delivery Group Case Narrative

Receipt Information
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Changes to the Revision
This is an original submittal of the final report package.

Analytical Information
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:
The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

SW8260B:
The continuing calibration verification 1K32701-CCV1 with a negative bias for 1,2-Dichloroethane.

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

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Tropical Laboratory

CHAIN OF CUSTODY RECORD

Page 1 of 1

Special Handling: TAT - Indicate Date Needed 11/23/11 - All TATs subject to laboratory approval. Rush charges may apply to expedite service. Samples disposed of after 60 days unless otherwise instructed.

Report To: Hilry Ott, CH2M Hill
Invoice To: CH2M Hill, Vieques, PR - Navy CLEAN 1000 - CTO-113
Project No. 409743 FL FK.P4
Site Name: PI-4
Location: Vieques
State: PR
Sampler(s): K. Slater + S. Brant
Project Mgr: John Swetnich
P.O. No:
RQN:

1=Na2S2O3 2=HCl 3=H2SO4 4=HNO3 5=NaOH 6=Ascorbic Acid 7=CH3OH 8=NaHSO4 9= 10= 11=
DW=Drinking Water GW=Groundwater WW=Wastewater O=Oil SW=Surface Water SO=Soil SL=Sludge A=Air X1= X2= X3=
G=Grab C=Composite

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	# of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	List preservative code below: 2	Analyses: 20978-9h8-MS	Notes:
-01	VEP4-GW1D-1111	11/20/11	1707	G	GW	3					X	24hr TAT
-02	VEP4-EB01-1109	11/20/11	1810	G	GW	3					X	
-03	VEP4-GW11-1111	11/21/11	0930	G	GW	3					X	24hr TAT
-04	VEP4-GW12-1111	11/21/11	1155	G	GW	3					X	24hr TAT
-05	VEP4-EB01-1120	11/21/11	1210	G	GW	3					X	
-06	VEP4-TB01-1120	11/21/11	—	G	GW	2					X	

QA/QC Reporting Level: ☐ Level I ☐ Level II ☐ Level III ☐ Level IV ☐ Other
State specific reporting standards:

Relinquished by: [signature] Date: 11/21/11 Time: 1300
Received by: [signature] Date: 11/22/11 Time: 0810

☐ E-mail to
EDD Format
Condition upon receipt: ☐ Iced ☐ Ambient ☐ °C

Tropical Laboratory, Inc. 8405 Benjamin Road, Suite A • Tampa, Florida 33634 • 813-888-9507 • FAX 813-889-7128 • www.pelab.com

11/21/11

Cooler Received/Opened On_ 11/22/11 @ 0810

1. Tracking # 5724 (last 4 digits, FedEx)

Courier: FED-EX

2. Temperature of rep. sample or temp blank when opened: 1.4 Degrees Celsius + correction factor 0.0 = 1.4

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA

4. Were custody seals on outside of cooler? YES NO NA

If yes, how many and where: 1-FRONT

5. Were the seals intact, signed, and dated correctly? YES NO NA

6. Were custody papers inside cooler? YES NO NA

I certify that I opened the cooler and answered questions 1-6 (initial) [illegible]

7. Were custody seals on containers: YES NO and Intact YES NO NA

Were these signed and dated correctly? YES NO NA

8. Packing mat'l used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None

9. Cooling process: Ice ice-pack ice (direct contact) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? YES NO NA

11. Were all container labels complete (#, date, signed, pres., etc)? YES NO NA

12. Did all container labels and tags agree with custody papers? YES NO NA

13a. Were VOA vials received? YES NO NA

b. Was there any observable headspace present in any VOA vial? YES NO NA

14. Was there a Trip Blank in this cooler? YES NO NA If multiple coolers, sequence #

I certify that I unloaded the cooler and answered questions 7-14 (initial) RT

15a. On preservd bottles, did pH test strips suggest preservation reached the correct pH level? YES NO NA

b. Did the bottle labels indicate that the correct preservatives were used YES NO NA

16. Was residual chlorine present? YES NO NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial) RT

17. Were custody papers properly filled out (ink, signed, etc)? YES NO NA

18. Did you sign the custody papers in the appropriate place? YES NO NA

19. Were correct containers used for the analysis requested? YES NO NA

20. Was sufficient amount of sample sent in each container? YES NO NA

I certify that I entered this project into LIMS and answered questions 17-20 (initial) RT

I certify that I attached a label with the unique LIMS number to each container (initial) RT

21. Were there Non-Conformance issues at login? YES NO Was a NCR generated? YES NO #

Additional Details:

065

VOLATILE DATA VALIDATION SUMMARY

Site Name: Vieques CTO-111
Project Number: 617.90.01
Sampling Date(s): 7/13 & 7/14/2010

Laboratory: Katahdin
Case/Order No. SD4219

SCAN & SIM

Compound List: ☑ TCL ☐ Priority Pollutant ☐ Appendix IX ☐ Other
Method: ☐ CLP SOW ☐ 40 CFR 136 ☑ SW-846 Method 8260B ☐ Other

The following table indicates the data validation criteria examined, any problems identified, and the QA action applied.

Data Validation Criteria:		Accept	FYI	Qualify	Comments
Holding Times		✓			
GC/MS Tuning		✓			
Initial Calibrations		✓			
Continuing Calibrations				✓	1,1,2,2 tetrachloroethane, carbon tet, 1,2 dichlor (LL)
Blank Analysis Results				✓	carbondisulfide, acetone (LL) in some samples
System Monitoring/Surrogate Results				✓	SM Bias for -4, SM Bias for -2,-3,-6
MS/MSD Results	NA				
Field Duplicate Results		✓			
Internal Standard Areas/RT		✓			
Target Compound Identification		✓			
TIC Identification	NA				
Quantitation/Detection Limits		✓			
System Performance		✓			
Overall Assessment of Data		✓			
Other	LDS	✓			

General Comments:

Accept – No qualification required.
FYI – For your information only, no qualification necessary
Qualify – Qualify as rejected, estimated or biased
NA – Not applicable.
NR – Not reviewed.

QA Scientist [signature]
Date 10/31/12

Revised 12/11/2000

crowshan

From: crowshan [crowshan@voicenet.com]
Sent: Sunday, October 31, 2010 1:06 PM
To: 'Kelly Perkins'
Cc: 'Shawne M. Rodgers'; MZamboni@ch2m.com; Rebekha Shaw (Rebekha.Shaw@CH2M.com); 'Juan.Acaron@CH2M.com'
Subject: Data Validation Inquiry - Vieques CTO-111 - Katahdin Sample Delivery Group SD4219

Hi Kelly,

We are currently completing a validation review of data generated for the above referenced project. The following issues have arisen as a result of this review:

VOC:

1) The continuing calibration summary forms are presenting incorrect CCAL RRFs. The concentration is actually 0.5, not 0.1. Please revise and resubmit.

Thank you for your assistance,

Caroline

Caroline Rowshan
Environmental Data Quality, Inc.
967 East Swedesford Road, Suite 404
Exton, PA 19341
Phone: (610) 719-1981
Fax: (610) 725-1781
crowshan@voicenet.com

crowshan

From: Deb Nadeau [dnadeau@katahdinlab.com]
Sent: Monday, November 01, 2010 3:56 PM
To: crowshan@voicenet.com
Cc: plemay@katahdinlab.com; kperkins@katahdinlab.com; jobrin@katahdinlab.com
Subject: RE: Data Validation Inquiry - Vieques CTO-111 - Katahdin Sample Delivery Group SD4219
Attachments: doc08337320101101152947.pdf

Caroline,

Here are the revised Form VII's with the correct true value.

Thanks,
Deb

Deborah Nadeau
Laboratory Operations Manager
Katahdin Analytical Services
A Woman-Owned Small Business Enterprise
800 Technology Way
Scarborough, Maine 04074
Direct - 207 874.2400 x19
Fax - 207 775.4029
www.katahdinlab.com

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From: Kelly Perkins [mailto:kperkins@katahdinlab.com]
Sent: Monday, November 01, 2010 9:26 AM
To: dnadeau@katahdinlab.com
Cc: plemay@katahdinlab.com
Subject: FW: Data Validation Inquiry - Vieques CTO-111 - Katahdin Sample Delivery Group SD4219
Importance: High

Kelly Perkins
Project Manager
Katahdin Analytical Services
600 Technology Way
Scarborough, ME 04074
(207) 874-2400 Ext. 17

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1

SOP # HW-24
Revision # 2
August 2008

USEPA
Hazardous Waste Support Branch
Validating Volatile Organic Compounds
By Gas Chromatography/Mass Spectrometry
SW-846 Method 8260B

Prepared by: George Karas Date: 8/27/08
George Karas, Chemist
Hazardous Waste Support Section

Prepared by: Russell Amoni Date: 8/25/08
Russell Amoni, Chemist
Hazardous Waste Support Section

Concurred by: Linda M. Mauel Date: 8/26/08
Linda Mauel, Chief
Hazardous Waste Support Section

Approved by: Robert Runyon Date: 8/26/08
Robert Runyon, Chief
Hazardous Waste Support Branch

Annual Review

Reviewed by: Russell Amoni Date: 08/11/09
Name

Reviewed by: _____ Date: _____
Name

Scope and Applicability

This SOP offers detailed guidance in evaluating laboratory data generated according to the USEPA SW-846, Method 8260B December 1996. The validation methods and actions discussed in this document are based on the requirements set forth in USEPA SW-846, Method 8260B and Method 8000C, Rev 3, March 2003; and "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review," January, 2005. This document covers technical as well as method specific problems; however situations may arise where data limitations must be assessed based on the reviewer's own professional judgement.

Summary

To ensure a thorough evaluation of each result in a data case, the reviewer must complete the checklist within this SOP, answering specific questions while performing the prescribed "ACTIONS" in each section. Qualifiers (or flags) are applied to questionable or unusable results as instructed. The data qualifiers discussed in this document are defined on page 4.

The reviewer must prepare a detailed data assessment to be submitted along with the complete SOP checklist. The Data Assessment must list all data qualifications, reasons for qualifications, instances of missing data, and contract non-compliance.

DEFINITIONS

Acronyms

BNA - base neutral acid(another name for Semi Volatiles)
CLP - Contract Laboratory Program
CRQL - Contract Required Quantitation Limit
CF - calibration factor
%D - percent difference
DCB -decachlorobiphenyl
DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenylethane
DDT - dichlorodiphenyltrichloroethane
DoC - Date of Collection
GC - gas chromatography
GC/ECD - gas chromatography/electron capture detector
GC/MS - gas chromatography/mass spectrometer
GPC - gel permeation chromatography
IS - internal standard
kg - kilogram
µg - microgram
MS - matrix spike
MSD - matrix spike duplicate
l - liter
ml - milliliter
PCB - Polychlorinated biphenyl
PE - performance evaluation
PEM - Performance Evaluation Mixture
QC - quality control
RAS - Routine Analytical Services
RIC - reconstructed ion chromatogram
RPD - relative percent difference
RRF - relative response factor
RRF - average relative response factor (from initial calibration)
RRT - relative retention time
RSD - relative standard deviation
RT - retention time
RSCC - Regional Sample Control Center
SDG - sample delivery group
SMC - system monitoring compound
SOP - standard operating procedure
SOW - Statement of Work
SVOA - semivolatile organic acid
TCL - Target Compound List
TCLP - Toxicity Characteristics Leachate Procedure
TCX -tetrachloro-m-xylene
TIC - tentatively identified compound

TOPO - Task Order Project Officer
TPO - Technical Project Officer
VOA - Volatile organic
VTSR - Validated Time of Sample Receipt

Data Qualifiers

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

N - The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."

NJ - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

LAB QUALIFIERS:

D - The positive value is the result of an analysis at a secondary dilution factor.

B - The analyte is present in the associated method blank as well as in the sample. This qualifier has a different meaning when validating inorganic data.

E - The concentration of this analyte exceeds the calibration range of the instrument.

A - Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

YES NO N/A

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: _____ LAB: Katahdin

SITE NAME: Vieques (CTO-111)

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalents? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. **VOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓ ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ___ ___ ✓

1.3 Sample Conditions/Problems

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ [✓] ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ [✓] ___

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

Sample Name	Lab_Sample_ID	Date Time	Extraction	Analysis_2	EHT	AHT	Analytical Method	SDG
VEP04-EB01-071310	SD4219-1	7/13/2010	7/27/2010	7/27/2010		14	8260B	SD4219
VEP04-GW07-0710	SD4219-2	7/13/2010	7/27/2010	7/27/2010		13	8260B	SD4219
VEP04-GW07P-0710	SD4219-3	7/13/2010	7/27/2010	7/27/2010		13	8260B	SD4219
VEP04-GW05-0710	SD4219-4	7/13/2010	7/27/2010	7/27/2010		13	8260B	SD4219
VEP04-EB01-071410	SD4219-5	7/14/2010	7/27/2010	7/27/2010		13	8260B	SD4219
VEP04-GW06-0710	SD4219-6	7/14/2010	7/28/2010	7/28/2010		14	8260B	SD4219
VEP04-TB01-071410	SD4219-7	7/14/2010	7/27/2010	7/27/2010		13	8260B	SD4219
LABQC	WG50214-1	7/27/2010	7/27/2010	7/27/2010		0	8260B	SD4219
LABQC	WG50214-2	7/27/2010	7/27/2010	7/27/2010		0	8260B	SD4219
VEP04-EB01-071310	SD4219-1	7/13/2010	7/28/2010	7/28/2010		13	8260B_SIM	SD4219
VEP04-GW07-0710	SD4219-2	7/13/2010	7/26/2010	7/26/2010		12	8260B_SIM	SD4219
VEP04-GW07P-0710	SD4219-3	7/13/2010	7/26/2010	7/26/2010		12	8260B_SIM	SD4219
VEP04-GW05-0710	SD4219-4	7/13/2010	7/26/2010	7/26/2010		12	8260B_SIM	SD4219
VEP04-GW05-0710	SD4219-4RA	7/13/2010	7/27/2010	7/27/2010		13	8260B_SIM	SD4219
VEP04-EB01-071410	SD4219-5	7/14/2010	7/26/2010	7/26/2010		12	8260B_SIM	SD4219
VEP04-GW06-0710	SD4219-6	7/14/2010	7/26/2010	7/26/2010		12	8260B_SIM	SD4219
VEP04-TB01-071410	SD4219-7	7/14/2010	7/27/2010	7/27/2010		13	8260B_SIM	SD4219

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water [✓] ___ ___

b. Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water [✓] ___ ___

b. Soil [ ] ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. [✓] ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [✓] ___ ___

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [✓] ___ ___

If yes, were samples reanalyzed? [✓] ___ ___
for low recovery only

Were method blanks reanalyzed? [ ] ✓ ___

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] ✓ ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

FORM 2
WATER VOLATILE SYSTEM MONITORING COMPOUND RECOVERY

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: CTO-111 NTR VIEQUES SDG No.: SD4219

	CLIENT SAMPLE ID	LAB SAMPLE ID	SMC1 DBF#	SMC2 BFB#	SMC3 TOL#	SMC4 DCA#	TOT OUT
01	WG80179-LCS	WG80179-1	104	105	95	114	0
02	WG80179-BLANK	WG80179-2	138*	90	108	250*	2
03	VEP04-EB01-071310	SD4219-1	121	83	90	133*	1
04	VEP04-GW07-0710	SD4219-2	148*	93	103	154*	2
05	VEP04-GW07P-0710	SD4219-3	131*	83	97	142*	2
06	VEP04-GW05-0710	SD4219-4	134*	80	46*	245*	3
07	VEP04-EB01-071410	SD4219-5	133*	92	98	150*	2
08	VEP04-GW06-0710	SD4219-6	128	75	92	145*	1
09	WG80225-LCS	WG80225-1	118	103	105	136*	1
10	WG80225-BLANK	WG80225-2	131*	88	100	140*	2
11	VEP04-TB01-071410	SD4219-7	126	75	86	133*	1
12	VEP04-GW05-0710	SD4219-4MA	128	83	41*	140*	2
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							

QC only
J
J
J
J
ND
QC only
QC only
ND
NR

		QC LIMITS
SMC1 (DBF)	= Dibromofluoromethane	(70-130)
SMC2 (BFB)	= P-Bromofluorobenzene	(70-130)
SMC3 (TOL)	= Toluene-D8	(70-130)
SMC4 (DCA)	= 1,2-Dichloroethane-D4	(70-130)

CR 11/1/10

Column to be used to flag recovery values

* Values outside of contract required QC limits

D System Monitoring Compound diluted out

① pos results (J) for ↑ rec

page 1 of 1 FORM II VOA-1

② GLS (UJ) pos results (J) for ↓ SS rec

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ✓

C. Med Soil [ ] ___ ✓

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [✓] ___ ___

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] ___ ✓

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent)

none reported

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] ___ ✓

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] ___ ✓

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month [page 8000C, section 9.5.1])

a. Water [ ] ___ ___

b. Waste [ ] ___ ___

c. Soil/Solid [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [ ] ___ ___

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ ___

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? [✓] ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? [✓] ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? [✓] ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? [✓] ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. [✓] ___ ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? [✓] [ ] ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

Environmental Data Quality, Inc.
BLANK ANALYSIS RESULTS FOR TARGET ORGANIC COMPOUNDS

Date / Time	Fraction V	SV	P	MATRIX Aqu.	Solid	BLANK TYPE TB	MB	EB	FB	Sample I.D. Number	Assoc. Samples	Contaminant	Conc. µg/L	µg/Kg	Qualification Limit 5X	10X
11/20/14	✓			✓			✓			WG80914	all	methylene chloride	1.3	J		
11/21/10												trans-1,3-dichloropropene	0.22	J		
11/21/10	✓				✓			✓		1201-0730 ①		acetone	16			
												2-butanone	4.7			
11/21/10	✓			✓				✓		1201-0740 ②		chloromethane	0.59	J		
												carbon disulfide	1.34	J		
												acetone	19			
												2-butanone	4.7			

Notes: ① 8260T, 8260TP, 6W05
② 8260T

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates [✓] ___ ___

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) [✓] ___ ___

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? [✓] ___ ___

YES NO N/A

Resolution? [✓] ___ ___

Peak shape? [✓] ___ ___

Full-scale graph (attenuation)? [✓] ___ ___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") – Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

Not Reported

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [✓] ___ ___

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Blanks [✓] ___ ___

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [✓] ___ ___

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [✓] ___ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [✓] ___ ___

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39) qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R". 15%

14.2 Are all average RRFs > 0.050? [✓] ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. [✓] [✓] ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) [ ] ___ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? [✓] ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? [✓] ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). [✓] ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

FORM 7B
VOLATILE CALIBRATION VERIFICATION SUMMARY

RESUBMITTAL
CR 11/1/10

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: CTO-111 NTR VIEQUES SDG No.: SD4219

Instrument ID: GCMS-D Calibration Date: 07/26/10 Time: 1157

Lab File ID: D6719 Init. Calib. Date(s): 07/25/10 07/25/10

Init. Calib. Times: 1717 2113

GC Column: RTX-VMS ID: 0.18 (mm)

COMPOUND	RRF or AMOUNT	RRF0.5000 or AMOUNT	CCAL RRF0.5000	MIN RRF	%D or %DRIFT	MAX %D or %DRIFT	CURV TYPE	
Vinyl chloride	0.7900000	0.9362500	0.9362500	0.01	18.51	20.00	AVRG	
1,1-Dichloroethene	0.6910000	0.7362200	0.7362200	0.1	6.54	20.00	AVRG	
Carbon Tetrachloride	1.2220000	1.4131000	1.4131000	0.01	15.64	20.00	AVRG	
Benzene	2.3050000	2.3886000	2.3886000	0.01	3.63	20.00	AVRG	
1,2-Dichloroethane	0.5920000	0.6717400	0.6717400	0.01	13.47	20.00	AVRG	
Tetrachloroethene	0.9780000	1.0118000	1.0118000	0.01	3.46	20.00	AVRG	
1,1,2,2-Tetrachloroethane	0.6421600	0.5000000	0.8374900	0.3	28.43	20.00	LINR	<- (1)
1,4-Dichlorobenzene	3.8090000	3.9322000	3.9322000	0.01	3.23	20.00	AVRG	
Dibromofluoromethane	0.7530000	0.7926000	0.7926000	0.01	5.26	20.00	AVRG	
P-Bromofluorobenzene	0.4860000	0.4703600	0.4703600	0.01	-3.22	20.00	AVRG	
Toluene-D8	1.0500000	0.9747600	0.9747600	0.01	-7.16	20.00	AVRG	
1,2-Dichloroethane-D4	0.5994100	0.5000000	0.6305100	0.01	19.88	20.00	LINR	

assoc samples: all except TB

(1) (UJ) in assoc samples; not prev. qualified

CR 11/2/10

FORM VII PEST

FORM 7B
VOLATILE CALIBRATION VERIFICATION SUMMARY

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: CTO-111 NTR VIEQUES SDG No.: SD4219

Instrument ID: GCMS-D Calibration Date: 07/26/10 Time: 1157

Lab File ID: D6719 Init. Calib. Date(s): 07/25/10 07/25/10

Init. Calib. Times: 1717 2113

GC Column: RTX-VMS ID: 0.18 (mm)

COMPOUND	RRF or AMOUNT	RRF0.5000 or AMOUNT	CCAL RRF0.1000	MIN RRF	%D or %DRIFT	MAX %D or %DRIFT	CURV TYPE	
Vinyl chloride	0.7900000	4.6813000	4.6813000	0.01	492.57	20.00	AVRG	<-
1,1-Dichloroethene	0.6910000	3.6811000	3.6811000	0.1	432.72	20.00	AVRG	<-
Carbon Tetrachloride	1.2220000	7.0656000	7.0656000	0.01	478.20	20.00	AVRG	<-
Benzene	2.3050000	11.943000	11.943000	0.01	418.13	20.00	AVRG	<-
1,2-Dichloroethane	0.5920000	3.3587000	3.3587000	0.01	467.35	20.00	AVRG	<-
Tetrachloroethene	0.9780000	5.0590000	5.0590000	0.01	417.28	20.00	AVRG	<-
1,1,2,2-Tetrachloroethane	0.6421600	4.1875000	4.1875000	0.3	542.16	20.00	LINR	<- (1)
1,4-Dichlorobenzene	3.8090000	19.661000	19.661000	0.01	416.17	20.00	AVRG	<-
Dibromofluoromethane	0.7530000	3.9630000	3.9630000	0.01	426.29	20.00	AVRG	<-
P-Bromofluorobenzene	0.4860000	2.3518000	2.3518000	0.01	383.91	20.00	AVRG	<-
Toluene-D8	1.0500000	4.8738000	4.8738000	0.01	364.17	20.00	AVRG	<-
1,2-Dichloroethane-D4	0.5994100	3.1000000	3.1525000	0.01	499.41	20.00	LINR	<-

assoc samples: ~~all~~ all except TB

(1) UJ in ~~assoc~~ samples not prev qual.

CR 10/31/10

FORM VII PEST

FORM 7B
VOLATILE CALIBRATION VERIFICATION SUMMARY

RESUBMITTAL
CR 11/1/10

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: CTO-111 NTR VIEQUES SDG No.: SD4219

Instrument ID: GCMS-D Calibration Date: 07/27/10 Time: 0952

Lab File ID: D6733 Init. Calib. Date(s): 07/25/10 07/25/10

Init. Calib. Times: 1717 2113

GC Column: RTX-VMS ID: 0.18 (mm)

COMPOUND	RRF or AMOUNT	RRF0.5000 or AMOUNT	CCAL RRF0.5000	MIN RRF	%D or %DRIFT	MAX %D or %DRIFT	CURV TYPE	
Vinyl chloride	0.7900000	0.8361600	0.8361600	0.01	5.84	20.00	AVRG	
1,1-Dichloroethene	0.6910000	0.7845200	0.7845200	0.1	13.53	20.00	AVRG	
Carbon Tetrachloride	1.2220000	1.6863000	1.6863000	0.01	38.00	20.00	AVRG	<- (1)
Benzene	2.3050000	2.5015000	2.5015000	0.01	8.52	20.00	AVRG	
1,2-Dichloroethane	0.5920000	0.6762900	0.6762900	0.01	14.24	20.00	AVRG	
Tetrachloroethene	0.9780000	1.1333000	1.1333000	0.01	15.88	20.00	AVRG	
1,1,2,2-Tetrachloroethane	0.5966000	0.5000000	0.7834900	0.3	19.32	20.00	LINR	
1,4-Dichlorobenzene	3.8090000	3.7933000	3.7933000	0.01	-0.41	20.00	AVRG	
Dibromofluoromethane	0.7530000	0.8627400	0.8627400	0.01	14.57	20.00	AVRG	
P-Bromofluorobenzene	0.4860000	0.5616300	0.5616300	0.01	15.56	20.00	AVRG	
Toluene-D8	1.0500000	1.0432000	1.0432000	0.01	-0.65	20.00	AVRG	
1,2-Dichloroethane-D4	0.6377900	0.5000000	0.6687500	0.01	27.56	20.00	LINR	<-

(1) (UJ) in TB

CR 11/2/10

FORM VII PEST

FORM 7B
VOLATILE CALIBRATION VERIFICATION SUMMARY

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: CTO-111 NTR VIEQUES SDG No.: SD4219

Instrument ID: GCMS-D Calibration Date: 07/27/10 Time: 0952

Lab File ID: D6733 Init. Calib. Date(s): 07/25/10 07/25/10

Init. Calib. Times: 1717 2113

GC Column: RTX-VMS ID: 0.18 (mm)

COMPOUND	RRF or AMOUNT	RRF0.5000 or AMOUNT	CCAL RRF0.1000	MIN RRF	%D or %DRIFT	MAX %D or %DRIFT	CURV TYPE	
Vinyl chloride	0.7900000	4.1808000	4.1808000	0.01	429.22	20.00	AVRG	<-
1,1-Dichloroethene	0.6910000	3.9226000	3.9226000	0.1	467.67	20.00	AVRG	<-
Carbon Tetrachloride	1.2220000	8.4313000	8.4313000	0.01	589.95	20.00	AVRG	<- (1)
Benzene	2.3050000	12.508000	12.508000	0.01	442.65	20.00	AVRG	<-
1,2-Dichloroethane	0.5920000	3.3814000	3.3814000	0.01	471.18	20.00	AVRG	<-
Tetrachloroethene	0.9780000	5.6665000	5.6665000	0.01	479.40	20.00	AVRG	<-
1,1,2,2-Tetrachloroethane	0.5966000	0.1000000	3.9174000	0.3	496.60	20.00	LINR	<-
1,4-Dichlorobenzene	3.8090000	18.967000	18.967000	0.01	397.95	20.00	AVRG	<-
Dibromofluoromethane	0.7530000	4.3137000	4.3137000	0.01	472.87	20.00	AVRG	<-
P-Bromofluorobenzene	0.4860000	2.8082000	2.8082000	0.01	477.82	20.00	AVRG	<-
Toluene-D8	1.0500000	5.2163000	5.2163000	0.01	396.79	20.00	AVRG	<-
1,2-Dichloroethane-D4	0.6377900	0.0000000	3.3437000	0.01	537.79	20.00	LINR	<-

(1) (UJ) in TB

CR 10/31/10

FORM VII PEST

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? [ ] [✓] [ ]

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? [✓] [ ] [ ]

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:
1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.
2. Do not qualify non-detects when the associated IS are counts area > + 100%.
3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".
4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? [✓] [ ] [ ]

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? [✓] [ ] [ ]

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

DataQual
Environmental Services, LLC

CH2M HILL-VBO
15010 Conference Center Drive
Suite 200
Chantilly, VA 20151

February 28, 2012
SDG#s 1111112 and 1111092, Empirical Laboratories
Vieques Island, Puerto Rico

Dear Ms. Ott,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG #s 1111112 and 1111092. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Method 8260B for volatiles (8260B-Rev 2, January 2006- SOP #HW-24) and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA
SDG# 1111112			
VEP4-SB20-0608-1111	1111112-01	soil	X
VEP4- SB20P-0608-1111	1111112-02	soil	X
VEP4-EB03-111011	1111112-03	water	X
VEP4-TB02-111011	1111112-04	water	X
VEP4-SB20-0608-1111 MS	1111112-01MS	soil	X
VEP4-SB20-0608-1111 MSD	1111112-01MSD	soil	X
SDG# 1111092			
VEP4-SB19-0607-1111	11111092-01	soil	X
VEP4-EB02-110811	11111092-02	water	X
VEP4-TB02-110811	11111092-03	water	X

The following quality control samples were provided with this SDG: samples VEP4-EB03-111011 and VEP4-EB02-110811- equipment blanks; samples VEP4-TB03-111011 and VEP4-TB02-110811- trip blanks; and sample VEP4- SB20P-0608-1111- field duplicate of sample VEP4- SB20-0608-1111.

The samples were evaluated based on the following criteria:

- Data Completeness +
- Sample Condition +
- Technical Holding Times +
- GC/MS Tuning +
- Initial/Continuing Calibrations
- Blanks +

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- Internal Standards *
- Surrogate Recoveries
- Laboratory Control Samples
- Matrix Spike Recoveries *
- Matrix Duplicate RPDs +
- Serial Dilutions +
- Field Duplicates +
- Identification/Quantitation +
- Reporting Limits +
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

Some sample compounds were qualified as estimated based on high %RSDs and %Ds which were exhibited in the initial and continuing calibrations.

One sample exhibited high a surrogate recovery that resulted in qualifying positive results as estimated.

One of the laboratory control samples exhibited non-compliant recoveries that resulted in qualifications to the associated samples.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to chain of custody records, sampling was performed on 11/08-10/11 and samples were received on 11/09-11/11. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

Initial/Continuing Calibration

VOA

Calibration standards exhibited %RSDs and %D that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results were qualified as indicated.

SDG# 1111092

Standard ID	Compound(s)	RRF, %RSD, %D	Samples	Q Flag	Q Code
IC 10/19/11	methylene chloride	31.14	VEP4-SB19-0607-1111	J/UJ	ICH
CC 11/15/11	1,2-dichloroethane tetrachloroethene	27.4 20.7	VEP4-EB02-110811 VEP4-TB02-110811	J/UJ	CCH

Surrogates

VOA

SDG# 1111112

Sample VEP4-EB03-111011 exhibited high recovery for surrogate dibromofluoromethane at 116% (QC limits 85-115%); therefore all positive results were qualified as estimated (J), qualifier code: SSH. The laboratory did not re-analyze the sample.

Laboratory Control Samples

VOA

SDG# 1111092

The following laboratory control sample exhibited non-compliant recoveries; qualifications were applied to the associated samples as stated in the table below.

Associated samples	Compound	LCS % Rec	QC Limit	Qualifier	Qualifier Code
VEP4-EB02-110811, VEP4-TB02-110811	1,2-dichlomethane	68.2	70-130	J/UJ	BSL

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
VEP4-SB19-0607-1111	methylene chloride	+/-	J/UJ	ICH
VEP4-EB02-110811, VEP4-TB02-110811	1,2-dichloromethane* terrachloroethene	+/-	J/UJ	CCH
VEP4-EB03-111011	all results	+	J+	SSH
VEP4-EB02-110811, VEP4-TB02-110811	1,2-dichloroethane	+/-	J/UJ	BSL

*final qualifier due to non-compliant LCS recovery

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the LOD (2X sample LOD for common laboratory contaminants) when the blank value is less than the LOD. The sample result for the blank contaminant is not qualified with any blank qualifiers.
U*	The sample result for the blank contaminant is less than the LOD (2X sample LOD for common laboratory contaminants) but greater than the MDL when the blank value is less than the LOD. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.
LOD**	The sample result for the blank contaminant is less than the LOD (2X sample LOD for common laboratory contaminants) but greater than the MDL when the blank value is less than the LOD. The sample result for the blank contaminant is changed to the LOD and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the LOD.

Inorganic Methods

ICB/CCB/PB Action:

No Action -	The sample result is greater than the LOD and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the LOD, result is reported as non-detect at the LOD* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the LOD.

Glossary of Qualification Flags and Abbreviations, continued

R -	Sample result is greater than the LOD and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the LOD.
J -	Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the LOD.
JNU -	Sample result is less than 10X LOD when blank result is below the negative LOD.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the LOD.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.
Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action -	The sample result is greater than the LOD and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the LOD, result is reported as non-detect at the LOD* or at the reported concentration**, when the FB result is less or greater than the LOD.
R -	Sample result is greater than the LOD and less than the FB value when the FB value is greater than the LOD.
J -	Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the LOD.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the LOD.

General Abbreviations

RL	reporting limit
PQL	practical quantitation limit
IDL	instrument detection limit
MDL	method detection limit
CRQL/LOQ	contract required quantitation limit
+	positive result
-	non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Time
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
ML	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
OR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Reconstitution
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOC	High moisture content

SDG# 1111112

ANALYSIS DATA SHEET

VEP4-SB20-0608-1111

Laboratory: Empirical Laboratories, LLC | SDG: 1111112
Client: CH2M Hill, Inc. | Project: Vieques CTO-113
Matrix: Solid | Laboratory ID: 1111112-01 | File ID: 1111201.D
Sampled: 11/10/11 08:25 | Prepared: 11/18/11 00:00 | Analyzed: 11/18/11 11:09
Solids: 96.14 | Preparation: 5035 | Dilution: 1
Batch: 1K13008 | Sequence: 1K32503 | Calibration: 1321002 | Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		1.23	2.45	4.91	U
75-00-3	Chloroethane		1.23	2.45	4.91	U
67-66-3	Chloroform		1.23	2.45	4.91	U
75-34-3	1,1-Dichloroethane		1.23	2.45	4.91	U
107-06-2	1,2-Dichloroethane		1.23	2.45	4.91	U
75-35-4	1,1-Dichloroethene		1.23	2.45	4.91	U
156-59-2	cis-1,2-Dichloroethene		1.23	2.45	4.91	U
156-60-5	trans-1,2-Dichloroethene		1.23	2.45	4.91	U
75-09-2	Methylene chloride		2.45	4.91	9.81	U
127-18-4	Tetrachloroethene		1.23	2.45	4.91	U
71-55-6	1,1,1-Trichloroethane		1.23	2.45	4.91	U
79-01-6	Trichloroethene		1.23	2.45	4.91	U
75-01-4	Vinyl chloride		1.23	2.45	4.91	U

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
Bromofluorobenzene	29.44	28.40	96.5	85 - 120	
Dibromofluoromethane	29.44	30.14	102	80 - 125	
1,2-Dichloroethane-d4	29.44	32.22	109	75 - 140	
Toluene-d8	29.44	30.43	103	85 - 115	

LM 02/27/12

011

ANALYSIS DATA SHEET

VEP4-SB20P-0608-1111

Laboratory: Empirical Laboratories, LLC | SDG: 1111112
Client: CH2M Hill, Inc. | Project: Vieques CTO-113
Matrix: Solid | Laboratory ID: 1111112-02 | File ID: 1111202.D
Sampled: 11/10/11 08:30 | Prepared: 11/18/11 00:00 | Analyzed: 11/18/11 11:37
Solids: 97.06 | Preparation: 5035 | Dilution: 1
Batch: 1K13008 | Sequence: 1K32503 | Calibration: 1321002 | Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		1.41	2.82	5.64	U
75-00-3	Chloroethane		1.41	2.82	5.64	U
67-66-3	Chloroform		1.41	2.82	5.64	U
75-34-3	1,1-Dichloroethane		1.41	2.82	5.64	U
107-06-2	1,2-Dichloroethane		1.41	2.82	5.64	U
75-35-4	1,1-Dichloroethene		1.41	2.82	5.64	U
156-59-2	cis-1,2-Dichloroethene		1.41	2.82	5.64	U
156-60-5	trans-1,2-Dichloroethene		1.41	2.82	5.64	U
75-09-2	Methylene chloride		2.82	5.64	11.3	U
127-18-4	Tetrachloroethene		1.41	2.82	5.64	U
71-55-6	1,1,1-Trichloroethane		1.41	2.82	5.64	U
79-01-6	Trichloroethene		1.41	2.82	5.64	U
75-01-4	Vinyl chloride		1.41	2.82	5.64	U

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
Bromofluorobenzene	31.82	31.82	94.1	85 - 120	
Dibromofluoromethane	33.82	34.11	101	80 - 125	
1,2-Dichloroethane-d4	33.82	36.59	108	75 - 140	
Toluene-d8	33.82	34.76	103	85 - 115	

LM 02/27/12

011

ANALYSIS DATA SHEET

VEP4-EB03-111011

Laboratory: Empirical Laboratories, LLC | SDG: 1111112
Client: CH2M Hill, Inc. | Project: Vieques CTO-113
Matrix: Water | Laboratory ID: 1111112-03 | File ID: 1111203.D
Sampled: 11/10/11 10:45 | Prepared: 11/17/11 00:00 | Analyzed: 11/17/11 14:09
Solids: | Preparation: 5030B | Dilution: 1
Batch: 1K17018 | Sequence: 1K32216 | Calibration: 1320003 | Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	U
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride	0.673	0.500	1.00	2.00	J
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.250	0.500	1.00	U
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.54	95.1	75 - 120	
Dibromofluoromethane	30.00	34.91	116	85 - 115	*
1,2-Dichloroethane-d4	30.00	31.40	105	70 - 120	
Toluene-d8	30.00	28.99	96.6	85 - 120	

SSH

LM 02/27/12

012

ANALYSIS DATA SHEET

VEP4-TB03-111011

Laboratory: Empirical Laboratories, LLC | SDG: 1111112
Client: CH2M Hill, Inc. | Project: Vieques CTO-113
Matrix: Water | Laboratory ID: 1111112-04 | File ID: 1111204.D
Sampled: 11/10/11 00:00 | Prepared: 11/17/11 00:00 | Analyzed: 11/17/11 14:36
Solids: | Preparation: 5030B | Dilution: 1
Batch: 1K17018 | Sequence: 1K32216 | Calibration: 1320003 | Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	U
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.250	0.500	1.00	U
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.10	97.0	75 - 120	
Dibromofluoromethane	30.00	34.06	114	85 - 115	
1,2-Dichloroethane-d4	30.00	33.69	112	70 - 120	
Toluene-d8	30.00	28.17	93.9	85 - 120	

LM 02/27/12

013

ANALYSIS DATA SHEET

Matrix Spike

Laboratory: Empirical Laboratories, LLC | SDG: 1111112
Client: CH2M Hill, Inc. | Project: Vieques CTO-113
Matrix: | Laboratory ID: 1K18008-MS1 | File ID: 1111201M.D
Sampled: | Prepared: | Analyzed: 11/18/11 16:33
Solids: | Preparation: 5035 | Dilution:
Batch: 1K18008 | Sequence: 1K32503 | Calibration: 1321002 | Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride	45.93	1.40	2.81	5.62	
75-00-3	Chloroethane	48.23	1.40	2.81	5.62	
67-66-3	Chloroform	43.81	1.40	2.81	5.62	
75-34-3	1,1-Dichloroethane	44.27	1.40	2.81	5.62	
107-06-2	1,2-Dichloroethane	39.67	1.40	2.81	5.62	
75-35-4	1,1-Dichloroethene	46.66	1.40	2.81	5.62	
156-59-2	cis-1,2-Dichloroethene	49.44	1.40	2.81	5.62	
156-60-5	trans-1,2-Dichloroethene	47.74	1.40	2.81	5.62	
75-09-2	Methylene chloride	43.50	2.81	5.62	11.2	
127-18-4	Tetrachloroethene	53.86	1.40	2.81	5.62	
71-55-6	1,1,1-Trichloroethane	47.17	1.40	2.81	5.62	
79-01-6	Trichloroethene	45.32	1.40	2.81	5.62	
75-01-4	Vinyl chloride	60.83	1.40	2.81	5.62	

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
Bromofluorobenzene	33.70	34.79	103	85 - 120	
Dibromofluoromethane	33.70	32.09	95.2	80 - 125	
1,2-Dichloroethane-d4	33.70	29.23	86.8	75 - 140	
Toluene-d8	33.70	36.26	108	85 - 115	

WM 02/27/12

014

ANALYSIS DATA SHEET

Matrix Spike Dup

Laboratory: Empirical Laboratories, LLC | SDG: 1111112
Client: CH2M Hill, Inc. | Project: Vieques CTO-113
Matrix: | Laboratory ID: 1K18008-MSD1 | File ID: 1111201S.D
Sampled: | Prepared: | Analyzed: 11/18/11 17:02
Solids: | Preparation: 5035 | Dilution:
Batch: 1K18008 | Sequence: 1K32503 | Calibration: 1321002 | Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride	47.91	1.39	2.78	5.57	
75-00-3	Chloroethane	49.81	1.39	2.78	5.57	
67-66-3	Chloroform	46.55	1.39	2.78	5.57	
75-34-3	1,1-Dichloroethane	45.39	1.39	2.78	5.57	
107-06-2	1,2-Dichloroethane	42.05	1.39	2.78	5.57	
75-35-4	1,1-Dichloroethene	48.95	1.39	2.78	5.57	
156-59-2	cis-1,2-Dichloroethene	51.38	1.39	2.78	5.57	
156-60-5	trans-1,2-Dichloroethene	50.65	1.39	2.78	5.57	
75-09-2	Methylene chloride	45.87	2.78	5.57	11.1	
127-18-4	Tetrachloroethene	58.86	1.39	2.78	5.57	
71-55-6	1,1,1-Trichloroethane	48.53	1.39	2.78	5.57	
79-01-6	Trichloroethene	48.11	1.39	2.78	5.57	
75-01-4	Vinyl chloride	64.43	1.39	2.78	5.57	

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
Bromofluorobenzene	33.41	34.22	102	85 - 120	
Dibromofluoromethane	33.41	31.71	95.0	80 - 125	
1,2-Dichloroethane-d4	33.41	31.06	93.0	75 - 140	
Toluene-d8	33.41	36.29	109	85 - 115	

WM 02/27/12

015

SDG# 1111092

016

ANALYSIS DATA SHEET

VEP4-SB19-0607-1111

Laboratory: Empirical Laboratories, LLC | SDG: 1111092
Client: CH2M Hill, Inc. | Project: Vieques CTO-113
Matrix: Solid | Laboratory ID: 1111092-01 | File ID: 1109201.D
Sampled: 11/09/11 08:00 | Prepared: 11/11/11 00:00 | Analyzed: 11/11/11 17:11
Solids: 93.14 | Preparation: 5035 | Dilution: 1
Batch: 1K10071 | Sequence: 1K31807 | Calibration: 1291003 | Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		1.30	2.59	5.18	U
75-00-3	Chloroethane		1.30	2.59	5.18	U
67-66-3	Chloroform		1.30	2.59	5.18	U
75-34-3	1,1-Dichloroethane		1.30	2.59	5.18	U
107-06-2	1,2-Dichloroethane		1.30	2.59	5.18	U
75-35-4	1,1-Dichloroethene		1.30	2.59	5.18	U
156-59-2	cis-1,2-Dichloroethene		1.30	2.59	5.18	U
156-60-5	trans-1,2-Dichloroethene		1.30	2.59	5.18	U
75-09-2	Methylene chloride		2.59	5.18	10.4	~~U~~ B 11/14/11
127-18-4	Tetrachloroethene		1.30	2.59	5.18	U
71-55-6	1,1,1-Trichloroethane		1.30	2.59	5.18	U
79-01-6	Trichloroethene		1.30	2.59	5.18	U
75-01-4	Vinyl chloride		1.30	2.59	5.18	U

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
Bromofluorobenzene	31.09	26.62	85.6	85 - 120	
Dibromofluoromethane	31.09	29.33	94.3	80 - 125	
1,2-Dichloroethane-d4	31.09	29.28	94.2	75 - 140	
Toluene-d8	31.09	30.64	98.6	85 - 115	

WM 02/27/12

017

ANALYSIS DATA SHEET

VEP4-EB02-110811

Laboratory: Empirical Laboratories, LLC SDG: 1111092
Client: CH2M Hill, Inc. Project: Vieques CTO-113
Matrix: Water Laboratory ID: 1111092-02 File ID: 1109202.D
Sampled: 11/08/11 09:20 Prepared: 11/15/11 00:00 Analyzed: 11/15/11 12:20
Solids: Preparation: 5030B Dilution: 1
Batch: 1K15018 Sequence: 1K11909 Calibration: 1258002 Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	~~0.1 U~~ BSL
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride	0.601	0.500	1.00	2.00	J
127-18-4	Tetrachloroethene		0.250	0.500	1.00	~~0.1 U~~ BSL
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.250	0.500	1.00	U
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.13	100	75 - 120	
Dibromofluoromethane	30.00	26.33	87.8	85 - 115	
1,2-Dichloroethane-d4	30.00	29.42	98.1	70 - 120	
Toluene-d8	30.00	34.61	115	85 - 120	X

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ANALYSIS DATA SHEET

VEP4-TB02-110811

Laboratory: Empirical Laboratories, LLC SDG: 1111092
Client: CH2M Hill, Inc. Project: Vieques CTO-113
Matrix: Water Laboratory ID: 1111092-03 File ID: 1109203.D
Sampled: 11/08/11 00:00 Prepared: 11/15/11 00:00 Analyzed: 11/15/11 12:57
Solids: Preparation: 5030B Dilution: 1
Batch: 1K15018 Sequence: 1K11909 Calibration: 1258002 Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	~~0.1 U~~ BSL
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	~~0.1 U~~ BSL
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.250	0.500	1.00	U
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.79	99.3	75 - 120	
Dibromofluoromethane	30.00	27.01	90.0	85 - 115	
1,2-Dichloroethane-d4	30.00	29.79	99.3	70 - 120	
Toluene-d8	30.00	34.34	115	85 - 120	X

WM 022112

019

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USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 1111112 and 1111092 LAB: Empirical

SITE NAME: CTO-113 Vieques

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. VOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓

1.3 Sample Conditions/Problems

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USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ✓

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"0J".

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ✓

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

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HOLDING TIME SUMMARY
SW8260B

Laboratory: Empirical Laboratories, LLC SDG: 1111112
Client: CH2M Hill, Inc. Project: Vieques CTO-113

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
VEP4-SB20-0608-1111	11/10/11 08:23	11/11/11 08:35	11/18/11 00:00	N/A	14.00	11/18/11 11:09	8.16	14.00	
VEP4-SB20P-0608-1111	11/10/11 08:30	11/11/11 08:35	11/18/11 00:00	N/A	14.00	11/18/11 11:37	8.17	14.00	
VEP4-EB03-111011	11/10/11 10:45	11/11/11 08:35	11/17/11 00:00	N/A	14.00	11/17/11 14:09	7.15	14.00	
VEP4-TB03-111011	11/09/11 00:00	11/11/11 08:35	11/17/11 00:00	N/A	14.00	11/17/11 14:38	7.65	14.00	

022

HOLDING TIME SUMMARY
SW8260B

Laboratory: Empirical Laboratories, LLC SDG: 1111092
Client: CH2M Hill, Inc. Project: Vieques CTO-113

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
VEP4-SB19-0607-1111	11/08/11 08:00	11/09/11 08:15	11/17/11 00:00	N/A	14.00	11/17/11 17:11	3.42	14.00	
VEP4-EB02-110811	11/08/11 09:30	11/09/11 08:15	11/15/11 00:00	N/A	14.00	11/15/11 12:30	7.17	14.00	
VEP4-TB02-110811	11/08/11 00:00	11/09/11 08:15	11/15/11 00:00	N/A	14.00	11/15/11 12:57	7.58	14.00	

023

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water ☑ ___ ___

b. Soil ☐ ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water ☑ ___ ___

b. Soil ☐ ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. ☑ ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? ☑ ___ ___

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. ☑ ___ ___

If yes, were samples reanalyzed? ☐ ✓ ___

Were method blanks reanalyzed? ☐ ___ ✓

SURROGATE STANDARD RECOVERY AND RT SUMMARY

SW8260B

Laboratory: Empirical Laboratories, LLC — SDG: 111112

Client: CH2M Hill, Inc. — Project: Vieques CTO-113

Sequence: 1K32216 — Instrument: MS-VOA3

Calibration: 120003

Surrogate Compound	Spike Level	% Recovery	Recovery Limits	RT	CCV RT	RT Diff	RT Diff Limit	Q
Calibration Check (1K32216-CCV1) ug/L				Lab File ID: 1117CCV1.D		Analyzed: 11/17/11 10:33		
Bromofluorobenzene	30.00	105	80 - 120	12.262	12.262	0.0000	+/-1.000	
Dibromofluoromethane	30.00	101	80 - 120	6.878	6.878	0.0000	+/-1.000	
1,2-Dichloroethane-d4	30.00	103	80 - 120	7.383	7.383	0.0000	+/-1.000	
Toluene-d8	30.00	95.5	80 - 120	9.622	9.622	0.0000	+/-1.000	
LCS (1K17018-BS1) ug/L				Lab File ID: 1117LCS1.D		Analyzed: 11/17/11 11:00		
Bromofluorobenzene	30.00	102	75 - 120	12.262	12.262	0.0000	+/-1.000	
Dibromofluoromethane	30.00	105	85 - 115	6.878	6.878	0.0000	+/-1.000	
1,2-Dichloroethane-d4	30.00	103	70 - 120	7.383	7.383	0.0000	+/-1.000	
Toluene-d8	30.00	97.1	85 - 120	9.628	9.622	0.0060	+/-1.000	
Blank (1K17018-BLK1) ug/L				Lab File ID: 1117BLK1.D		Analyzed: 11/17/11 12:19		
Bromofluorobenzene	30.00	97.2	75 - 120	12.262	12.262	0.0000	+/-1.000	
Dibromofluoromethane	30.00	111	85 - 115	6.878	6.878	0.0000	+/-1.000	
1,2-Dichloroethane-d4	30.00	109	70 - 120	7.383	7.383	0.0000	+/-1.000	
Toluene-d8	30.00	100	85 - 120	9.622	9.622	0.0000	+/-1.000	
VEP4-EB03-111011 (1111112-03) ug/L				Lab File ID: 1111203.D		Analyzed: 11/17/11 14:09		
Bromofluorobenzene	30.00	95.3	75 - 120	12.269	12.262	0.0070	+/-1.000	
Dibromofluoromethane	30.00	116	85 - 115	6.878	6.878	0.0000	+/-1.000	* J
1,2-Dichloroethane-d4	30.00	105	70 - 120	7.383	7.383	0.0000	+/-1.000	
Toluene-d8	30.00	96.6	85 - 120	9.628	9.622	0.0060	+/-1.000	
VEP4-TB03-111011 (1111112-04) ug/L				Lab File ID: 1111204.D		Analyzed: 11/17/11 14:36		
Bromofluorobenzene	30.00	97.0	75 - 120	12.262	12.262	0.0000	+/-1.000	
Dibromofluoromethane	30.00	114	85 - 115	6.879	6.878	0.0010	+/-1.000	
1,2-Dichloroethane-d4	30.00	112	70 - 120	7.383	7.383	0.0000	+/-1.000	
Toluene-d8	30.00	93.9	85 - 120	9.628	9.622	0.0060	+/-1.000	

026

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] ✓ ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

027

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ ✓

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [✓] ___ ___

028

PREPARATION BATCH SUMMARY

SW8260B

Laboratory: Empirical Laboratories, LLC — SDG: 111092

Client: CH2M Hill, Inc. — Project: Vieques CTO-113

Batch: 1K15018 — Batch Matrix: Water — Preparation: 5030B

SAMPLE NAME	LAB SAMPLE ID	DATE PREPARED	INITIAL VOL./WEIGHT	FINAL VOL.
VEP4-EB02-110811	1111092-02	11/15/11 00:00	5.00	5.00
VEP4-TB02-110811	1111092-03	11/15/11 00:00	5.00	5.00
Blank	1K15018-BLK1	11/15/11 00:00	5.00	5.00
LCS	1K15018-BS1	11/15/11 00:00	5.00	5.00

029

LCS / LCS DUPLICATE RECOVERY
SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	1111092
Client:	CH2M Hill, Inc.	Project:	Vieques CTO-113
Matrix:	Water		
Batch:	1K15018	Laboratory ID:	1K15018-BS1
Preparation:	5030B	Initial/Final:	5 mL / 5 mL

ANALYTE	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	LCS % REC	QC LIMITS REC
Carbon tetrachloride	50.00	40.2	80.4	65 - 140
Chloroethane	50.00	48.0	95.9	60 - 135
Chloroform	50.00	40.2	80.5	65 - 135
1,1-Dichloroethane	50.00	41.1	82.2	70 - 135
1,2-Dichloroethane	**50.00**	**34.1**	**68.2**	**70 - 130**
1,1-Dichloroethene	50.00	42.1	84.1	70 - 130
cis-1,2-Dichloroethene	50.00	45.3	90.5	70 - 125
trans-1,2-Dichloroethene	50.00	45.4	90.7	60 - 140
Methylene chloride	50.00	39.6	79.2	55 - 140
Tetrachloroethene	50.00	57.9	116	45 - 150
1,1,1-Trichloroethane	50.00	40.1	80.1	65 - 130
Trichloroethene	50.00	44.2	88.4	70 - 125
Vinyl chloride	50.00	48.1	96.2	50 - 145

J UJ

C30

PREPARATION BATCH SUMMARY
SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	1111112
Client:	CH2M Hill, Inc.	Project:	Vieques CTO-113
Batch:	1K18008 Batch Matrix: Solid	Preparation:	5035

SAMPLE NAME	LAB SAMPLE ID	DATE PREPARED	INITIAL VOL./WEIGHT	FINAL VOL.
VEP4-SB20-0608-1111	1111112-01	11/08/11 00:00	5.00	5.00
VEP4-SB207-0608-1111	1111112-02	11/08/11 00:00	4.57	5.00
Blank	1K18008-BLK1	11/08/11 00:00	5.00	5.00
LCS	1K18008-BS1	11/08/11 00:00	5.00	5.00
VEP4-SB20-0608-1111	1K18008-MS1	11/08/11 00:00	4.83	5.00
VEP4-SB20-0608-1111	1K18008-MSD1	11/08/11 00:00	4.67	5.00

no qual

C31

LCS / LCS DUPLICATE RECOVERY
SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	1111112
Client:	CH2M Hill, Inc.	Project:	Vieques CTO-113
Matrix:	Solid		
Batch:	1K18008	Laboratory ID:	1K18008-BS1
Preparation:	5035	Initial/Final:	5 g / 5 mL

ANALYTE	SPIKE ADDED (ug/Kg wet)	LCS CONCENTRATION (ug/Kg wet)	LCS % REC	QC LIMITS REC
Carbon tetrachloride	50.00	55.70	111	65 - 135
Chloroethane	50.00	59.58	119	40 - 159
Chloroform	50.00	53.33	107	70 - 125
1,1-Dichloroethane	50.00	53.66	107	75 - 125
1,2-Dichloroethane	50.00	52.21	104	70 - 135
1,1-Dichloroethene	50.00	55.40	111	65 - 135
cis-1,2-Dichloroethene	50.00	59.03	118	65 - 125
trans-1,2-Dichloroethene	50.00	54.93	110	65 - 135
Methylene chloride	50.00	52.95	106	55 - 140
Tetrachloroethene	50.00	63.48	127	65 - 140
1,1,1-Trichloroethane	50.00	55.88	112	70 - 135
Trichloroethene	50.00	54.64	109	75 - 125
Vinyl chloride	**50.00**	**71.56**	**143**	**60 - 125**

J

assoc. samples had MS/D for this compd - no qual

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USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent) SDG# 1111112 MS/MSD VEP4-SB20-0608-1111

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? Y ___ ___

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? Y ___ ___

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

C33

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month (page 8000C, section 9.5.1)

a. Water [✓] ___ ___

b. Waste [ ] ___ ___

c. Soil/Solid [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [✓] ___ ___

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] [✓] ___

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? [✓] ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? [✓] ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? [✓] ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? [✓] ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. [✓] ___ ___

No qual

PREPARATION BATCH SUMMARY

SW8260B

Laboratory: Empirical Laboratories, LLC SDG: 1111092

Client: CH2M Hill, Inc. Project: Vieques CTO-113

Batch: 1K10021 Batch Matrix: Solid Preparation: 5035

SAMPLE NAME	LAB SAMPLE ID	DATE PREPARED	INITIAL VOL./WEIGHT	FINAL VOL.
VEPA-SB19-0605-1111	1111092-01	11/11/11 00:00	5.10	5.00
Blank	1K10021-BLK1	11/11/11 00:00	5.00	5.00
LCS	1K10021-BS1	11/11/11 00:00	5.00	5.00
LCS Dup	1K10021-BSD1	11/11/11 00:00	5.00	5.00

No qual

ANALYSIS DATA SHEET

Blank

Laboratory:	Empirical Laboratories, LLC		SDG:	1111092	
Client:	CH2M HILL Inc.		Project:	Vincom CTO-113	
Matrix:		Laboratory ID:	1K10021-BLK1	File ID:	1111BLK1.D
Sampled:		Prepared:		Analyzed:	11/11/11 09:45
Solids:		Preparation:	5035	Dilution:	

Batch: 1K10021 Sequence: 1K31807 Calibration: 1293001 Instrument: MS-VOA5

CAS NO.	COMPOUND	DNC (ug/Kg wet)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		1.25	2.50	5.00	U
75-00-3	Chloroethane		1.25	2.50	5.00	U
67-66-3	Chloroform		1.25	2.50	5.00	U
75-34-3	1,1-Dichloroethane		1.25	2.50	5.00	U
107-06-2	1,2-Dichloroethane		1.25	2.50	5.00	U
75-35-4	1,1-Dichloroethene		1.25	2.50	5.00	U
156-59-2	cis-1,2-Dichloroethene		1.25	2.50	5.00	U
156-60-5	trans-1,2-Dichloroethene		1.25	2.50	5.00	U
75-09-2	Methylene chloride	3.20	2.50	5.00	10.0	J
127-18-4	Tetrachloroethene		1.25	2.50	5.00	U
71-55-6	1,1,1-Trichloroethane		1.25	2.50	5.00	U
79-01-6	Trichloroethene		1.25	2.50	5.00	U
75-01-4	Vinyl chloride		1.25	2.50	5.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg wet)	CONC (ug/Kg wet)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.28	90.9	85 - 120	
Dibromofluoromethane	30.00	27.20	90.7	80 - 125	
1,2-Dichloroethane-d4	30.00	24.16	80.5	75 - 140	
Toluene-d8	30.00	30.92	103	85 - 115	

038

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ✓ ___ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.) no qual

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

VEP4-EB02-110811
methylene chloride 0.601J

VEP4-EB03-111011 0.673J
Methylene chloride

trip blanks - no Q

039

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contamination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone
** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

040

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

041

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

C42

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates ✓ ___ ___

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ✓ ___ ___

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? ✓ ___ ___

C43

YES NO N/A

Resolution? ✓ ___ ___

Peak shape? ✓ ___ ___

Full-scale graph (attenuation)? ✓ ___ ___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? ✓ ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? ✓ ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ✓ ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ✓ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

C44

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

No TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? ___ ___ ✓

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate ___ ___ ✓

b. Blanks ___ ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

C45

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ ✓

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ ✓

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] ✓ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ ✓

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [ ] ✓ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? [ ] ✓ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39)qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? [ ] ✓ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. [ ] ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? [ ] ✓ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) [ ] ✓ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? ✓ ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). ✓ ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ANALYSIS SEQUENCE SUMMARY
SW8260B

Laboratory: Empirical Laboratories, LLC
SDG: 1111092
Client: CH2M Hill, Inc.
Project: Vieques CTO-113
Sequence: 1I29112
Instrument: MS-VOA5
Calibration: 1293003

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
MS Tune	1I29112-TUN1	1019TU1.D	10/19/11 06:33
Cal Standard	1I29112-CAL1	SEQCAL1.D	10/19/11 07:28
Cal Standard	1I29112-CAL2	SEQCAL2.D	10/19/11 07:55
Cal Standard	1I29112-CAL4	SEQCAL4.D	10/19/11 08:49
Cal Standard	1I29112-CAL5	SEQCAL5.D	10/19/11 09:16
Cal Standard	1I29112-CAL6	SEQCAL6.D	10/19/11 09:43
Cal Standard	1I29112-CAL7	SEQCAL7.D	10/19/11 10:11
Cal Standard	1I29112-CAL8	SEQCAL8.D	10/19/11 10:38
Initial Cal Check	1I29112-ICV1	SEQICV1.D	10/19/11 11:32

ANALYSIS SEQUENCE SUMMARY
SW8260B

Laboratory: Empirical Laboratories, LLC
SDG: 1111092
Client: CH2M Hill, Inc.
Project: Vieques CTO-113
Sequence: 1K31807
Instrument: MS-VOA5
Calibration: 1293003

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
MS Tune	1K31807-TUN1	1111TU1.D	10/11/11 06:25
Calibration Check	1K31807-CCV1	1111CCV1.D	10/11/11 06:52
LCS	1K10021-BS1	1111LCS1.D	10/11/11 07:29
Blank	1K10021-BLK1	1111BLK1.D	10/11/11 09:45
VEM-SB19-0607-1111	1111092-01	1109261.D	10/11/11 17:11
LCS Dup	1K10021-BSD1	1110LCDE.D	10/11/11 18:05

INITIAL CALIBRATION DATA (Continued)
SW8260B

Laboratory: Empirical Laboratories, LLC
SDG: 1111092
Client: CH2M Hill, Inc.
Project: Vieques CTO-113
Calibration: 1293003
Instrument: MS-VOA5
Matrix: Water
Calibration Dates: 10/19/11 7:28 10/19/11 10:38

Compound	Mean RF	RF RSD	Mean RT	RT RSD	Linear r	Quad COD	LIMIT	Q
1,4-Dichlorobenzene	1.418774	6.802571	11.44129	2.970327E-02			15	
Dichlorodifluoromethane	0.4534663	12.84592	1.868286	6.612172			15	
1,1-Dichloroethane	0.8461138	6.848483	5.714724	6.004556E-02			SPCC (0.1)	
1,2-Dichloroethane	0.5535695	6.388359	7.445852	4.320285E-02			15	
1,1-Dichloroethene	0.3786163	9.853904	4.185457	3.227913E-02			CCC (20)	
cis-1,2-Dichloroethene	0.4109428	7.697506	6.426714	7.534808E-02			15	
trans-1,2-Dichloroethene	0.4062641	8.398421	5.338714	4.917615E-02			15	
1,2-Dichloroethane (max)	0.4656634	8.038725	0	0			15	
1,2-Dichloropropane	0.4615869	7.380831	6.428271	4.940264E-02			CCC (20)	
1,3-Dichloropropane	1.018899	6.042634	10.02214	3.775604E-02			15	
2,2-Dichloropropane	0.6142563	8.423934	6.534	5.204119E-02			15	
1,1-Dichloropropene	0.6139889	10.08832	7.467143	2.374999E-02			15	
cis-1,3-Dichloropropene	0.6120931	10.54339	9.141572	2.819924E-02			15	
trans-1,3-Dichloropropene	1.127884	9.123825	9.653857	0.0369569			15	
Dimethyl Ether	1.844724	5.86504	6.081286	6.739131E-02			15	
Diethylether	1.208889	9.56375	11.1881	0.0274715			CCC (20)	
Ethyl tert-Butyl Ether	1.131302	8.382719	6.352	3.057946E-02			15	
Ethyl Methacrylate	0.8520671	7.775286	9.844714	5.734717E-02			15	
Hexachlorobutadiene	0.5130279	11.14701	13.1571	1.485464E-02			15	
2-Hexanone	0.9310943	7.684718	9.958857	2.976021E-02			15	
Indenotriene	0.1314894	18.7176	6.181714	6.937318E-02	0.9981357	NT	0.995	
Isopropylbenzene	2.398352	8.151767	11.69929	2.031289E-02			15	
p-Isopropyltoluene	2.630321	7.959175	14.39914	1.520915E-02			15	
Methylene chloride	0.5552896	31.14323	4.684571	1.198686E-02	0.9997563	J NJ	0.995	
Methyl Acetate	0.7807975	2.132829	4.576666	3.194051E-02			15	
Methylcyclohexane	0.6412842	10.91016	8.790837	2.987233E-02			15	
Naphthalene	0.9679416	8.179872	13.63314	2.103868E-02			15	
Methyl Methacrylate	0.5276701	5.876393	5.519141	4.852519E-02			15	
4-Methyl-2-pentanone	0.6896837	5.878161	9.104286	3.794899E-02			15	
Methyl t-Butyl Ether	0.9511913	8.834413	5.216286	0.047289			15	
n-Propylbenzene	4.508665	6.280236	12.50943	2.804332E-02			15	
Styrene	1.613149	9.594858	11.63857	2.569838E-02			15	

ANALYSIS SEQUENCE SUMMARY
SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	1111092
Client:	CH2M Hill, Inc.	Project:	Vieques CTO-113
Sequence:	1K31909	Instrument:	MS-VOA6
Calibration:	1258002		

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
MS Tune	1K31909-TUN1	1115TUN1.D	11/15/11 07:57
Calibration Check	1K31909-CCV1	1115CCV1.D	11/15/11 08:24
LCS	1K15018-BS1	1115LCS1.D	11/15/11 08:58
Blank	1K15018-BLK1	1115BLK1.D	11/15/11 10:16
VEP4-EB02-110811	1111092-02	1109202.D	11/15/11 12:30
VEP4-TB05-110811	1111092-03	1109203.D	11/15/11 12:57

054

CONTINUING CALIBRATION CHECK
SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	1111092
Client:	CH2M Hill, Inc.	Project:	Vieques CTO-113
Instrument ID:	MS-VOA6	Calibration:	1258002
Lab File ID:	1115CCV1.D	Calibration Date:	09/13/11 14:57
Sequence:	1K31909	Injection Date:	11/15/11
Lab Sample ID:	1K31909-CCV1	Injection Time:	08:24

		CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
COMPOUND	TYPE	STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT (#)
Carbon tetrachloride	A	100.0	85.56	0.3446436	0.2948782		-14.4	20
Chloroethane	A	100.0	90.34	0.1625273	0.1468322		-9.7	20
Chloroform	A	100.0	83.43	0.5218466	0.4353982		-16.6	20
1,1-Dichloroethane	A	100.0	85.83	0.5652557	0.4851757	0.1	-14.2	20
1,2-Dichloroethane	A	100.0	72.65	0.5270445	0.3828881		-27.4	20 *
1,1-Dichloroethene	A	100.0	96.58	0.1954271	0.1887449		-3.4	20
cis-1,2-Dichloroethene	A	100.0	93.96	0.2829685	0.265869		-6.0	20
trans-1,2-Dichloroethene	A	100.0	95.79	0.2506448	0.240088		-4.2	20
Methylene chloride	A	100.0	83.43	0.2438477	0.2034433		-16.6	20
Tetrachloroethene	A	100.0	120.7	0.4829744	0.5827682		20.7	20 *
1,1,1-Trichloroethane	A	100.0	84.08	0.4166082	0.3502721		-15.9	20
Trichloroethene	A	100.0	92.03	0.2737895	0.2520209		-8.0	20
Vinyl chloride	A	100.0	81.16	0.2569739	0.2085693		-18.8	20
Bromofluorobenzene	A	30.00	30.96	0.878475	0.9067285		3.2	20
Dibromofluoromethane	A	30.00	27.00	0.3115604	0.2804483		-10.0	20
1,2-Dichloroethane-d4	A	30.00	28.37	6.496203E-02	6.143014E-02		-5.4	20
Toluene-d8	A	30.00	36.03	1.972531	2.370545		20.2	20 *

Column to be used to flag Response Factor and %Diff/Drift values with an asterisk

* Values outside of QC limits

055

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? [ ] ✓ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds in section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? ✓ ___ ___

056

- 28 VOA -

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION: 1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.

2. Do not qualify non-detects when the associated IS are counts area > + 100%.

3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".

4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

057

- 29 VOA -

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ✓ ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

VEP4-SB20-0608-1111
VEP4-SB20P-0608-1111 > no Q

- 30 VOA -

C58

From: DataQual Environmental Services, LLC
To: "sgordon@empirlabs.com"
Cc: "Hillary Ott"; "Michael.Zamboni@CH2M.com"; "Jacqueline Cleveland"
Subject: RE: Vieques CTO-113 VOA fraction
Date: Monday, February 27, 2012 3:53:00 PM

Sonya,

The lab is correct that the non-compliance were only slightly out of QC range. Sample VEP4-EB03-111011 in SDG# 1111112 did exhibit one positive result, but it is below the LOD. I will just add a statement in the report that the samples were not re-analyzed.

Thank you,
Laura

From: Sonya Gordon [mailto:sgordon@empirlabs.com]
Sent: Monday, February 27, 2012 3:12 PM
To: 'DataQual Environmental Services, LLC'
Cc: 'Hillary Ott'; Michael.Zamboni@CH2M.com; 'Jacqueline Cleveland'
Subject: RE: Vieques CTO-113 VOA fraction

Hi Laura,

I've been told the following concerning these samples.

"As there were no target analytes detected in the samples and surrogate recovery showed a borderline high bias, reanalysis was not performed."

Please let me know if you need further information.

Sonya Gordon
Project Manager
Empirical Laboratories, LLC
Main: 615.345.1115 ext. 238 I Fax: 866.417.0548

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From: DataQual Environmental Services, LLC [mailto:dataqual@charter.net]
Sent: Monday, February 27, 2012 8:01 AM
To: sgordon@empirlabs.com
Cc: Hillary Ott; Michael.Zamboni@CH2M.com; 'Jacqueline Cleveland'
Subject: Vieques CTO-113 VOA fraction

Hi Sonya,

C59

For project CTO-113, two of the data packages (SDG# 1111112 and 1111132) had samples with non-compliant surrogates. I am not seeing that these samples were re-analyzed. Please check sample VEP4-EB03-111011 in SDG3 1111112 and sample VEP4-EB04-111111 in SDG# 1111132 and confirm if these samples were re-analyzed; if these samples were re-analyzed please submit the data and forms for the re-analysis.

Thank you,
Laura

Laura Maschhoff
DataQual Environmental Services, LLC
dataqual@charter.net

C61

From: Hillary Ott@CH2M.com
To: dataqual@charter.net
Subject: RE: Vieques CTO-113 VOA fraction
Date: Monday, February 27, 2012 10:36:55 AM

Hi Laura,

I will be over nighting revised form 1s for two samples in SDG 1111180. The sample IDs were incorrect and the lab sent revised pages with the updated IDs. Would you mind sticking them into the data packages?

Thanks,

Hillary Ott
Environmental Information Specialist
CH2M HILL
15010 Conference Center Drive
Chantilly, VA 20151

From: DataQual Environmental Services, LLC [mailto:dataqual@charter.net]
Sent: Monday, February 27, 2012 9:01 AM
To: sgordon@empirlabs.com
Cc: Ott, Hillary/WDC; Zamboni, Michael/WDC; 'Jacqueline Cleveland'
Subject: Vieques CTO-113 VOA fraction

Hi Sonya,

For project CTO-113, two of the data packages (SDG# 1111112 and 1111132) had samples with non-compliant surrogates. I am not seeing that these samples were re-analyzed. Please check sample VEP4-EB03-111011 in SDG3 1111112 and sample VEP4-EB04-111111 in SDG# 1111132 and confirm if these samples were re-analyzed; if these samples were re-analyzed please submit the data and forms for the re-analysis.

Thank you,
Laura

Laura Maschhoff
DataQual Environmental Services, LLC
dataqual@charter.net

C61

SDG# 1111112

Sample Delivery Group Case Narrative

Receipt Information
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Changes to the Revision
This is an original submittal of the final report package.

Analytical Information
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:
The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

SW8260B:
The surrogate Dibromofluoromethane exceeded criteria with a positive bias in 1111112-03.

The batch spike associated to batch 1K18008 exceeded recovery criteria with a positive bias for Vinyl Chloride.

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

EMPIRICAL LABORATORIES, LLC - CHAIN OF CUSTODY RECORD
SHIP TO: 621 Mainstream Drive, Suite 270 • Nashville, TN 37228 • 615-245-1115 • (fax) 615-846-5426

Send Results to:
Name Hilary Oh
Company CH2M HILL
Address
City
State, Zip
Phone
Fax
E-mail

Send Invoice to:
Name ANY Clean 100-010-113
Company
Address
City
State, Zip
Phone
Fax
E-mail

Project No./Name:
Sampler's (Signature):

Analysis Requirements: 8260C

Lab Use Only:
VOA Headspace Y N NA
Field Filtered Y N NA
Correct Containers Y N NA
Discrepancies Y N NA
Cust. Seals Intact Y N NA
Containers Intact Y N NA
Airbill #:
CAR #:

Lab Use Only: Lab #	Date/Time Sampled	Sample Description	Sample Matrix	Comments	No. of Bottles	Lab Use Only: Containers/Pres.
01	11/10/11 0825	VEPH-5820-0608-1111	S	X	4	
02	11/10/11 0830	VEPH-5820P-0608-1111	S	X	3	
01	11/10/11 0825	VEPH-5820-0608-1111-MS	S	X	3	
01	11/10/11 0825	VEPH-5820-0608-1111-GD	S	X	3	
03	11/10/11 1045	VEPH-E603-111011	W	X	3	
04	11/10/11 na	VEPH-TB03-111011	W	X	2	

REMARKS:
S = Soil
W = Water

Details:
Page 1 of 1
Cooler No. 1 of 1
Date Shipped 11/10/11
Shipped By CC/SO
Turnaround

	Date/Time	Received By: (Signature)
Sample Kit Prepd by: (Signature)	Date/Time 11/10/11 1630	Received By: (Signature)
Relinquished by: (Signature)	Date/Time	Received By: (Signature)
Relinquished by: (Signature)	Date/Time	Received By: (Signature)
Received for Laboratory by: (Signature)	Date/Time 11/11/11	Temperature 4.3

Distribution: Original and yellow copies accompany sample shipment to laboratory; Pink retained by samplers.

1111112

Cooler Received/Opened On 11/11/11 @ 0835
1. Tracking # 5466 (last 4 digits, FedEx)
Courier: FED-EX
2. Temperature of rep. sample or temp blank when opened: 4.3 Degrees Celsius + correction factor 0.0 = 4.3
3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA
4. Were custody seals on outside of cooler? YES...NO...NA
If yes, how many and where: 2-FRONT & BACK
5. Were the seals intact, signed, and dated correctly? YES...NO...NA
6. Were custody papers inside cooler? YES...NO...NA
I certify that I opened the cooler and answered questions 1-6 (initial)
7. Were custody seals on containers: YES NO and intact YES...NO...NA
Were these signed and dated correctly? YES...NO...NA
8. Packing mat'l used? Bubblewrap Plastic bag Peanuts Vermiculite Foam insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry ice Other None
10. Did all containers arrive in good condition (unbroken)? YES...NO...NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES...NO...NA
12. Did all container labels and tags agree with custody papers? YES...NO...NA
13a. Were VOA vials received? YES...NO...NA
b. Was there any observable headspace present in any VOA vial? YES...NO...NA
14. Was there a Trip Blank in this cooler? YES...NO...NA If multiple coolers, sequence #
I certify that I unloaded the cooler and answered questions 7-14 (initial)
15a. Preservative, did pH test strips suggest preservation reached the correct pH level? YES...NO...NA
b. Did the bottle labels indicate that the correct preservatives were used YES...NO...NA
16. Was residual chlorine present? YES...NO...NA
I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial)
17. Were custody papers properly filled out (ink, signed, etc)? YES...NO...NA
18. Did you sign the custody papers in the appropriate place? YES...NO...NA
19. Were correct containers used for the analysis requested? YES...NO...NA
20. Was sufficient amount of sample sent in each container? YES...NO...NA
I certify that I entered this project into LIMS and answered questions 17-20 (initial)
I certify that I attached a label with the unique LIMS number to each container (initial)
21. Were there Non-Conformance issues at login? YES NO Was a NCR generated? YES...NO... #
Additional Details:

SDG# 1111092

Sample Delivery Group Case Narrative

Receipt Information
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Changes to the Revision
This is an original submittal of the final report package.

Analytical Information
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:
The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

SW8260B:
The method blank 1K10021-BLK1 has a positive result for Methylene Chloride.

The batch spike associated to batch 1K15018 exceeded recovery criteria with a negative bias for 1,2-Dichloroethane.

The continuing calibration verification 1K31909-CCV1 exceeded recovery criteria with a negative bias for 1,2-Dichloroethane and with a positive bias for Tetrachloroethene and Toluene-d8.

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

Wet Chemistry:
Sample 1111092-01 is qualified with an * for Total Organic Carbon to indicate that the sample and replicate exceeded relative percent difference criteria.

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

1111092

EMPIRICAL LABORATORIES, LLC - CHAIN OF CUSTODY RECORD
SHIP TO: 621 Mainstream Drive, Suite 270 • Nashville, TN 37228 • 615-945-1115 • (fax) 615-846-5428

Send Results to:
Name Hilary Orr
Company CH2M HILL
Address
City
State, Zip
Phone
Fax
E-mail Hilary.Orr@ch2m.com

Send Invoice to:
Name NAVFAC Lee-CTO-113
Company CH2M HILL
Address
City
State, Zip
Phone
Fax
E-mail
Sampler's (Signature): Lloyd Kahn
Project No./Name: 8260C

Analysis Requirements:

Lab Use Only:
VOA Headspace Y N NA
Field Filtered Y N NA
Correct Containers Y N NA
Discrepancies Y N NA
Cust. Seals Intact Y N NA
Containers Intact Y N NA
Airbill #
CAR #:

Lab Use Only Lab #	Date/Time Sampled	Sample Description	Sample Matrix	Comments	No. of Bottle	Lab Use Only Containerties
01	11/28/11 0800	VEPA-SB13-0607-1111	Soil	X	4	
02	11/28/11 0830	VEPA-EB09-112811	Water	X	3	
03	11/28/11 N/A	VEPA-TB02-112811	Water	X	2	

Sample Kit Prepd By: (Signature) Date/Time 11/28/11 1010 Received By: (Signature)
Relinquished by: (Signature) Date/Time Received By: (Signature)
Relinquished by: (Signature) Date/Time Received By: (Signature)
Received for Laboratory By: (Signature) Date/Time 11/1/05 Temperature 4.2

REMARKS:

Details:
Page 1 of 1
Cooler No. 1 of 1
Date Shipped 11/28/11
Shipped By CC/KB
Turnaround

Distribution: Original and yellow copies accompany sample shipment to laboratory; Pink retained by samplers.

1111092

Cooler Received/Opened On 11/09/11 @ 0615

1. Tracking # 6900 (last 4 digits, FedEx)

Courier: FED-EX

2. Temperature of rep. sample or temp blank when opened: 4.2 Degrees Celsius + correction factor 0.0 = 4.2

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA

4. Were custody seals on outside of cooler? YES NO NA

If yes, how many and where: 2-FRONT + BACK

5. Were the seals intact, signed, and dated correctly? YES NO NA

6. Were custody papers inside cooler? YES NO NA

I certify that I opened the cooler and answered questions 1-6 (initial)

7. Were custody seals on containers: YES NO and intact YES NO NA

Were these signed and dated correctly? YES NO NA

8. Packing mat'l used? Bubble Wrap Plastic Bag Peanuts Vermiculite Foam Insert Paper Other None

9. Cooling process: Ice-pack Ice (direct contact) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? YES NO NA

11. Were all container labels complete (#, date, signed, pres., etc)? YES NO NA

12. Did all container labels and tags agree with custody papers? YES NO NA

13a. Were VOA vial's received? YES NO NA

b. Was there any observable headspace present in any VOA vial? YES NO NA

14. Was there a Trip Blank in this cooler? YES NO NA If multiple coolers, sequence #

I certify that I unloaded the cooler and answered questions 7-14 (initial)

15a. Did preservative bottles, did pH test strips suggest preservation reached the correct pH level? YES NO NA

b. Did the bottle labels indicate that the correct preservatives were used YES NO NA

16. Was residual chlorine present? YES NO NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial)

17. Were custody papers properly filled out (ink, signed, etc)? YES NO NA

18. Did you sign the custody papers in the appropriate place? YES NO NA

19. Were correct containers used for the analysis requested? YES NO NA

20. Was sufficient amount of sample sent in each container? YES NO NA

I certify that I entered this project into LIMS and answered questions 17-20 (initial)

I certify that I attached a label with the unique LIMS number to each container (initial)

21. Were there Non-Conformance issues at login? YES NO Was a NCR generated? YES NO #

Additional Details:

070

DataQual
Environmental Services, LLC

CH2M HILL-VBO
15010 Conference Center Drive
Suite 200
Chantilly, VA 20151

February 28, 2012
SDG#s 1112054, 1111132, 1111138, 1111180 and 1111183, Empirical Laboratories
Vieques Island, Puerto Rico

Dear Ms. Ott,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG #s 1112054, 1111132, 1111138, 1111180 and 1111183. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Method 8260B for volatiles (8260B-Rev 2, January 2006-SOP #HW-24) and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA
SDG# 1112054			
VEP4-TB01-120711	1112054-01	water	X
VEP4-GW13-1211	1112054-02	water	X
VEP4-GW14-1211	1112054-03	water	X
VEP4-EB01-120711	1112054-04	water	X
SDG# 1111132			
VEP4-SB17-1011-1111	1111132-01	soil	X
VEP4-EB04-111111	1111132-02	water	X
VEP4-TB04-111111	1111132-03	water	X
SDG# 1111138			
VEP4-SB18-1214-1111	1111138-01	soil	X
VEP4-EB05-111511	1111138-02	water	X
VEP4-TB05-111511	1111138-03	water	X
VEP4-GW08-1111	1111138-04	water	X
VEP4-EB01-111811	1111138-05	water	X
VEP4-TB06-111511	1111138-06	water	X
SDG# 1111180			
VEP4-GW06-1111	1111180-01	water	X
VEP4-GW07-1111	1111180-02	water	X
VEP4-EB01-111711	1111180-03	water	X
VEP4-TB01-111711	1111180-04	water	X
VEP4-GW06-1111 MS	1111180-01MS	water	X
VEP4-GW06-1111 MSD	1111180-01MSD	water	X
SDG# 1111183			
VEP4-GW09-1111	1111183-01	water	X
VEP4-GW05-1111	1111183-02	water	X
VEP4-EB01-111811	1111183-03	water	X
VEP4-TB01-111811	1111183-04	water	X
VEP4-GW05P-1111	1111183-05	water	X

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The following quality control samples were provided with this SDG: samples VEP4-EB01-120711, VEP4-EB04-111111, VEP4-EB05-111511, VEP4-EB01-111511, VEP4-EB01-1111 and VEP4-EB01-111811- equipment blanks; samples VEP4-TB01-120711, VEP4-TB04-111111, VEP4-TB05-111511, VEP4-TB06-111511, VEP4-TB01-1111 and VEP4-TB01-111811- trip blanks; and sample VEP4-GW05P-1111- field duplicate of sample VEP4-GW05-1111.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries *
- Matrix Duplicate RPDs *
- Serial Dilutions *
- Field Duplicates *
- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria.

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

No qualifications to the data were required.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to chain of custody records, sampling was performed on 11/11-12/07/11 and samples were received on 11/12-12/08/11. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
No qualifications required				

CH2M HILL
Vieques, Puerto Rico – CTO-113
SDG#s 1112054, 1111132, 1111138, 1111180 and 1111183

004

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U not detected above the reported sample quantitation limit
J estimated value
UJ reported quantitation limit is qualified as estimated
N analyte has been tentatively identified
JN analyte has been tentatively identified, estimated value
R result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA The sample result for the blank contaminant is greater than the LOD (2X sample LOD for common laboratory contaminants) when the blank value is less than the LOD. The sample result for the blank contaminant is not qualified with any blank qualifiers.

U* The sample result for the blank contaminant is less than the LOD (2X sample LOD for common laboratory contaminants) but greater than the MDL when the blank value is less than the LOD. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.

LOD** The sample result for the blank contaminant is less than the LOD (2X sample LOD for common laboratory contaminants) but greater than the MDL when the blank value is less than the LOD. The sample result for the blank contaminant is changed to the LOD and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the LOD.

Inorganic Methods

ICB/CCB/PB Action:

No Action - The sample result is greater than the LOD and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the LOD, result is reported as non-detect at the LOD* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the LOD.

CH2M HILL
Vieques, Puerto Rico – CTO-113
SDG#s 1112054, 1111132, 1111138, 1111180 and 1111183

005

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the LOD and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the LOD.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the LOD.

J/UJ - Sample result is less than 10X LOD when blank result is below the negative LOD.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the LOD.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.

Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the LOD and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the LOD, result is reported as non-detect at the LOD* or at the reported concentration**, when the FB result is less or greater than the LOD.

R - Sample result is greater than the LOD and less than the FB value when the FB value is greater than the LOD.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the LOD.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the LOD.

General Abbreviations

RL reporting limit
PQL practical quantitation limit
IDL instrument detection limit
MDL method detection limit
CRQL/LOQ contract required quantitation limit
+ positive result
non-detect result

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Vieques, Puerto Rico – CTO-113
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006

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard – Low Recovery
ISH	Internal Standard – High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between random determinations
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate – High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration – Low Relative Response Factors (RRF)
ICH	Initial Calibration – High Relative Response Factors (RRF)
ICB	Initial Calibration – Bad Linearity or Curve Function
CCL	Continuing Calibration – Low Recovery or %Difference
CCH	Continuing Calibration – High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column – Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Reflandent Result – due to Re-analysis or Re-extraction
DL	Reflandent Result – due to Dilution
FD	Field Duplicate
OT	Other – explained in data validation report
%SOL	High moisture content

CH2M HILL
Vieques, Puerto Rico – CTO-113
SDG#s 1112054, 1111132, 1111138, 1111180 and 1111183

007

SDG# 1112054

008

ANALYSIS DATA SHEET

VEP4-TB01-120711

Laboratory: Empirical Laboratories, LLC SDG: 1112054
Client: CH2M Hill, Inc. Project: Vieques CTO-113
Matrix: Water Laboratory ID: 1112054-01 File ID: 1205401.D
Sampled: 12/07/11 00:00 Prepared: 12/08/11 00:00 Analyzed: 12/08/11 10:23
Solids: Preparation: 5030B Dilution: 1
Batch: 11.08008 Sequence: 11.34302 Calibration: 1339001 Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform	0.281	0.250	0.500	1.00	J
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	U
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.250	0.500	1.00	U
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.87	103	75 - 120	
Dibromofluoromethane	30.00	30.36	101	85 - 115	
1,2-Dichloroethane-d4	30.00	30.41	101	70 - 120	
Toluene-d8	30.00	29.91	99.7	85 - 120	

02.27.12

008

ANALYSIS DATA SHEET

VEP4-GW13-1211

Laboratory: Empirical Laboratories, LLC SDG: 1112054
Client: CH2M Hill, Inc. Project: Vieques CTO-113
Matrix: Water Laboratory ID: 1112054-02 File ID: 1205402.D
Sampled: 12/07/11 08:25 Prepared: 12/08/11 00:00 Analyzed: 12/08/11 14:24
Solids: Preparation: 5030B Dilution: 1
Batch: 11.08008 Sequence: 11.34302 Calibration: 1339001 Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	U
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene	1.96	0.250	0.500	1.00	
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene	87.7	0.250	0.500	1.00	
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.49	102	75 - 120	
Dibromofluoromethane	30.00	30.40	101	85 - 115	
1,2-Dichloroethane-d4	30.00	31.17	104	70 - 120	
Toluene-d8	30.00	30.02	100	85 - 120	

02.27.12

010

ANALYSIS DATA SHEET

VEP4-GW14-1211

Laboratory: Empirical Laboratories, LLC SDG: 1112054
Client: CH2M Hill, Inc. Project: Vieques CTO-113
Matrix: Water Laboratory ID: 1112054-03 File ID: 1205403.D
Sampled: 12/07/11 10:38 Prepared: 12/08/11 00:00 Analyzed: 12/08/11 14:51
Solids: Preparation: 5030B Dilution: 1
Batch: 11.08008 Sequence: 11.34302 Calibration: 1339001 Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	U
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene	5.47	0.250	0.500	1.00	
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.03	100	75 - 120	
Dibromofluoromethane	30.00	30.15	101	85 - 115	
1,2-Dichloroethane-d4	30.00	30.83	103	70 - 120	
Toluene-d8	30.00	29.64	98.8	85 - 120	

02.27.12

011

ANALYSIS DATA SHEET

VEP4-EB01-120711

Laboratory:	Empirical Laboratories, LLC		SDG:	1112054	
Client:	CH2M Hill, Inc.		Project:	Vieques CTO-113	
Matrix:	Water	Laboratory ID:	1112054-04	File ID:	1205404.D
Sampled:	12/07/11 12:25	Prepared:	12/08/11 08:00	Analyzed:	12/08/11 10:50
Solids:		Preparation:	5030B	Dilution:	1
Batch:	1L08008	Sequence:	1L34302	Calibration:	1319001

Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	U
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.250	0.500	1.00	U
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.35	101	75 - 120	
Dibromofluoromethane	30.00	30.45	101	85 - 115	
1,2-Dichloroethane-d4	30.00	31.01	103	70 - 120	
Toluene-d8	30.00	30.04	100	85 - 120	

WM 02/27/12

012

SDG# 1111132

013

ANALYSIS DATA SHEET

VEP4-SB17-1011-1111

Laboratory:	Empirical Laboratories, LLC		SDG:	1111132	
Client:	CH2M Hill, Inc.		Project:	Vieques CTO-113	
Matrix:	Soil	Laboratory ID:	1111132-03	File ID:	1113201.D
Sampled:	11/11/11 10:00	Prepared:	11/18/11 00:00	Analyzed:	11/18/11 12:04
Solids:	92.19	Preparation:	5035	Dilution:	1
Batch:	IK18008	Sequence:	IK32303	Calibration:	1321002

Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		1.31	2.62	5.25	U
75-00-3	Chloroethane		1.31	2.62	5.25	U
67-66-3	Chloroform		1.31	2.62	5.25	U
75-34-3	1,1-Dichloroethane		1.31	2.62	5.25	U
107-06-2	1,2-Dichloroethane		1.31	2.62	5.25	U
75-35-4	1,1-Dichloroethene		1.31	2.62	5.25	U
156-59-2	cis-1,2-Dichloroethene		1.31	2.62	5.25	U
156-60-5	trans-1,2-Dichloroethene		1.31	2.62	5.25	U
75-09-2	Methylene chloride		2.62	5.25	10.5	U
127-18-4	Tetrachloroethene		1.31	2.62	5.25	U
71-55-6	1,1,1-Trichloroethane		1.31	2.62	5.25	U
79-01-6	Trichloroethene		1.31	2.62	5.25	U
75-01-4	Vinyl chloride		1.31	2.62	5.25	U

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
Bromofluorobenzene	31.47	30.88	98.1	85 - 120	
Dibromofluoromethane	31.47	31.20	99.5	80 - 125	
1,2-Dichloroethane-d4	31.47	32.62	104	75 - 140	
Toluene-d8	31.47	31.88	101	85 - 115	

WM 02/27/12

014

ANALYSIS DATA SHEET

VEP4-EB04-111111

Laboratory:	Empirical Laboratories, LLC		SDG:	1111132	
Client:	CH2M Hill, Inc.		Project:	Vieques CTO-113	
Matrix:	Water	Laboratory ID:	1111132-02	File ID:	1113202.D
Sampled:	11/11/11 10:55	Prepared:	11/17/11 00:00	Analyzed:	11/17/11 13:02
Solids:		Preparation:	5030B	Dilution:	1
Batch:	IK17018	Sequence:	IK32216	Calibration:	1320003

Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	U
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.250	0.500	1.00	U
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.96	96.5	75 - 120	
Dibromofluoromethane	30.00	34.63	116	85 - 115	*
1,2-Dichloroethane-d4	30.00	32.95	110	70 - 120	
Toluene-d8	30.00	28.83	96.2	85 - 120	

WM 02/27/12

015

ANALYSIS DATA SHEET

VEP4-TB04-111111

Laboratory:	Empirical Laboratories, LLC		SDG:	1111132	
Client:	CH2M Hill, Inc.		Project:	Vieques CTO-113	
Matrix:	Water	Laboratory ID:	1111132-03	File ID:	1113203.D
Sampled:	11/11/11 00:00	Prepared:	11/17/11 00:00	Analyzed:	11/17/11 15:29
Solids:		Preparation:	5030B	Dilution:	1
Batch:	1K17018	Sequence: 1K32216	Calibration:	1320003	Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	U
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.250	0.500	1.00	U
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.30	97.7	75 - 120	
Dibromofluoromethane	30.00	34.23	114	85 - 115	
1,2-Dichloroethane-d4	30.00	33.06	110	70 - 120	
Toluene-d8	30.00	28.89	96.3	85 - 120	

016

SDG# 1111138

017

ANALYSIS DATA SHEET

VEP4-SB18-1214-1111

Laboratory:	Empirical Laboratories, LLC		SDG:	1111138	
Client:	CH2M Hill, Inc.		Project:	Vieques CTO-113	
Matrix:	Soil	Laboratory ID:	1111138-01	File ID:	1113801.D
Sampled:	11/15/11 08:05	Prepared:	11/18/11 00:00	Analyzed:	11/18/11 12:51
Solids:	95.16	Preparation:	5035	Dilution:	1
Batch:	1K18008	Sequence: 1K32503	Calibration:	1321002	Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		1.33	2.67	5.34	U
75-00-3	Chloroethane		1.33	2.67	5.34	U
67-66-3	Chloroform		1.33	2.67	5.34	U
75-34-3	1,1-Dichloroethane		1.33	2.67	5.34	U
107-06-2	1,2-Dichloroethane		1.33	2.67	5.34	U
75-35-4	1,1-Dichloroethene		1.33	2.67	5.34	U
156-59-2	cis-1,2-Dichloroethene		1.33	2.67	5.34	U
156-60-5	trans-1,2-Dichloroethene		1.33	2.67	5.34	U
75-09-2	Methylene chloride		2.67	5.34	10.7	U
127-18-4	Tetrachloroethene		1.33	2.67	5.34	U
71-55-6	1,1,1-Trichloroethane		1.33	2.67	5.34	U
79-01-6	Trichloroethene		1.33	2.67	5.34	U
75-01-4	Vinyl chloride		1.33	2.67	5.34	U

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
Bromofluorobenzene	32.04	30.57	95.4	85 - 120	
Dibromofluoromethane	32.04	32.24	101	80 - 125	
1,2-Dichloroethane-d4	32.04	33.24	104	75 - 140	
Toluene-d8	32.04	33.04	103	85 - 115	

018

ANALYSIS DATA SHEET

VEP4-EB05-111511

Laboratory:	Empirical Laboratories, LLC		SDG:	1111138	
Client:	CH2M Hill, Inc.		Project:	Vieques CTO-113	
Matrix:	Water	Laboratory ID:	1111138-02	File ID:	1113802.D
Sampled:	11/15/11 08:35	Prepared:	11/17/11 00:00	Analyzed:	11/17/11 12:56
Solids:		Preparation:	5030B	Dilution:	1
Batch:	1K17016	Sequence: 1K32213	Calibration:	1258002	Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	U
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.250	0.500	1.00	U
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.90	99.7	75 - 120	
Dibromofluoromethane	30.00	27.53	91.8	85 - 115	
1,2-Dichloroethane-d4	30.00	29.36	97.9	70 - 120	
Toluene-d8	30.00	33.29	111	85 - 120	

019

ANALYSIS DATA SHEET

VEP4-TB05-111511

Laboratory: Empirical Laboratories, LLC | SDG: 1111138
Client: CH2M Hill, Inc. | Project: Vieques CTO-113
Matrix: Water | Laboratory ID: 1111138-03 | File ID: 1113805.D
Sampled: 11/15/11 00:00 | Prepared: 11/17/11 00:00 | Analyzed: 11/17/11 13:23
Solids: | Preparation: 5030B | Dilution: 1
Batch: 1K17016 | Sequence: 1K32213 | Calibration: 1258002 | Instrument: MS-VOA8

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	U
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.250	0.500	1.00	U
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.11	100	75 - 120	
Dibromofluoromethane	30.00	26.95	89.8	85 - 115	
1,2-Dichloroethane-d4	30.00	28.67	95.6	70 - 120	
Toluene-d8	30.00	33.79	113	85 - 120	

020

ANALYSIS DATA SHEET

VEP4-GW08-1111

Laboratory: Empirical Laboratories, LLC | SDG: 1111138
Client: CH2M Hill, Inc. | Project: Vieques CTO-113
Matrix: Water | Laboratory ID: 1111138-04 | File ID: 1113804.D
Sampled: 11/15/11 09:00 | Prepared: 11/17/11 00:00 | Analyzed: 11/17/11 16:47
Solids: | Preparation: 5030B | Dilution: 1
Batch: 1K17016 | Sequence: 1K32213 | Calibration: 1258002 | Instrument: MS-VOA8

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	U
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene	1.03	0.250	0.500	1.00	
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene	41.4	0.250	0.500	1.00	
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.77	99.2	75 - 120	
Dibromofluoromethane	30.00	27.88	92.9	85 - 115	
1,2-Dichloroethane-d4	30.00	29.18	97.2	70 - 120	
Toluene-d8	30.00	33.74	112	85 - 120	

021

ANALYSIS DATA SHEET

VEP4-EB01-111511

Laboratory: Empirical Laboratories, LLC | SDG: 1111138
Client: CH2M Hill, Inc. | Project: Vieques CTO-113
Matrix: Water | Laboratory ID: 1111138-05 | File ID: 1113805.D
Sampled: 11/15/11 11:00 | Prepared: 11/17/11 00:00 | Analyzed: 11/17/11 13:50
Solids: | Preparation: 5030B | Dilution: 1
Batch: 1K17016 | Sequence: 1K32213 | Calibration: 1258002 | Instrument: MS-VOA8

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	U
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.250	0.500	1.00	U
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.65	98.8	75 - 120	
Dibromofluoromethane	30.00	27.45	91.5	85 - 115	
1,2-Dichloroethane-d4	30.00	29.35	97.8	70 - 120	
Toluene-d8	30.00	33.21	111	85 - 120	

022

ANALYSIS DATA SHEET

VEP4-TB06-111511

Laboratory: Empirical Laboratories, LLC | SDG: 1111138
Client: CH2M Hill, Inc. | Project: Vieques CTO-113
Matrix: Water | Laboratory ID: 1111138-06 | File ID: 1113806.D
Sampled: 11/15/11 00:00 | Prepared: 11/17/11 00:00 | Analyzed: 11/17/11 14:17
Solids: | Preparation: 5030B | Dilution: 1
Batch: 1K17016 | Sequence: 1K32213 | Calibration: 1258002 | Instrument: MS-VOA8

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	U
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.250	0.500	1.00	U
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.70	99.0	75 - 120	
Dibromofluoromethane	30.00	27.84	92.8	85 - 115	
1,2-Dichloroethane-d4	30.00	29.73	99.1	70 - 120	
Toluene-d8	30.00	33.50	112	85 - 120	

023

SDG# 1111180

024

ANALYSIS DATA SHEET

VEP4-GW06-1111

Laboratory:	Empirical Laboratories, LLC		SDG:	1111180	
Client:	CH2M Hill, Inc.		Project:	Vinyues CTO-113 (24hr rush)	
Matrix:	Water	Laboratory ID:	1111180-01	File ID:	1118001.D
Sampled:	11/17/11 08:25	Prepared:	11/21/11 00:00	Analyzed:	11/21/11 09:43
Solids:		Preparation:	5030B	Dilution:	1
Batch:	1K21001	Sequence: 1K32502	Calibration:	1258002	Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	U
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.250	0.500	1.00	U
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.11	100	75 - 120	
Dibromofluoromethane	30.00	27.77	92.6	85 - 115	
1,2-Dichloroethane-d4	30.00	30.30	101	70 - 120	
Toluene-d8	30.00	32.57	109	85 - 120	

02212

025

ANALYSIS DATA SHEET

VEP4-GW07-1111

Laboratory:	Empirical Laboratories, LLC		SDG:	1111180	
Client:	CH2M Hill, Inc.		Project:	Vinyues CTO-113 (24hr rush)	
Matrix:	Water	Laboratory ID:	1111180-02	File ID:	1118002.D
Sampled:	11/17/11 10:55	Prepared:	11/21/11 00:00	Analyzed:	11/21/11 10:10
Solids:		Preparation:	5030B	Dilution:	1
Batch:	1K21001	Sequence: 1K32502	Calibration:	1258002	Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	U
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.250	0.500	1.00	U
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.07	100	75 - 120	
Dibromofluoromethane	30.00	27.47	91.6	85 - 115	
1,2-Dichloroethane-d4	30.00	29.29	97.6	70 - 120	
Toluene-d8	30.00	33.22	111	85 - 120	

02212

026

ANALYSIS DATA SHEET

VEP4-EB01-111711

Laboratory:	Empirical Laboratories, LLC		SDG:	1111180	
Client:	CH2M Hill, Inc.		Project:	Vinyues CTO-113 (24hr rush)	
Matrix:	Water	Laboratory ID:	1111180-03	File ID:	1118003.D
Sampled:	11/17/11 12:00	Prepared:	11/21/11 00:00	Analyzed:	11/21/11 09:16
Solids:		Preparation:	5030B	Dilution:	1
Batch:	1K21001	Sequence: 1K32502	Calibration:	1258002	Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	U
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.250	0.500	1.00	U
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.67	98.9	75 - 120	
Dibromofluoromethane	30.00	27.70	92.3	85 - 115	
1,2-Dichloroethane-d4	30.00	30.25	101	70 - 120	
Toluene-d8	30.00	32.55	108	85 - 120	

02212

027

ANALYSIS DATA SHEET

VEP4-TB01-111711

Laboratory: Empirical Laboratories, LLC SDG: 1111180
Client: CH2M Hill, Inc. Project: Vieques CTO-113 (24hr rush)
Matrix: Water Laboratory ID: 1111180-04 File ID: 1118004.D
Sampled: 11/17/11 00:00 Prepared: 11/21/11 00:00 Analyzed: 11/21/11 08:49
Solids: Preparation: 5030B Dilution: 1
Batch: 1K21001 Sequence: 1K32502 Calibration: 1258002 Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	U
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.250	0.500	1.00	U
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.92	99.7	75 - 120	
Dibromofluoromethane	30.00	27.51	91.7	85 - 115	
1,2-Dichloroethane-d4	30.00	29.13	97.1	70 - 120	
Toluene-d8	30.00	33.06	110	85 - 120	

WM 02280

028

ANALYSIS DATA SHEET

Matrix Spike

Laboratory: Empirical Laboratories, LLC SDG: 1111180
Client: CH2M Hill, Inc. Project: Vieques CTO-113 (24hr rush)
Matrix: Laboratory ID: 1K21001-MS1 File ID: 11180001M.D
Sampled: Prepared: Analyzed: 11/21/11 17:18
Solids: Preparation: 5030B Dilution:
Batch: 1K21001 Sequence: 1K32502 Calibration: 1258002 Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride	42.3	0.250	0.500	1.00	
75-00-3	Chloroethane	47.8	0.250	0.500	1.00	
67-66-3	Chloroform	41.7	0.250	0.500	1.00	
75-34-3	1,1-Dichloroethane	43.7	0.250	0.500	1.00	
107-06-2	1,2-Dichloroethane	39.7	0.250	0.500	1.00	
75-35-4	1,1-Dichloroethene	41.2	0.250	0.500	1.00	
156-59-2	cis-1,2-Dichloroethene	44.5	0.250	0.500	1.00	
156-60-5	trans-1,2-Dichloroethene	43.5	0.250	0.500	1.00	
75-09-2	Methylene chloride	40.0	0.500	1.00	2.00	
127-18-4	Tetrachloroethene	51.3	0.250	0.500	1.00	
71-55-6	1,1,1-Trichloroethane	42.5	0.250	0.500	1.00	
79-01-6	Trichloroethene	44.6	0.250	0.500	1.00	
75-01-4	Vinyl chloride	50.0	0.250	0.500	1.00	

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.01	100	75 - 120	
Dibromofluoromethane	30.00	27.12	90.4	85 - 115	
1,2-Dichloroethane-d4	30.00	28.55	95.2	70 - 120	
Toluene-d8	30.00	33.34	111	85 - 120	

WM 02272

029

ANALYSIS DATA SHEET

Matrix Spike Dup

Laboratory: Empirical Laboratories, LLC SDG: 1111180
Client: CH2M Hill, Inc. Project: Vieques CTO-113 (24hr rush)
Matrix: Laboratory ID: 1K21001-MSD1 File ID: 11180015.D
Sampled: Prepared: Analyzed: 11/21/11 17:45
Solids: Preparation: 5030B Dilution:
Batch: 1K21001 Sequence: 1K32502 Calibration: 1258002 Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride	41.5	0.250	0.500	1.00	
75-00-3	Chloroethane	48.0	0.250	0.500	1.00	
67-66-3	Chloroform	41.2	0.250	0.500	1.00	
75-34-3	1,1-Dichloroethane	43.8	0.250	0.500	1.00	
107-06-2	1,2-Dichloroethane	39.6	0.250	0.500	1.00	
75-35-4	1,1-Dichloroethene	40.8	0.250	0.500	1.00	
156-59-2	cis-1,2-Dichloroethene	43.6	0.250	0.500	1.00	
156-60-5	trans-1,2-Dichloroethene	43.4	0.250	0.500	1.00	
75-09-2	Methylene chloride	40.0	0.500	1.00	2.00	
127-18-4	Tetrachloroethene	49.2	0.250	0.500	1.00	
71-55-6	1,1,1-Trichloroethane	41.3	0.250	0.500	1.00	
79-01-6	Trichloroethene	43.1	0.250	0.500	1.00	
75-01-4	Vinyl chloride	51.3	0.250	0.500	1.00	

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.34	101	75 - 120	
Dibromofluoromethane	30.00	27.25	90.8	85 - 115	
1,2-Dichloroethane-d4	30.00	28.73	95.8	70 - 120	
Toluene-d8	30.00	33.56	112	85 - 120	

WM 02272

030

SDG# 1111183

031

ANALYSIS DATA SHEET

VEP4-GW09-1111

Laboratory: Empirical Laboratories, LLC | SDG: 1111183
Client: CH2M Hill, Inc. | Project: Vieques CTO-113
Matrix: Water | Laboratory ID: 1111183-01 | File ID: 1118301.D
Sampled: 11/18/11 08:20 | Prepared: 11/21/11 00:00 | Analyzed: 11/21/11 12:24
Solids: | Preparation: 5030B | Dilution: 1
Batch: 1K21001 | Sequence: 1K32502 | Calibration: 1258002 | Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	U
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene	2.76	0.250	0.500	1.00	
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.22	101	75 - 120	
Dibromofluoromethane	30.00	27.40	91.3	85 - 115	
1,2-Dichloroethane-d4	30.00	28.71	95.8	70 - 120	
Toluene-d8	30.00	33.80	113	85 - 120	

C32

ANALYSIS DATA SHEET

VEP4-GW05-1111

Laboratory: Empirical Laboratories, LLC | SDG: 1111183
Client: CH2M Hill, Inc. | Project: Vieques CTO-113
Matrix: Water | Laboratory ID: 1111183-02 | File ID: 1118302.D
Sampled: 11/18/11 09:55 | Prepared: 11/21/11 00:00 | Analyzed: 11/21/11 12:50
Solids: | Preparation: 5030B | Dilution: 1
Batch: 1K21001 | Sequence: 1K32502 | Calibration: 1258002 | Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	U
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene	8.42	0.250	0.500	1.00	
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.44	101	75 - 120	
Dibromofluoromethane	30.00	27.70	92.3	85 - 115	
1,2-Dichloroethane-d4	30.00	30.24	101	70 - 120	
Toluene-d8	30.00	33.19	111	85 - 120	

C33

ANALYSIS DATA SHEET

VEP4-EB01-111811

Laboratory: Empirical Laboratories, LLC | SDG: 1111183
Client: CH2M Hill, Inc. | Project: Vieques CTO-113
Matrix: Water | Laboratory ID: 1111183-03 | File ID: 1118303.D
Sampled: 11/18/11 12:10 | Prepared: 11/21/11 00:00 | Analyzed: 11/21/11 13:30
Solids: | Preparation: 5030B | Dilution: 1
Batch: 1K21001 | Sequence: 1K32502 | Calibration: 1258002 | Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	U
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.250	0.500	1.00	U
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.94	99.8	75 - 120	
Dibromofluoromethane	30.00	27.42	91.4	85 - 115	
1,2-Dichloroethane-d4	30.00	29.11	97.0	70 - 120	
Toluene-d8	30.00	32.91	110	85 - 120	

034

ANALYSIS DATA SHEET

VEP4-TB01-111811

Laboratory: Empirical Laboratories, LLC | SDG: 1111183
Client: CH2M Hill, Inc. | Project: Vieques CTO-113
Matrix: Water | Laboratory ID: 1111183-04 | File ID: 1118304.D
Sampled: 11/18/11 00:00 | Prepared: 11/21/11 00:00 | Analyzed: 11/21/11 13:57
Solids: | Preparation: 5030B | Dilution: 1
Batch: 1K21001 | Sequence: 1K32502 | Calibration: 1258002 | Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	U
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.250	0.500	1.00	U
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.37	101	75 - 120	
Dibromofluoromethane	30.00	27.89	93.0	85 - 115	
1,2-Dichloroethane-d4	30.00	29.56	98.5	70 - 120	
Toluene-d8	30.00	33.53	112	85 - 120	

035

ANALYSIS DATA SHEET

VEP4-GW05P-1111

Laboratory:	Empirical Laboratories, LLC		SDG:	1111183	
Client:	CH2M Hill, Inc.		Project:	Vieques CTO-113	
Matrix:	Water	Laboratory ID:	1111183-05	File ID:	1118305.D
Sampled:	11/18/11 10:00	Prepared:	11/21/11 08:00	Analyzed:	11/21/11 13:17
Solids:		Preparation:	5030B	Dilution:	1
Batch:	1K21001	Sequence:	1K32502	Calibration:	1258002	Instrument:	MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
56-23-5	Carbon tetrachloride		0.250	0.500	1.00	U
75-00-3	Chloroethane		0.250	0.500	1.00	U
67-66-3	Chloroform		0.250	0.500	1.00	U
75-34-3	1,1-Dichloroethane		0.250	0.500	1.00	U
107-06-2	1,2-Dichloroethane		0.250	0.500	1.00	U
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
75-09-2	Methylene chloride		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene	0.271	0.250	0.500	1.00	J
71-55-6	1,1,1-Trichloroethane		0.250	0.500	1.00	U
79-01-6	Trichloroethene	7.44	0.250	0.500	1.00	
75-01-4	Vinyl chloride		0.250	0.500	1.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.33	97.8	75 - 120	
Dibromofluoromethane	30.00	27.29	91.0	85 - 115	
1,2-Dichloroethane-d4	30.00	28.98	96.6	70 - 120	
Toluene-d8	30.00	32.34	108	85 - 120	

WM 12/7/11

036

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 1112054, 1111180, 1111183, 1111138 and 1111182 LAB: Empirical Lab

SITE NAME: Vieques CTO-113

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. VOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓

1.3 Sample Conditions/Problems

037

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ✓

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ✓

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

038

HOLDING TIME SUMMARY

SW8260B

Laboratory:	Empirical Laboratories, LLC		SDG:	1111132	
Client:	CH2M Hill, Inc.		Project:	Vieques CTO-113	

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
VEP4-SB17-1911-1111	11/11/11 10:00	11/12/11 09:00	11/14/11 09:00	N/A	14.00	11/18/11 12:04	5.13	14.00	
VEP4-EB04-111111	11/11/11 10:35	11/12/11 09:00	11/17/11 09:00	N/A	14.00	11/17/11 15:02	6.21	14.00	
VEP4-TB04-111111	11/11/11 00:00	11/12/11 09:00	11/17/11 09:00	N/A	14.00	11/17/11 15:29	6.69	14.00	

039

HOLDING TIME SUMMARY
SW8260B

Laboratory: Empirical Laboratories, LLC SDG: 1111138
Client: CH2M Hill, Inc. Project: Vieques CTO-113

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
VEP4-SB18-1214-1111	11/15/11 08:05	11/16/11 08:20	11/18/11 00:00	N/A	14.00	11/30/11 12:31	3.23	14.00	
VEP4-EB05-111511	11/15/11 08:35	11/16/11 08:20	11/17/11 00:00	N/A	14.00	11/17/11 12:56	2.22	14.00	
VEP4-TB05-111511	11/15/11 00:00	11/16/11 08:20	11/17/11 00:00	N/A	14.00	11/17/11 13:23	2.60	14.00	
VEP4-GW08-1111	11/15/11 09:00	11/16/11 08:20	11/17/11 00:00	N/A	14.00	11/17/11 16:57	2.37	14.00	
VEP4-EB01-111511	11/15/11 11:00	11/16/11 08:20	11/17/11 00:00	N/A	14.00	11/17/11 13:50	2.16	14.00	
VEP4-TB06-111511	11/15/11 00:00	11/16/11 08:20	11/17/11 00:00	N/A	14.00	11/17/11 14:17	2.64	14.00	

043

1111138 Summ Package 68

HOLDING TIME SUMMARY
SW8260B

Laboratory: Empirical Laboratories, LLC SDG: 1112054
Client: CH2M Hill, Inc. Project: Vieques CTO-113

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
VEP4-TB01-120711	12/07/11 00:00	12/08/11 08:30	12/08/11 00:00	N/A	14.00	12/08/11 10:23	1.47	14.00	
VEP4-GW13-1211	12/07/11 09:25	12/08/11 08:30	12/08/11 00:00	N/A	14.00	12/08/11 14:24	1.29	14.00	
VEP4-GW14-1211	12/07/11 10:38	12/08/11 08:30	12/08/11 00:00	N/A	14.00	12/08/11 14:51	1.22	14.00	
VEP4-EB01-120711	12/07/11 12:23	12/08/11 08:30	12/08/11 00:00	N/A	14.00	12/08/11 10:50	0.98	14.00	

041

1112054 Summ Package 41

HOLDING TIME SUMMARY
SW8260B

Laboratory: Empirical Laboratories, LLC SDG: 1111180
Client: CH2M Hill, Inc. Project: Vieques CTO-113 (24hr rush)

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
VEP4-GW06-1111	11/17/11 08:25	11/18/11 08:20	11/21/11 00:00	N/A	14.00	11/21/11 09:43	4.10	14.00	
VEP4-GW07-1111	11/17/11 09:55	11/18/11 08:20	11/21/11 00:00	N/A	14.00	11/21/11 10:10	4.09	14.00	
VEP4-EB01-1111	11/17/11 12:00	11/18/11 08:20	11/21/11 00:00	N/A	14.00	11/21/11 09:16	3.95	14.00	
VEP4-TB01-1111	11/17/11 00:00	11/18/11 08:20	11/21/11 00:00	N/A	14.00	11/21/11 08:49	4.41	14.00	

042

1111180 Summ Package 46

HOLDING TIME SUMMARY
SW8260B

Laboratory: Empirical Laboratories, LLC SDG: 1111183
Client: CH2M Hill, Inc. Project: Vieques CTO-113

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
VEP4-GW09-1111	11/18/11 08:20	11/19/11 08:20	11/21/11 00:00	N/A	14.00	11/21/11 12:24	3.21	14.00	
VEP4-GW05-1111	11/18/11 09:55	11/19/11 08:20	11/21/11 00:00	N/A	14.00	11/21/11 12:50	3.18	14.00	
VEP4-EB01-111811	11/18/11 12:10	11/19/11 08:20	11/21/11 00:00	N/A	14.00	11/21/11 11:30	3.01	14.00	
VEP4-TB01-111811	11/18/11 00:00	11/19/11 08:20	11/21/11 00:00	N/A	14.00	11/21/11 11:57	3.54	14.00	
VEP4-GW05P-1111	11/18/11 10:00	11/19/11 08:20	11/21/11 00:00	N/A	14.00	11/21/11 13:12	3.18	14.00	

043

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	>7 days	J	R
	Yes	<14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water [✓] ___ ___

b. Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water [✓] ___ ___

b. Soil [ ] ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. [✓] ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [✓] ___ ___

ACTION: Circle all outliers with a red pencil. 1 sample had 1 high rec – no qual since note in sample

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank, Table 2. [✓] ___ ___

If yes, were samples reanalyzed? [ ] [✓] ___

Were method blanks reanalyzed? [ ] ___ [✓]

SURROGATE STANDARD RECOVERY AND RT SUMMARY
SW8260B

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Sequence: 1K32216
SDG: 1111132
Project: Vieques CTO-113
Instrument: MS-VOA3
Calibration: 1320003

Surrogate Compound	Spike Level	% Recovery	Recovery Limits	RT	CCV RT	RT Diff	RT Diff Limit	Q
Calibration Check (1K32216-CCV1) ug/L				Lab File ID: 1117CCV1.D		Analyzed: 11/17/11 10:33		
Bromofluorobenzene	30.00	105	80 - 120	12.262	12.262	0.0000	+/-1.000	
Dibromofluoromethane	30.00	101	80 - 120	6.878	6.878	0.0000	+/-1.000	
1,2-Dichloroethane-d4	30.00	103	80 - 120	7.383	7.383	0.0000	+/-1.000	
Toluene-d8	30.00	95.5	80 - 120	9.622	9.622	0.0000	+/-1.000	
LCS (1K17018-BS1) ug/L				Lab File ID: 1117LCS1.D		Analyzed: 11/17/11 11:00		
Bromofluorobenzene	30.00	102	75 - 120	12.262	12.262	0.0000	+/-1.000	
Dibromofluoromethane	30.00	105	85 - 115	6.878	6.878	0.0000	+/-1.000	
1,2-Dichloroethane-d4	30.00	103	70 - 120	7.383	7.383	0.0000	+/-1.000	
Toluene-d8	30.00	97.1	85 - 120	9.628	9.622	0.0060	+/-1.000	
Blank (1K17018-BLK1) ug/L				Lab File ID: 1117BLK1.D		Analyzed: 11/17/11 12:19		
Bromofluorobenzene	30.00	97.2	75 - 120	12.262	12.262	0.0000	+/-1.000	
Dibromofluoromethane	30.00	111	85 - 115	6.878	6.878	0.0000	+/-1.000	
1,2-Dichloroethane-d4	30.00	109	70 - 120	7.383	7.383	0.0000	+/-1.000	
Toluene-d8	30.00	100	85 - 120	9.622	9.622	0.0000	+/-1.000	
VEP4-EB04-111111 (1111132-02) ug/L				Lab File ID: 1113202.D		Analyzed: 11/17/11 15:02		
Bromofluorobenzene	30.00	96.5	75 - 120	12.262	12.262	0.0000	+/-1.000	
Dibromofluoromethane	30.00	116	85 - 115	6.879	6.878	0.0010	+/-1.000	*
1,2-Dichloroethane-d4	30.00	110	70 - 120	7.383	7.383	0.0000	+/-1.000	
Toluene-d8	30.00	96.2	85 - 120	9.622	9.622	0.0000	+/-1.000	
VEP4-TB04-111111 (1111132-03) ug/L				Lab File ID: 1113203.D		Analyzed: 11/17/11 15:29		
Bromofluorobenzene	30.00	97.7	75 - 120	12.262	12.262	0.0000	+/-1.000	
Dibromofluoromethane	30.00	114	85 - 115	6.878	6.878	0.0000	+/-1.000	
1,2-Dichloroethane-d4	30.00	110	70 - 120	7.383	7.383	0.0000	+/-1.000	
Toluene-d8	30.00	96.3	85 - 120	9.622	9.622	0.0000	+/-1.000	

J NOD

no qual

C46

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] [✓] ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

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SOP: HW-24, Rev. 2

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ [✓]

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [✓] ___ ___

high rec - no ⊕, no qual

-11 VOA-

C48

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LCS / LCS DUPLICATE RECOVERY
SW8260B

Laboratory: Empirical Laboratories, LLC
SDG: 1111138
Client: CH2M Hill, Inc.
Project: Vieques CTO-113
Matrix: Solid
Batch: IK18008
Laboratory ID: IK18008-BS1
Preparation: 5035
Initial/Final: 5 g / 5 mL

ANALYTE	SPIKE ADDED (ug/Kg wet)	LCS CONCENTRATION (ug/Kg wet)	LCS % REC	QC LIMITS REC.
Carbon tetrachloride	50.00	55.70	111	65 - 135
Chloroethane	50.00	59.58	119	40 - 155
Chloroform	50.00	53.33	107	70 - 125
1,1-Dichloroethane	50.00	53.66	107	75 - 125
1,2-Dichloroethane	50.00	52.21	104	70 - 135
1,1-Dichloroethene	50.00	55.40	111	65 - 135
cis-1,2-Dichloroethene	50.00	59.03	118	65 - 125
trans-1,2-Dichloroethene	50.00	54.93	110	65 - 135
Methylene chloride	50.00	52.95	106	55 - 140
Tetrachloroethene	50.00	63.48	127	65 - 140
1,1,1-Trichloroethane	50.00	55.88	112	70 - 135
Trichloroethene	50.00	54.64	109	75 - 125
Vinyl chloride	**50.00**	**71.56**	**143**	**60 - 125**

VE14-SB15-1214-1111 — no ⊕ for this compd - no qual

C49

1111138 Summ Package 28

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PREPARATION BATCH SUMMARY
SW8260B

Laboratory: Empirical Laboratories, LLC
SDG: 1111132
Client: CH2M Hill, Inc.
Project: Vieques CTO-113
Batch: IK18008
Batch Matrix: Solid
Preparation: 5035

SAMPLE NAME	LAB SAMPLE ID	DATE PREPARED	INITIAL VOL./WEIGHT	FINAL VOL.
VE14-SB15-1214-1111	1111132-01	11/18/11 00:00	5.17	5.00
Blank	IK18008-BLK1	11/18/11 00:00	5.00	5.00
LCS	IK18008-BS1	11/18/11 00:00	5.00	5.00

C50

1111132 Summ Package 25

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LCS / LCS DUPLICATE RECOVERY
SW8260B

Laboratory: Empirical Laboratories, LLC
SDG: 1111132
Client: CH2M Hill, Inc.
Project: Vieques CTO-113
Matrix: Solid
Batch: IK18008
Laboratory ID: IK18008-BS1
Preparation: 5035
Initial/Final: 5 g / 5 mL

ANALYTE	SPIKE ADDED (ug/Kg wet)	LCS CONCENTRATION (ug/Kg wet)	LCS % REC	QC LIMITS REC.
Carbon tetrachloride	50.00	55.70	111	65 - 135
Chloroethane	50.00	59.58	119	40 - 155
Chloroform	50.00	53.33	107	70 - 125
1,1-Dichloroethane	50.00	53.66	107	75 - 125
1,2-Dichloroethane	50.00	52.21	104	70 - 135
1,1-Dichloroethene	50.00	55.40	111	65 - 135
cis-1,2-Dichloroethene	50.00	59.03	118	65 - 125
trans-1,2-Dichloroethene	50.00	54.93	110	65 - 135
Methylene chloride	50.00	52.95	106	55 - 140
Tetrachloroethene	50.00	63.48	127	65 - 140
1,1,1-Trichloroethane	50.00	55.88	112	70 - 135
Trichloroethene	50.00	54.64	109	75 - 125
Vinyl chloride	**50.00**	**71.56**	**143**	**60 - 125**

no ⊕ in associated samples - no qual

C51

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YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent) SDG# 1111180 MS/MSD VEPA-6W06-1111

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? ☑ ___ ___

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? ☑ ___ ___

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month (page 8000C, section 9.5.1)

a. Water ☑ ___ ___

b. Waste ☐ ___ ___

c. Soil/Solid ☐ ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. ☑ ___ ___

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. ☐ ☑ ___

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? ☑ ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? ☑ ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? ☑ ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? ☑ ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ☐ ☑ ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ✓ ___ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.) no field

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone
** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ✓

b. Matrix spikes and matrix spike duplicates ✓

c. Blanks ✓

d. Laboratory Control Samples ✓

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ✓

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ✓

c. Blanks ✓

d. Laboratory Control Samples ✓

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? ✓

YES NO N/A

Resolution? ✓

Peak shape? ✓

Full-scale graph (attenuation)? ✓

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? ✓

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? ✓

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ✓

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ✓

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

No TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present: and do listed TICs include scan number or retention time, estimated concentration and a qualifier? ✓

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate ✓

b. Blanks ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? ✓

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ✓

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? ✓

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ ✓

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39) qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? [✓] ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. [✓] ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) [ ] ✓ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? [✓] ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? [✓] ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). [ ] ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? ___ ✓ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R"

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? ✓ ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:
1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.
2. Do not qualify non-detects when the associated IS are counts area > + 100%.
3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".
4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ✓ ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

VEP4-GW05-1111
VEP4-GW05P-1111 > no qual, see attached sheet

DataQual VOA

FIELD DUPLICATE SAMPLE SUMMARY

Sample ID: VEP4-GW05-1111
Duplicate Sample ID: VEP4-GW05P-1111

Water RPD>20%
Soil RPD>30%

Compound	Sample Conc.	Dup. Sample Conc.	%RPD
trichloroethene	8.42	7.44	12
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!

COMMENTS: No qualifications required

* one of the results below the LOD

DataQual VOA

Initial Calibration Date: 9/13/2011
RRF and %RSD Calculations:

Compound Name: vinyl chloride
Lab Value: 0.2674

Area of Compound	770768
Area of Internal STD	993157
Conc. of Internal STD	30
Conc. of Compound	200
Calculated RRF	0.267

Compound Name: benzene
Lab Value: 3.42

RRF of STD 1	1.0125
RRF of STD 2	1.0193
RRF of STD 3	1.0122
RRF of STD 4	1.0290
RRF of STD 5	1.0489
RRF of STD 6	1.0734
RRF of STD 7	1.0804
RRF of STD 8	1.0899
RRF of STD 9	1.1063
Calculated % RSD	3.42

Continuing Calibration File ID: 11/21/2011
RRF and %D Calculations:

Compound Name: methylene chloride
Lab Value: 0.205

Area of Compound	595163
Area of Internal STD	870024
Conc. of Internal STD	30
Conc. of Compound	100
Calculated RRF	0.205

Compound Name: carbon tetrachloride
Lab Value: 5.6

Average RRF	0.345
Calibration Check RRF	0.325
Calculated % D	5.6

072

From: DataQual Environmental Services, LLC
To: "sgordon@empirlabs.com"
Cc: "Hillary Ott"; "Michael.Zamboni@CH2M.com"; "Jacqueline Cleveland"
Subject: RE: Vieques CTO-113 VOA fraction
Date: Monday, February 27, 2012 3:53:00 PM

Sonya,

The lab is correct that the non-compliance were only slightly out of QC range. Sample VEP4-EB03-111011 in SDG# 1111112 did exhibit one positive result, but it is below the LOD. I will just add a statement in the report that the samples were not re-analyzed.

Thank you.
Laura

From: Sonya Gordon [mailto:sgordon@empirlabs.com]
Sent: Monday, February 27, 2012 3:12 PM
To: 'DataQual Environmental Services, LLC'
Cc: 'Hillary Ott'; Michael.Zamboni@CH2M.com; 'Jacqueline Cleveland'
Subject: RE: Vieques CTO-113 VOA fraction

Hi Laura,

I've been told the following concerning these samples.

"As there were no target analytes detected in the samples and surrogate recovery showed a borderline high bias, reanalysis was not performed."

Please let me know if you need further information

Sonya Gordon
Project Manager
Empirical Laboratories, LLC
Main: 615.345.1115 ext. 238 I Fax: 866.417.0548

This message and any attachments are intended only for the individual(s) to whom it is addressed. This email is confidential and may be privileged information. If you are neither the intended recipient nor the agent responsible for delivering the message to the intended recipient, you are hereby notified that any dissemination of this communication, disclosure, copying, distribution and use are prohibited and may be unlawful. If you feel you have received this communication in error please notify us immediately by returning this email to the sender and deleting it out of your email.

From: DataQual Environmental Services, LLC [mailto:dataqual@charter.net]
Sent: Monday, February 27, 2012 8:01 AM
To: sgordon@empirlabs.com
Cc: Hillary Ott; Michael.Zamboni@CH2M.com; 'Jacqueline Cleveland'
Subject: Vieques CTO-113 VOA fraction

Hi Sonya,

073

For project CTO-113, two of the data packages (SDG# 1111112 and 1111132) had samples with non-compliant surrogates. I am not seeing that these samples were re-analyzed. Please check sample VEP4-EB03-111011 in SDG1 1111112 and sample VEP4-EB04-111111 in SDG# 1111132 and confirm if these samples were re-analyzed; if these samples were re-analyzed please submit the data and forms for the re-analysis.

Thank you,
Laura

Laura Maschhoff
DataQual Environmental Services, LLC
dataqual@charter.net

074

SDG# 1112054

075

Sample Delivery Group Case Narrative

Receipt Information
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Changes to the Revision
This is an original submittal of the final report package.

Analytical Information
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:
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A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

SW8260B:
No anomalies or deviations are noted.

075

1112054

EMPIRICAL LABORATORIES, LLC - CHAIN OF CUSTODY RECORD
SHIP TO: 621 Mainstream Drive, Suite 270 • Nashville, TN 37228 • 615-885-1115 • (fax) 615-885-2429

Send Results to:
Name Hilary Ott
Company CH2M HILL
Address
City
State, Zip
Phone
Fax
E-mail Hilary.Ott@CH2M.com

Send Invoice to:
Name Virginia PA WALLACE INVOICING
Company CH2M HILL
Address
City
State, Zip
Phone
Fax
E-mail

Project No./Name:

Sampler's (Signature): 708978-978-7MS

Analysis Requirements:

Lab Use Only:
VOA Headspace Y N NA
Field Filtered Y N NA
Correct Containers Y N NA
Discrepancies Y N NA
Cust. Seals Intact Y N NA
Containers Intact Y N NA
Alt-b # ____
CAR #: ____

Lab Use Only Lab #	Date/Time Sampled	Sample Description	Sample Matrix	Comments	No. of Bottles	Lab Use Only Comments/Flags
01	12/7/11	VEP4-TB01-121711	AQ		2	
02	12/7/11 0835	VEP4-GW13-1211	AQ	24hr TAT	3	
03	12/7/11 1038	VEP4-GW19-1211	AQ	24hr TAT	3	
04	12/7/11 1425	VEP4-EB01-121711	AQ		3	

REMARKS: 24 hr TAT on VEP4-GW13-1211 and VEP4-GW14-1211 samples

Sample Kit Prep'd by (Signature) Date/Time Relinquished by (Signature) Date/Time
Relinquished by (Signature) Date/Time Received by (Signature)
Received by (Signature) Date/Time Temperature 1.5
Received for Laboratory by (Signature) Date/Time

Details: Page 1 of 1 Cooler No. 1 of 1
Date Shipped 12/7/11
Shipped By K. Bolt/UPS
Turnaround 24 TAT

Distribution: Original and yellow copies accompany sample shipment to laboratory. Pink retained by samplers

1112054 Summ Package

1112054

Cooler Received/Opened On 12/08/11 @ 0830
1. Tracking # 8868 (last 4 digits, FedEx)
Courier: FED-EX
2. Temperature of rep. sample or temp blank when opened: 1.5 Degrees Celsius + correction factor 0.0 = 1.5
3. If item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA
4. Were custody seals on outside of cooler? YES...NO...NA
if yes, how many and where: 2-FRONT & BACK
5. Were the seals intact, signed, and dated correctly? YES...NO...NA
6. Were custody papers inside cooler? YES...NO...NA
I certify that I opened the cooler and answered questions 1-6 (initial) BO
7. Were custody seals on containers: YES NO and intact YES...NO...NA
Were these signed and dated correctly? YES...NO...NA
8. Packing mat'l used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry Ice Other None
10. Did all containers arrive in good condition (unbroken)? YES...NO...NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES...NO...NA
12. Did all container labels and tags agree with custody papers? YES...NO...NA
13a. Were VOA vials received? YES...NO...NA
b. Was there any observable headspace present in any VOA vial? YES...NO...NA
14. Was there a Trip Blank in this cooler? YES...NO...NA If multiple coolers, sequence #
I certify that I unloaded the cooler and answered questions 7-14 (initial) KT
15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES...NO...NA
b. Did the bottle labels indicate that the correct preservatives were used YES...NO...NA
16. Was residual chlorine present? YES...NO...NA
I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial) KT
17. Were custody papers properly filled out (ink, signed, etc)? YES...NO...NA
18. Did you sign the custody papers in the appropriate place? YES...NO...NA
19. Were correct containers used for the analysis requested? YES...NO...NA
20. Was sufficient amount of sample sent in each container? YES...NO...NA
I certify that I entered this project into LIMS and answered questions 17-20 (initial) KT
I certify that I attached a label with the unique LIMS number to each container (initial) KT
21. Were there Non-Conformance issues at login? YES NO Was a NCR generated? YES NO #
Additional Details:

078

SDG# 1111132

075

Sample Delivery Group Case Narrative

Receipt Information
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Changes to the Revision
This is an original submittal of the final report package.

Analytical Information
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C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

SW8260B:
The surrogate Dibromofluoromethane exceeded criteria with a positive bias in 1111132-02.

The batch spike associated to batch 1K18008 exceeded recovery criteria with a positive bias for Vinyl Chloride.

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

080

EMPIRICAL LABORATORIES, LLC - CHAIN OF CUSTODY RECORD
SHIP TO: 621 Mainstream Drive, Suite 270 • Nashville, TN 37228 • 615-345-1115 • (fax) 615-846-5426

Send Results to: Name Hilary Gatt; Company CHAM HILL; Address; City; State, Zip; Phone; Fax; E-mail Hilary.gatt@chan.com

Send Invoice to: Name Accounts Payable; Company CHAM HILL; Address; City; State, Zip; Phone; Fax; E-mail

Project No./Name: 403743, Ft. Pk., PA

Sampler's (Signature): Lloyd Kohn

Analysis Requirements: 8260C

Lab Use Only: VOA Headspace; Field Filtered; Correct Containers; Discrepancies; Cust. Seals Intact; Containers Intact; Airbill #: 88795; CAR #:

Lab Use Only Lab #	Date/Time Sampled	Sample Description	Sample Matrix	Comments	No. of Bottles	Lab Use Only Containers/Res.
1111132-01	11/11/11 1000	VEPA-SB07-(01-1)(1)	S	X X	4	
-02	11/11/11 1065	VEPA-EB01-(1)(1)(1)	W	X X	5	
-03	11/11/11 NA	VEPA-TB01-(1)(1)	W	X X	2	

Sample Kit Prep'd by: (Signature) CHAM HILL; Date/Time 11/11/11 1155
Relinquished by: (Signature); Date/Time
Relinquished by: (Signature); Date/Time
Received by: (Signature); Date/Time 11/12/11
Received by: (Signature)
Received by: (Signature)
Received by: (Signature); Temperature 3.2°C

REMARKS: S = soil; W = water

Details: Page 1 of 1; Cooler No. 1 of 1; Date Shipped 11/11/11; Shipped By cc/HG; Turnaround

1111132 Summ Package

Distribution: Original and yellow copies accompany sample shipment to laboratory. Pink retained by samplers.

1. Tracking # 7073 (last 4 digits, FedEx) 11/12/11 0900
Courier: FEDEX
2. Temperature of rep. sample or temp blank when opened: 3.2 Degrees Celsius + correction factor 0.0 = 3.2
3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA
4. Were custody seals on outside of cooler? YES...NO...NA
If yes, how many and where:
5. Were the seals intact, signed, and dated correctly? YES...NO...NA
6. Were custody papers inside cooler? YES...NO...NA
I certify that I opened the cooler and answered questions 1-6 (initial)
7. Were custody seals on containers: YES NO and intact YES...NO...NA
Were these signed and dated correctly? YES...NO...NA
8. Packing mat'l used? Bubble wrap Plastic bag Peanuts Vermiculite Foam insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry Ice Other None
10. Did all containers arrive in good condition (unbroken)? YES...NO...NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES...NO...NA
12. Did all container labels and tags agree with custody papers? YES...NO...NA
13a. Were VOA vials received? YES...NO...NA
b. Was there any observable headspace present in any VOA vial? YES...NO...NA
14. Was there a Trip Blank in this cooler? YES...NO...NA If multiple coolers, sequence #
I certify that I unloaded the cooler and answered questions 7-14 (initial)
15a. Did preservative bottles, did pH test strips suggest preservation reached the correct pH level? YES...NO...NA
b. Did the bottle labels indicate that the correct preservatives were used YES...NO...NA
16. Was residual chlorine present? YES...NO...NA
I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial)
17. Were custody papers properly filled out (ink, signed, etc)? YES...NO...NA
18. Did you sign the custody papers in the appropriate place? YES...NO...NA
19. Were correct containers used for the analysis requested? YES...NO...NA
20. Was sufficient amount of sample sent in each container? YES...NO...NA
I certify that I entered this project into LIMS and answered questions 17-20 (initial)
I certify that I attached a label with the unique LIMS number to each container (initial)
21. Were there Non-Conformance issues at login? YES...NO Was a NCR generated? YES...NO...#
Additional Details:

082

11/12/2011

[redacted]

SDG# 1111138

083

Sample Delivery Group Case Narrative

Receipt Information
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

As per the client, sample listed on the CoC as VEP4-EB06-111511 should be VEP4-EB01-111511.

Changes to the Revision
This is an original submittal of the final report package.

Analytical Information
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

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C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

SW8260B:
The batch spike associated to batch 1K18008 exceeded recovery criteria with a positive bias for Vinyl Chloride.

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

084

EMPIRICAL LABORATORIES, LLC - CHAIN OF CUSTODY RECORD
SHIP TO: 801 Mainstream Drive, Suite 270 • Nashville, TN 37228 • 615-345-1115 • (fax) 615-345-5425

Send Results to: Name Hilary Orr; Company CH2M HILL; Address; City; State, Zip; Phone; Fax; E-mail Hilary.OH@CH2M.com
Project No./Name:
Sampler's (Signature):

Send Invoice to: Name Mary Clear 1000 Creek; Company; Address; City; State, Zip; Phone; Fax; E-mail
Analysis Requirements: 8260C VOA
Area # 5680
CAR #

Lab Use Only: VOA Headspace Y; Field Filtered Y; Correct Containers Y; Discrepancies N; Cust. Seals Intact N; Containers Intact N

Lab Use Only Lab #	Date/Time Sampled	Sample Description	Sample Matrix	Comments	No. of Bottles	Lab Use Only Container/Pres.
1111138 -01	11/15/11 0930	VEP4-SB13-1219-111	S		4	NA
-02	11/15/11 1035	VEP4-EB06-111511	GW	For Soil	3	NA
-03	11/15/11 N/A	VEP4-TB05-111511	GW	For Soil	2	NA
-04	11/15/11 0900	VEP4-GW03-111	GW	24 TAT	3	NA
-05	11/15/11 1100	VEP4-EB06-111511	GW	For GW	3	NA
-06	11/15/11 N/A	VEP4-TB06-111511	GW	For GW	2	NA

Sample Kit Prep'd by: (Signature) Date/Time 11/15/11 1200
Relinquished by: (Signature) Date/Time
Relinquished by: (Signature) Date/Time
Received for Laboratory by: (Signature) Date/Time 11/16/11 0820 Temperature 21°C

Received By: (Signature)
Received By: (Signature)
Received By: (Signature)

REMARKS: S = Soil; W = Water; GW = Groundwater

Details: Page 1 of 1; Cooler No: 1 of 1; Date Shipped: 11/15/11; Shipped By: Ground; Turnaround: 24TAT Except

Distribution: Original and yellow copies accompany sample shipment to laboratory. Pink retained by samplers.

Cooler Received/Opened On 11/16/11 @ 0820
1. Tracking # 3682 (last 4 digits, FedEx)
Courier: FED-EX
2. Temperature of rep. sample or temp blank when opened: 21 Degrees Celsius + correction factor 0.0 = 21
3. If item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA
4. Were custody seals on outside of cooler? YES NO NA
If yes, how many and where: 2 FRONT + BACK
5. Were the seals intact, signed, and dated correctly? YES NO NA
6. Were custody papers inside cooler? YES NO NA
I certify that I opened the cooler and answered questions 1-6 (initial) [illegible]
7. Were custody seals on containers: YES NO and intact YES NO NA
Were these signed and dated correctly? YES NO NA
8. Packing mat'l used? Bubblewrap Plastic bag Peanuts Vermiculite Foam insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry ice Other None
10. Did all containers arrive in good condition (unbroken)? YES NO NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES NO NA
12. Did all container labels and tags agree with custody papers? YES NO NA
13a. Were VOA vials received? YES NO NA
b. Was there any observable headspace present in any VOA vial? YES NO NA
14. Was there a Trip Blank in this cooler? YES NO NA If multiple coolers, sequence # ____
I certify that I unloaded the cooler and answered questions 7-14 (initial) [illegible]
15a. On prep'd bottles, did pH test strips suggest preservation reached the correct pH level? YES NO NA
b. Did the bottle labels indicate that the correct preservatives were used YES NO NA
15. Was residual chlorine present? YES NO NA
I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial) [illegible]
17. Were custody papers properly filled out (ink, signed, etc)? YES NO NA
18. Did you sign the custody papers in the appropriate place? YES NO NA
19. Were correct containers used for the analysis requested? YES NO NA
20. Was sufficient amount of sample sent in each container? YES NO NA
I certify that I entered this project into LIMS and answered questions 17-20 (initial) [illegible]
I certify that I attached a label with the unique LIMS number to each container (initial) [illegible]
21. Were there Non-Conformance issues at login? YES NO Was a NCR generated? YES NO #____
Additional Details:

086

MEMORANDUM **CH2MHILL**

Corrections to COCs

TO: Sonya Gordon, Empirical Laboratories, LLC

COPIES: File
Data Validation Package
Laboratory Package SDG: 1111138

FROM: Hillary Orr
Project Data Manager

DATE: November 18, 2010

This memo is to document corrections made to entries on the Chains of Custody (COC) and Logins for Vieques, PI4.

The corrections include changes to the sample IDs on the COC and Login.

Sample ID on Login	Updated Sample ID	Date Collected	Time Collected	SDG
VEP4-EB06-111511	VEP4-EB01-111511	11/15/2011	11:00	1111138

087

SDG# 1111180

088

Sample Delivery Group Case Narrative

Receipt Information
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

As per the client, samples listed on the CoC as VEP4-EB02-111711 should be VEP4-EB01-111711 and VEP4-TB02-111711 should be VEP4-TB01-111711.

Changes to the Revision
Package revised to change client IDs for samples 1111180-03 and -04 from VEP4-EB01-1111 to VEP4-EB01-111711 and from VEP4-TB01-1111 to VEP4-TB01-111711.

Analytical Information
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

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C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

SW8260B:
No anomalies or deviations are noted.

089

1111180

Empirical Laboratories
CompuChem
a division of Liberty Analytical Corp.

CHAIN OF CUSTODY
501 Madison Ave.
Cary, NC 27513
Phone: 919.379.4100 Fax 919.379.4060

№ 008002
Page 1 of 1

Company Name: CH2M HILL
Address:
City: State: Zip:
Project Contact: Hilary Ott
Phone #:
Sampler's Name: Charlotte Cisneros/Kenji Butler
Project Name: Vieques, PR, Navy CLEANUP 420153
Sampling Location: Vieques, PI-4
Turnaround Time: 24-hr TAT
Reply to Project Specific (if Specific, attach Sample ID)
All approved samples field filtered for metals? Y or N
Are high concentrations expected? Y or N (If yes, attach IDs)

Field ID	Date	Time	Matrix	# of bottles	HCL	NaOH	HNO3	H2SO4	NaOH2	Other
VEP4-GW06-1111	11/11/11	0925	GW	39	39					
VEP4-GW07-1111	11/11/11	1015	GW	3	3					
VEP4-EB03-111711	11/11/11	1200	EB	3	3					
VEP4-TB03-111711	11/11/11	N/A	TB	2	2					

Sample Unpacked By:
Sample Order Entry By:
Samples Received in Good Condition? Y or N
If no, explain:
Relinquished by: Date/Time: 11/11/11 Received by: Date/Time:
Relinquished by: Date/Time: 1500 Received by: Date/Time: 11/11/11 0820
Subcontract? Y or N If yes, where?
Cooler Temp: °C
Samples stored 60 days after data report emailed as no extra charge.
Cooler seals (Intact? Y or N) On ice? Y or N
Cooler seals: Y
Cooler samples checked for nitric & chlorine? Y or NA
ZS & Phenol samples checked for chlorine? Y or NA
All samples checked for pH between 5.0-9.0? Y or NA
Sample Collect: Y
Customer:
Remarks:
GW - Ground water
WW - Waste water
SW - Surface water
SD - Soil/Sediment
TB - Trip Blank
EB - Equipment
WP - Wipe
O - Other
Are Samples Field Filtered?
Sampling Complete? Y or N
Cooler Temp
Cooler Seals (Intact? Y or N)
On Ice? Y or N
Cooler Seals: Y
White & Yellow copy to lab • Pink copy for customer

1111180 Summ Package

1111180

Cooler Received/Opened On 11/18/11 @ 0820
1. Tracking # 5730 (last 4 digits, FedEx)
Courier: FED-EX
2. Temperature of rep. sample or temp blank when opened: 3.8 Degrees Celsius + correction factor 0.0 = 3.8
3. If item #2 temperature is 6°C or less, was the representative sample or temp blank frozen? YES...NO...NA
4. Were custody seals on outside of cooler? YES...NO...NA
If yes, how many and where: 2 - FRONT + BACK
5. Were the seals intact, signed, and dated correctly? YES...NO...NA
6. Were custody papers inside cooler? YES...NO...NA
I certify that I opened the cooler and answered questions 1-6 (initial)
7. Were custody seals on containers: YES NO and intact YES...NO...NA
Were these signed and dated correctly? YES...NO...NA
8. Packing mat'l used? Bubblewrap Plastic bag Peanuts Vermiculite Foam insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry Ice Other None
10. Did all containers arrive in good condition (unbroken)? YES...NO...NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES...NO...NA
12. Did all container labels and tags agree with custody papers? YES...NO...NA
13a. Were VOA vials received? YES...NO...NA
b. Was there any observable headspace present in any VOA vial? YES...NO...NA
14. Was there a Trip Blank in this cooler? YES...NO...NA If multiple coolers, sequence #
I certify that I unloaded the cooler and answered questions 7-14 (initial)
15a. Chem preserved bottles, did pH test strips suggest preservation reached the correct pH level? YES...NO...NA
b. Did the bottle labels indicate that the correct preservatives were used YES...NO...NA
16. Was residual chlorine present? YES...NO...NA
I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial)
17. Were custody papers properly filled out (ink, signed, etc)? YES...NO...NA
18. Did you sign the custody papers in the appropriate place? YES...NO...NA
19. Were correct containers used for the analysis requested? YES...NO...NA
20. Was sufficient amount of sample sent in each container? YES...NO...NA
I certify that I entered this project into LIMS and answered questions 17-20 (initial)
I certify that I attached a label with the unique LIMS number to each container (initial)
21. Were there Non-Conformance issues at login? YES...NO Was a NCR generated? YES...NO...#
Additional Details:

1111180 Summ Package

091

MEMORANDUM **CH2MHILL**

Corrections to COCs

TO: Sonya Gorden, Empirical

COPIES: File
Data Validation Package
Laboratory Package

FROM: Hillary Ott
Project Data Manager

DATE: November 21, 2011

This memo is to document corrections made to entries on the Chains of Custody (COC) for Vieques, PI-4.

The corrections include changes to the sample IDs on the COC.

Sample ID on Login	Updated Sample ID	Date Collected	Time Collected
VEP4-EB02-111711	VEP4-EB01-111711	11/17/2011	12:00
VEP4-TB02-111711	VEP4-TB01-111711	11/17/2011	--

1111180 Summ Package

092 11

SDG# 1111183

093

Sample Delivery Group Case Narrative

Receipt Information
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. Samples were subcontracted to Microbial Insights for qPCR and to Test America for Volatile Fatty Acids.

Changes to the Revision
This is an original submittal of the final report package.

Analytical Information
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:
The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

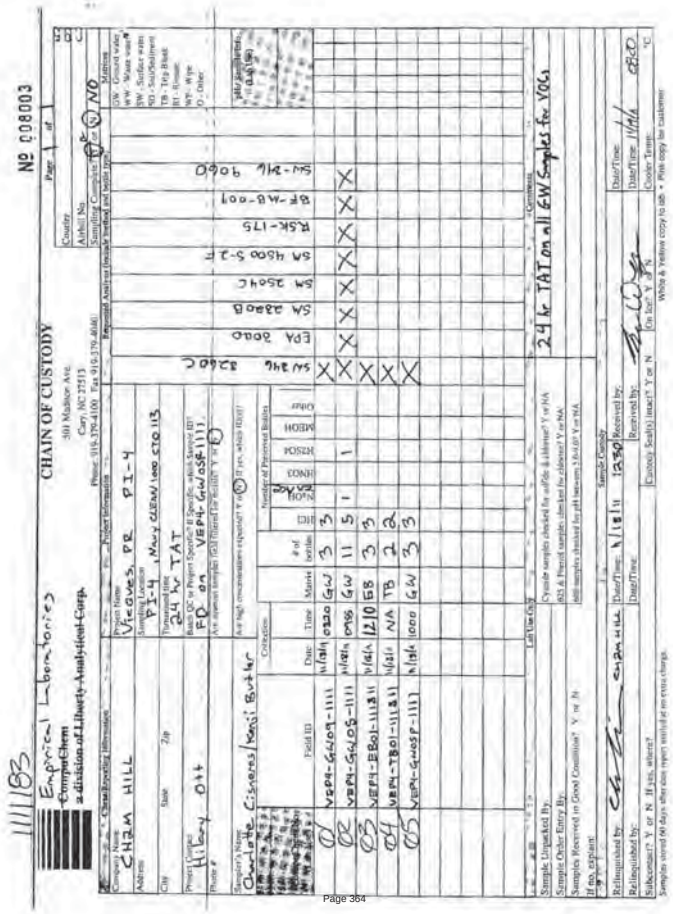
A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

SW8260B:
No anomalies or deviations are noted.

RSK175 MEE:
The method blank 1K23015-BLK1 has a positive result for Methane.

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

094



11/11/83

Cooler Received/Opened On_ 11/19/11 @ 0620

1. Tracking # 5741 (last 4 digits, FedEx)

Courier: __FED-EX

2. Temperature of rep. sample or temp blank when opened: 3.3 Degrees Celsius + correction factor 0.0 = 3.3

3. If item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES ...NO...NA

4. Were custody seals on outside of cooler? YES...NO...NA

If yes, how many and where: 2 FRONT & BACK

5. Were the seals intact, signed, and dated correctly? YES...NO...NA

6. Were custody papers inside cooler? YES...NO...NA

I certify that I opened the cooler and answered questions 1-6 (initial) B

7. Were custody seals on containers: YES ...NO... and intact YES...NO...NA

Were these signed and dated correctly? YES...NO...NA

8. Packing mat'l used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None

9. Cooling process: Ice Ice-pack Ice (direct contact) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? YES...NO...NA

11. Were all container labels complete (#, date, signed, pres., etc)? YES...NO...NA

12. Did all container labels and tags agree with custody papers? YES...NO...NA

13a. Were VOA vials received? YES...NO...NA

b. Was there any observable headspace present in any VOA vial? YES...NO...NA

14. Was there a Trip Blank in this cooler? YES...NO...NA If multiple coolers, sequence # _

I certify that I unpacked the cooler and answered questions 7-14 (initial) B

15a. Did preser'd bottles, did pH test strips suggest preservation reached the correct pH level? YES...NO...NA

b. Did the bottle labels indicate that the correct preservatives were used YES...NO...NA

16. Was residual chlorine present? YES...NO...NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial) B

17. Were custody papers properly filled out (ink, signed, etc)? YES...NO...NA

18. Did you sign the custody papers in the appropriate place? YES...NO...NA

19. Were correct containers used for the analysis requested? YES...NO...NA

20. Was sufficient amount of sample sent in each container? YES...NO...NA

I certify that I entered this project into LIMS and answered questions 17-20 (initial) B

I certify that I attached a label with the unique LIMS number to each container (initial) B

21. Were there Non-Conformance issues at login? YES...NO Was a NCR generated? YES...NO...#_

Additional Details:

096

DataQual
Environmental Services, LLC

CH2M HILL-VBO
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

December 11, 2013
SDG# 1305150, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1305150. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24 and 8270D-Rev 4, August 2008-SOP #HW-22,), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA	SVOA
VEP4-GW01-0513	1305150-01	water	X	X
VEP4-EB01-051413-GW	1305150-02	water	X	X
VEP4-TB01-051413-GW	1305150-03	water	X	

The following quality control samples were provided with this SDG: sample VEP4-EB01-051413-GW - equipment blank and sample VEP4-TB01-051413-GW- trip blank.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Field Duplicates NA
- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

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001

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

No qualifications were required to the data.

SVOA

No qualifications were required to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were required as the raw data was not printed dark enough to read in the original package. The laboratory was contacted and updated pages were submitted.

Technical Holding Times

According to chain of custody records, sampling was performed on 5/14/13 and samples were received at the laboratory 5/15/13. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

SVOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U not detected above the reported sample quantitation limit
J estimated value
UJ reported quantitation limit is qualified as estimated
N analyte has been tentatively identified
JN analyte has been tentatively identified, estimated value
R result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.

U* The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.

RL** The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.

J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.
Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL reporting limit
PQL practical quantitation limit
IDL instrument detection limit
MDL method detection limit
CRDL contract required detection limit
CRQL contract required quantitation limit
+ positive result
- non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Time
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DI	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other – explained in data validation report
%SOL	High moisture content

ANALYSIS DATA SHEET

VEP4-GW01-0513

Laboratory:	Empirical Laboratories, LLC		SDG:	1305150	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1305150-01	File ID:	0515001.D
Sampled:	05/14/13 09:35	Prepared:	05/22/13 05:12	Analyzed:	05/22/13 05:12
Solids:		Preparation:	5030B	Dilution:	1
Batch:	3E21026	Sequence:	3E14201	Calibration:	3127004

Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	26.68	88.9	75 - 120	
Dibromofluoromethane	30.00	29.74	99.1	85 - 115	
1,2-Dichloroethane-d4	30.00	29.04	96.8	70 - 120	
Toluene-d8	30.00	30.15	100	85 - 120	

LM 12.08.13

ANALYSIS DATA SHEET

VEP4-EB01-051413-GW

Laboratory:	Empirical Laboratories, LLC		SDG:	1305150	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1305150-02	File ID:	0515002.D
Sampled:	05/14/13 11:03	Prepared:	05/23/13 00:00	Analyzed:	05/24/13 00:36
Solids:		Preparation:	5030B	Dilution:	1
Batch:	3E21024	Sequence:	3E14402	Calibration:	3140001

Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	32.14	107	75 - 120	
Dibromofluoromethane	30.00	30.59	102	85 - 115	
1,2-Dichloroethane-d4	30.00	29.66	98.9	70 - 120	
Toluene-d8	30.00	30.07	100	85 - 120	

LM 12.08.13

ANALYSIS DATA SHEET

VEP4-TB01-051413-GW

Laboratory:	Empirical Laboratories, LLC		SDG:	1305150	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1305150-04	File ID:	0515004.D
Sampled:	05/14/13 12:40	Prepared:	05/24/13 14:31	Analyzed:	05/24/13 14:31
Solids:		Preparation:	5030B	Dilution:	1
Batch:	3E24013	Sequence:	3E14502	Calibration:	3127004

Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.29	91.0	75 - 120	
Dibromofluoromethane	30.00	29.73	99.1	85 - 115	
1,2-Dichloroethane-d4	30.00	30.04	100	70 - 120	
Toluene-d8	30.00	30.65	102	85 - 120	

LM 12.08.13

ANALYSIS DATA SHEET

VEP4-GW01-0513

Laboratory:	Empirical Laboratories, LLC		SDG:	1305150	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1305150-01	File ID:	0512001.D
Sampled:	05/14/13 09:35	Prepared:	05/20/13 15:00	Analyzed:	05/21/13 17:09
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3E20023	Sequence:	3E14207	Calibration:	3122001

Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.245	0.490	0.980	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	49.02	43.50	88.8	50 - 110	
Terphenyl-d14	49.02	42.59	86.7	50 - 135	
2,4,6-Tribromophenol	98.04	85.05	86.8	40 - 125	X

LM 12.08.13

ANALYSIS DATA SHEET

VEP4-EB01-051413-GW

Laboratory:	Empirical Laboratories, LLC		SDG:	1305150	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1305150-02	File ID:	0513002.D
Sampled:	05/14/13 11:00	Prepared:	05/20/13 15:00	Analyzed:	05/21/13 17:36
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3E20021	Sequence: 3E14207	Calibration:	3132001	Instrument: MS-HNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.240	0.481	0.962	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	48.08	37.45	77.9	50 - 110	
Terphenyl-d14	48.08	41.13	85.5	50 - 135	
2,4,6-Tribromophenol	96.15	39.58	41.2	40 - 125	X

1305150 Summ Package 017 94

1305150 Summ Package

EMPIRICAL LABORATORIES, LLC - CHAIN OF CUSTODY RECORD

SHIP TO: 621 Mainstream Drive, Suite 270 • Nashville, TN 37228 • 615-345-1115 • (fax) 615-846-5426

18755

Send Results to: Name Mike Zenbori; Company CH2M Hill; Address 2020 Enterprise Center Dr.; City Manchester; State, Zip VA; Phone 703-376-5301; E-mail mikael.zenbori@ch2m.com

Send Invoice to: Name Sean Gordon; Company Empirical Laboratories; Address 621 Mainstream Dr. Suite 270; City Nashville; State, Zip TN 37228; Phone 615-345-1115; Fax 615-846-5126; E-mail

Analysis Requirements: Air/Gas Volcs 8260C-Full; Air/Gas Volcs 8260C-Full; Air/Gas Volcs 8260C-Full

Lab Use Only: VOA Headspace Y; Field Filtered Y; Correct Containers Y; Discrepancies Y; Cust. Seals Intact Y; Containers Intact Y; Airbill #; CAR #

Lab Use Only Lab #	Date/Time Sampled	Sample Description	Sample Matrix	Comments	No. of Bottles	Lab Use Only Containers/Pres
-01	05/14/13 0935	VEP4-GW01-051313	AQ		5	N NA
-02	05/14/13 1003	VEP4-EB01-051413-GW	AQ		5	N NA
-03	05/14/13 1100	VEP4-FB19-051413	AQ	24HR TAT	5	N NA
-04	05/14/13 1430	VEP4-TRIP-051413-GW	AQ			N NA

Sample's (Signature): Mike Zenbori

Project No./Name:

Sample Kit Freight by: (Signature) Fred Hunn — Date/Time 05/14/13 1435

Relinquished by: (Signature) Mark Jackson — Date/Time 05/14/13 1435

Relinquished by: (Signature) — Date/Time

Received by: (Signature) Mark Jackson

Received by: (Signature) — Date/Time

Received for Laboratory by: (Signature) — Date/Time 05/15/13 0830 — Temperature 2.1

REMARKS:

Delivery: Page ___ of ___; Cooler No. ___ of ___; Date Shipped ___; Shipped By: ___; Turnaround ___

Distribution: Original and yellow copies accompany sample shipment to laboratory. Pink retained by samplers.

1305150 Summ Package

EMPIRICAL LABORATORIES
COOLER RECEIPT FORM

1305150

Cooler Received/Opened On: 05/15/13 @ 0830 — Workorder# 1305150 (05/15/13)

1. Tracking # 4209 (last 4 digits, FedEx)
   Courier: FED-EX
2. Temperature of rep. sample or temp blank when opened: 2.2 °C + correction factor (-0.1) = 2.1 °C
3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA
4. Were custody seals on outside of cooler? YES NO NA
   If yes, how many and where: 2-FRONT 1 BACK
5. Were the seals intact, signed, and dated correctly? YES NO NA
6. Were custody papers inside cooler? YES NO NA

I certify that I opened the cooler and answered questions 1-6 (initial) [illegible]

7. Were custody seals on containers: YES NO and intact YES NO NA
   Were these signed and dated correctly? YES NO NA
8. Packing material used: Bubblewrap Plastic bag Peanuts Vermiculite Foam insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry ice Other None
10. Did all containers arrive in good condition (unbroken)? YES NO NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES NO NA
12. Did all container labels and tags agree with custody papers? YES NO NA
13. a. Were VOA vials received? YES NO NA
    b. Was there any observable headspace present in any VOA vial? YES NO NA
14. Was there a Trip Blank in this cooler? YES NO NA If multiple coolers, sequence #

I certify that I unloaded the cooler and answered questions 7-14 (initial) [illegible]

15. a. Did preservatives, did pH test strips suggest preservation reached the correct pH level? YES NO NA
    b. Did the bottle labels indicate that the correct preservatives were used YES NO NA
16. Was residual chlorine present? YES NO NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial) [illegible]

17. Were custody papers properly filled out (ink, signed, etc)? YES NO NA
18. Did you sign the custody papers in the appropriate place? YES NO NA
19. Were correct containers used for the analysis requested? YES NO NA
20. Was sufficient amount of sample sent in each container? YES NO NA

I certify that I entered this project into LIMS and answered questions 17-20 (initial) [illegible]

I certify that I attached a label with the unique LIMS number to each container (initial) [illegible]

I certify that I have performed a second check of the LIMS information against the COC to confirm accuracy (initial) [illegible]

21. Were there Non-Conformance issues at login? YES NO Was a NCR generated? YES NO #

Additional Details:

C:\Documents and Settings\bwright\Desktop\New CRF doc1.doc

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Sample Delivery Group Case Narrative

Receipt Information

The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Changes to the Revision

Revision 01: The package was revised to replace the raw data that was not dark enough to be read in the original package.

Analytical Information

All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:

The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

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SW8260B:
No anomalies or deviations are noted.

SW8270D BNA:
The following internal standards exceeded criteria:
Phenanthrene-d10 with a negative bias in 3E15016-BS2
Note – While the Perylene-d12 internal standard shifted outside +/-0.5min from the initial calibration in 3E14207-CCV1, 3E20021-BLK2, -BS2, -BSD2, 1305150-01, and -02, it is identified by the mass spectrum. This minimal shift would have no impact on the reported results.

The following continuing calibration verifications exceeded criteria:
3E13610-CCV1 with a positive bias for 2,4,6-Tribromophenol
3E14207-CCV1 with a positive bias for 2,4,6-Tribromophenol

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

016

YES NO N/A

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 1305150 LAB: Empirical

SITE NAME: Vieques SWMU 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ☑ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ☑ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ☑ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. **VOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ☑ ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ☑ ___ ___

1.3 Sample Conditions/Problems

017

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ☑ ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

a 5/14/13 a 5/22-24
a 5/15 t 2.1°C

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ ☑ ___

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

018

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water ☑ ___ ___

b. Soil ☐ ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water ☑ ___ ___

b. Soil ☐ ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

019

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. lab [✓] ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ [✓]

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] [✓] ___

If yes, were samples reanalyzed? [ ] ___ [✓]

Were method blanks reanalyzed? [ ] ___ [✓]

020

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] [✓] ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

021

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ [✓]

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] [✓] ___

022

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent) NO MS/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] ___ [✓]

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] ___ [✓]

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

023

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month (page 8000C, section 9.5.1)

a. Water [ ] ___ ___

b. Waste [ ] ___ ___

c. Soil/Solid [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7) for each matrix. [ ] ___ ___

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ ___

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? [ ] ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? [ ] ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? [ ] ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? [ ] ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. [ ] ___ ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ [ ] ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	≥ CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	≥ CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone
** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ☑ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ☑ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ☑ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ☑ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ☑ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ☑ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ☑ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ☑ ___

9.7 Have the appropriate number of significant figures (two) been reported? ☑ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ☑ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ☑ ___ ___
b. Matrix spikes and matrix spike duplicates ☐ ___ ☑
c. Blanks ☑ ___ ___
d. Laboratory Control Samples ☑ ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ☑ ___ ___
b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ☐ ___ ☑
c. Blanks ☑ ___ ___
d. Laboratory Control Samples ☑ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? ☑ ___ ___

YES NO N/A

Resolution? [✓] ___ ___

Peak shape? [✓] ___ ___

Full-scale graph (attenuation)? [✓] ___ ___

Other: _____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

No TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [✓] ___ ___

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Blanks [✓] ___ ___

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [✓] ___ ___

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [✓] ___ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [✓] ___ ___

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? ✓ ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39) qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. ✓ ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) ___ ✓ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? ✓ ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? ___ ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). ✓ ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? ✓ ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:
1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.
2. Do not qualify non-detects when the associated IS are counts area > + 100%.
3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".
4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ✓ ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

DataQual

VOA

Initial Calibration Date: 5/17/2013
RRF and %RSD Calculations:

Compound Name: vinyl chloride
Lab Value: 0.3017

Area of Compound	2851807
Area of Internal STD	1417697
Conc. of Internal STD	30
Conc. of Compound	200
Calculated RRF	0.302

Compound Name: 1,1-dichloroethene
Lab Value: 4.5

RRF of STD 1	0.2386
RRF of STD 2	0.2355
RRF of STD 3	0.2203
RRF of STD 4	0.2268
RRF of STD 5	0.2172
RRF of STD 6	0.2369
RRF of STD 7	0.2420
RRF of STD 8	0.2500
RRF of STD 9	0.2350
Calculated % RSD	4.5

Continuing Calibration File ID: 5/23/2013
RRF and %D Calculations:

Compound Name: cis-1,2-dichloroethene
Lab Value: 0.270

Area of Compound	1074177
Area of Internal STD	1195726
Conc. of Internal STD	30
Conc. of Compound	100
Calculated RRF	0.270

Compound Name: trichloroethene
Lab Value: 2.0

Average RRF	0.304
Calibration Check RRF	0.298
Calculated % D	2.0

YES NO N/A

E - The concentration of this analyte exceeds the calibration range of the instrument.

A - Indicates a Tentatively Identified Compound (TIC) is a suspected aldol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 1305150 LAB: Empirical

SITE NAME: Vieques SWMU 70

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the data assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative or cover letter present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

YES NO N/A

II. **SEMIVOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? ✓ ___ ___

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, all non-detects data are qualified as unusable (R), and detects are flagged "J".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (10°C), flag all positive results "J" and all non-detects "UJ". A 2/C

A 5/14/13 A 5/20
A 5/15 A 5/21

2.0 Holding Times

2.1 Have any semivolatile technical holding times, determined from date of collection to date of extraction, been exceeded? ___ ✓ ___

Continuous extraction of water samples for semivolatile analysis must be started within 7 days of the date of collection. Soil/sediment samples must be extracted within **14** days of collection. Extracts must be analyzed within

YES NO N/A

40 days of the date of extraction.

Table of Holding Time Violations

(See Traffic Report)

Sample ID	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted	Date Analyzed

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

YES NO N/A

3.0 Surrogate Recovery (Form II/Equivalent)

3.1 Have the semi volatile surrogate recoveries been listed on CLP Surrogate Recovery forms (Form II) for each of the following matrices:

a. Low Water ✓ ___ ___

b. Low/Med Soil ___ ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery Summary forms for each matrix:

a. Low Water ✓ ___ ___

b. Low/Med Soil ___ ___ ___

ACTION: If CLP deliverables are unavailable, document the effect(s) in data assessments. In some cases the lab may have to be contacted to obtain the data necessary to complete the validation.

3.3 Were outliers marked correctly with an asterisk? ✓ ___ ___

ACTION: Circle all outliers in red.

3.4 Were two or more base neutral OR acid surrogate recoveries out of specification for any sample or method blank (Reviewer should use lab in house recovery limits. Use surrogate recovery limits from USEPA National Functional Guidlines January 2005 page 130, if in house limits are not available. See Method 8000B-43 or 8000C-24). ___ ✓ ___

Note: Examine lab in house limits for reasonableness.

If yes, were samples re-analyzed? ___ ___ ✓

SURROGATE STANDARD RECOVERY AND RT SUMMARY
SW8270D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Sequence: 3E13610

SDG: 1305150
Project: Vineyard East SWMU 20
Instrument: MS-BNA4
Calibration: 3U22001

Surrogate Compound	Spike Level	% Recovery	Recovery Limits	RT	CCV RT	RT Diff	RT Diff Limit	Q
Calibration Check (3E13610-CCV1) ug/mL				Lab File ID: SEQ-CCV8.D		Analyzed: 05/16/13 02:18		
2-Fluorobiphenyl	10.00	106	80 - 120	7.759	7.759	0.0000	+/-0.500	
Terphenyl-d14	10.00	111	80 - 120	12.327	12.327	0.0000	+/-0.500	
2,4,6-Tribromophenol	20.00	121	80 - 120	9.534	9.534	0.0000	+/-0.500	*
Blank (3E15016-BLK2) ug/L				Lab File ID: E15016B1.D		Analyzed: 05/16/13 11:40		
2-Fluorobiphenyl	50.00	79.7	50 - 110	7.767	7.759	0.0080	+/-0.500	
Terphenyl-d14	50.00	79.9	50 - 135	12.339	12.327	0.0120	+/-0.500	
2,4,6-Tribromophenol	100.0	94.5	40 - 125	9.544	9.534	0.0100	+/-0.500	
LCS (3E15016-BS2) ug/L				Lab File ID: E15016L1.D		Analyzed: 05/16/13 12:08		
2-Fluorobiphenyl	50.00	82.5	50 - 110	7.764	7.759	0.0050	+/-0.500	
Terphenyl-d14	50.00	84.1	50 - 135	12.336	12.327	0.0090	+/-0.500	
2,4,6-Tribromophenol	100.0	101	40 - 125	9.541	9.534	0.0070	+/-0.500	
VEP4-GW19-051413 (1305150-03) ug/L				Lab File ID: 0515003.D		Analyzed: 05/16/13 12:36		
2-Fluorobiphenyl	46.30	75.6	50 - 110	7.765	7.759	0.0060	+/-0.500	
Terphenyl-d14	46.30	66.1	50 - 135	12.334	12.327	0.0070	+/-0.500	
2,4,6-Tribromophenol	92.59	95.2	40 - 125	9.545	9.534	0.0110	+/-0.500	

All good

045

SURROGATE STANDARD RECOVERY AND RT SUMMARY
SW8270D

Laboratory: Empirical Laboratories, LLC
Client: CH2M HILL Inc.
Sequence: 3E14207

SDG: 1305150
Project: Vieques East SWMU 20
Instrument: MS-BNA4
Calibration: 3122001

Surrogate Compound	Spike Level	% Recovery	Recovery Limits	RT	CCV RT	RT Diff	RT Diff Limit	Q
Calibration Check (3E14207-CCV1) ug/mL				Lab File ID: 3EQ-CCV1.D		Analyzed: 05/21/13 13:03		
2-Fluorobiphenyl	10.00	109	80 - 120	7.631	7.631	0.0000	+/-0.500	
Terphenyl-d14	10.00	118	80 - 120	12.186	12.186	0.0000	+/-0.500	
2,4,6-Tribromophenol	20.00	123	80 - 120	9.403	9.403	0.0000	+/-0.500	*
Blank (3E20021-BLK2) ug/L				Lab File ID: E20021B1.D		Analyzed: 05/21/13 13:30		
2-Fluorobiphenyl	50.00	81.0	50 - 110	7.631	7.631	0.0000	+/-0.500	
Terphenyl-d14	50.00	83.0	50 - 135	12.191	12.186	0.0050	+/-0.500	
2,4,6-Tribromophenol	100.0	86.0	40 - 125	9.403	9.403	0.0000	+/-0.500	
LCS (3E20021-BS2) ug/L				Lab File ID: E20021L1.D		Analyzed: 05/21/13 13:57		
2-Fluorobiphenyl	50.00	82.3	50 - 110	7.631	7.631	0.0000	+/-0.500	
Terphenyl-d14	50.00	82.3	50 - 135	12.191	12.186	0.0050	+/-0.500	
2,4,6-Tribromophenol	100.0	93.6	40 - 125	9.403	9.403	0.0000	+/-0.500	
LCS Dup (3E20021-BSD2) ug/L				Lab File ID: E20021L2.D		Analyzed: 05/21/13 14:24		
2-Fluorobiphenyl	50.00	81.7	50 - 110	7.631	7.631	0.0000	+/-0.500	
Terphenyl-d14	50.00	80.9	50 - 135	12.191	12.186	0.0050	+/-0.500	
2,4,6-Tribromophenol	100.0	94.6	40 - 125	9.403	9.403	0.0000	+/-0.500	
VEP4-GW01-0513 (1305150-01) ug/L				Lab File ID: 0513001.D		Analyzed: 05/21/13 17:09		
2-Fluorobiphenyl	49.02	88.8	50 - 110	7.636	7.631	0.0050	+/-0.500	
Terphenyl-d14	49.02	86.7	50 - 135	12.196	12.186	0.0100	+/-0.500	
2,4,6-Tribromophenol	98.04	86.8	40 - 125	9.403	9.403	0.0000	+/-0.500	
VEP4-EB01-051413-GW (1305150-02) ug/L				Lab File ID: 0515002.D		Analyzed: 05/21/13 19:36		
2-Fluorobiphenyl	49.08	77.9	50 - 110	7.631	7.631	0.0000	+/-0.500	
Terphenyl-d14	48.08	85.5	50 - 135	12.191	12.186	0.0050	+/-0.500	
2,4,6-Tribromophenol	96.15	41.2	40 - 125	9.403	9.403	0.0000	+/-0.500	

no qual

047

YES NO N/A

Were method blanks re-analyzed? [ ] ___ ✓

ACTION: If all surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet method specifications, for the affected fraction only (i.e. either base-neutral or acid compounds):

1. Flag all positive results as estimated ("J").

2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.

3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Positive results for the fraction with < 10% surrogate recovery are qualified with "J".

2. Non-detects for that fraction should be qualified as unusable (R) .

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ ✓ ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document

YES NO N/A

effect in data assessments.

4.0 Matrix Spikes (Form III/Equivalent)

no MS/MSD

4.1 Have the semivolatile Matrix Spike and Matrix Spike Duplicate/or duplicate unspiked Sample recoveries been listed on the Recovery Form (Form III)? [ ] ___ ✓

NOTE: Method 3500B/page 4 states the spiking compounds:

Base/neutrals	Acids
1,2,4-Trichlorobenzene	Pentachlorophenol
Acenaphthene	Phenol
2,4-Dinitrotoluene	2-Chlorophenol
Pyrene	4-Chloro-3-methylphenol
N-Nitroso-di-n-propylamine	4-Nitrophenol
1,4-Dichlorobenzene	

Note: Some projects may require the spiking of specific compounds of interest.

Note: See Method 8270D-sec 8.4.2 for deciding on whether to prepare and analyze duplicate samples or a matrix spike/matrix spike duplicate. If samples are expected to contain target analytes, then laboratory may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratory should use a matrix spike and matrix spike duplicate pair.

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water [ ] ___ ✓

b. Low Solid [ ] ___ ✓

c. Med Solid [ ] ___ ✓

YES NO N/A

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. It may be necessary to contact the lab to obtain the required data.

NOTE: If the data has not been reported on CLP equivalent form, then the laboratory must provide the information necessary to evaluate the spike recoveries in the MS and MSD. The required data which should have been provided by the lab include the analytes and concentrations used for spiking, background concentrations of the spiked analytes (i.e., concentrations in unspiked sample), methods and equations used to calculate the QC acceptance criteria for the spiked analytes, percent recovery data for all spiked analytes.

The data reviewer must verify that all reported equations and percent recoveries are correct before proceeding to the next section.

4.3 Were matrix spikes performed at concentration equal to 100ug/L for acid compounds, and 200ug/l for base compounds (Method 3500B-4), or those specified in project plan. [ ] ___ ✓

4.4 How many semivolatile spike recoveries are outside Laboratory in house MS/MSD recovery limits (use recovery limits values in Method 8270D-43&44 Table 6 if in house values not available).

Water	Solids
___ out of ___	___ out of ___

YES NO N/A

4.5 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water ____ out of ____

Solids ____ out of ____

ACTION: Circle all outliers with red pencil.

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria to determine the need for some qualification of the data.

4.6 Was a Laboratory Control Sample (LCS) analyzed with each analytical batch? ✓ ___ ___

NOTE: When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

5.0 Blanks (Form IV/Equivalent)

5.1 Is the Method Blank Summary (Form IV) present? ✓ ___ ___

5.2 Frequency of Analysis:

Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? ✓ ___ ___

5.3 Has a method blank been analyzed either after

YES NO N/A

the calibration standard or at any other time during the analytical shift for each GC/MS system used ? ✓ ___ ___

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, use professional judgement to determine if the associated sample data should be qualified.

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for the semivolatiles? ✓ ___ ___

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ✓ ___

6.2 Do any field/rinse/ blanks have positive results for target analytes and/or TICs (if required, see section 10 below)? ___ ✓ ___

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field Blanks must be qualified for outlying surrogates, poor spectra, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify sample results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

YES NO N/A

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

NOTE: If the laboratory did not report TIC analyses, check the project plans to verify whether or not it was required.

6.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

6.4 Was a instrument blank analyzed after each sample/dilution which contained a target compound

	YES	NO	N/A
that exceeded the initial calibration range.	✓		
6.5 Does the instrument blank have positive results for target analytes and/or TICs?		✓	

Note: Use professional judgement to determine if carryover occurred and qualify analytes accordingly.

7.0 GC/MS Apparatus and Materials

	YES	NO	N/A
7.1 Did the lab use the proper gas chromatographic column for analysis of semivolatiles by Method 8270D? Check raw data, instrument logs or contact the lab to determine what type of column was used. The method requires the use of 30 m x 0.25 mm ID (or 0.32 mm ID), silicone-coated, fused silica, capillary column.	✓		

ACTION: If the specified column, or equivalent, was not used, document the effects in the data assessment. Use professional judgement to determine the acceptability of the data.

8.0 GC/MS Instrument Performance Check (Form V/Equivalent)

	YES	NO	N/A
8.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)?	✓		

NOTE: The performance solution should also contain 4,4-DDT, pentachlorophenol, and benzidine to verify injection port inertness and column performance. The degradation of DDT to DDE and DDD must be less than 20% total and the response of pentachlorophenol and benzidine should be within normal ranges for these compounds (based upon lab experience) and show no peak degradation or tailing before samples are analyzed. (see section 5.5

	YES	NO	N/A
page 8270D-12).			
8.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift?	✓		
8.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument?	✓		

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

	YES	NO	N/A
8.4 Have the ion abundances been normalized to m/z 198?	✓		
8.5 Have the ion abundance criteria been met for each instrument used?	✓		

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action specified in section 3.2

	YES	NO	N/A
8.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.)		✓	
8.7 Have the appropriate number of significant figures (two) been reported?	✓		

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.

	YES	NO	N/A
8.8 Are the spectra of the mass calibration compound acceptable?	✓		

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

9.0 Target Analytes

	YES	NO	N/A
9.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate	✓		
b. Matrix spikes and matrix spike duplicates			✓
c. Blanks	✓		
9.2 Has any special cleanup, such as GPC, been performed on all soil/sediment sample extracts (see section 7.2, page 8270D-14)?			✓

ACTION: If data suggests that extract cleanup was not performed, use professional judgement. Make note in the data assessment narrative.

	YES	NO	N/A
9.3 Are the Reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?			
a. Samples and/or fractions as appropriate	✓		
b. Matrix spikes and matrix spike duplicates (Mass spectra not required)			✓
c. Blanks	✓		

ACTION: If any data are missing, take action specified in 3.2 above.

	YES	NO	N/A
9.4 Are the response factors shown in the Quant Report?	✓		
9.5 Is chromatographic performance acceptable with respect to:			
Baseline stability?	✓		
Resolution?	✓		
Peak shape?	✓		
Full-scale graph (attenuation)?	✓		
Other: _____			

ACTION: Use professional judgement to determine the acceptability of the data.

9.6 Are the lab-generated standard mass spectra of identified semivolatile compounds present for

YES NO N/A

each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the data assessment narrative. If spectra are missing, reject all positive data.

9.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

9.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

9.9 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 9.7, 9.8, and 9.9.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

YES NO N/A

10.0 Tentatively Identified Compounds (TIC)

No TICs

10.1 If Tentatively Identified Compounds were required for this project, are all Form Is, Part B present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier?

NOTE: Review sampling reports to determine if the lab was required to identify non target analytes (refer to section 7.6.2,page 8270D-21).

10.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following: [✓] ___ ___

a. Samples and/or fractions as appropriate [✓] ___ [✓]

b. Blanks [✓] ___ [✓]

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by CAS #.

10.3 Are any target compounds from one fraction listed as TIC compounds in another (e.g., an acid compound listed as a base neutral TIC)? ___ [✓] ___

ACTION: i. Flag with "R" any target compound listed as a TIC.

ii. Make sure all rejected compounds are properly reported in the other fraction.

10.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the

YES NO N/A

sample mass spectrum? [✓] ___ [✓]

10.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [✓] ___ [✓]

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate and remove "JN". Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R."

11.0 Compound Quantitation and Reported Detection Limits

11.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found? ___ [✓] ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

11.2 Are the method detection limits adjusted to reflect sample dilutions and, for soils, sample moisture? [✓] ___ [✓]

YES NO N/A

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I (if present) and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's that should not be used, including any in the summary package.

12.0 Standards Data (GC/MS)

12.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

13.0 GC/MS Initial Calibration (Form VI/Equivalent)

13.1 Is the Initial Calibration Form (Form VI/ Equivalent) present and complete for the semivolatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard row data are missing, take action specified in 3.2 above.

13.2 Are all base neutral or acid RRFs > 0.050? [✓] ___ ___

YES NO N/A

Check the **average RRFs** of the four System Performance Check Compounds (SPCCs): N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. These compounds must have **average RRFs** greater than or equal to 0.05 before running samples and should not show any peak tailing.

ACTION: Circle all outliers in red.

ACTION: For any target analyte with **average RRF <0.05**

1. "R" all non-detects:
2. "J" all positive results.

13.3 Are response factors for base neutral or acid target analytes stable over the concentration range of the calibration (% Relative standard deviation [%RSD] < 20.0%)? ☑ ___ ___

NOTE: The % RSD for each individual Calibration Check Compound (CCC, Method 8270D-40 see Table 4) must be less than 30% before analysis can begin. If grater 30%, the lab must clean and recalibrate the instrument.

CALIBRATION CHECK COMPOUNDS

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol

YES NO N/A

Benzo(a)pyrene

ACTION: If the %RSD for any CCC >30% and no corrective action taken, then "J" qualify all positive hits and "UJ" qualify all non-detects.

ACTION: Circle all outliers in red.

ACTION: If the % RSD is ≥ 20.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non- detect results for that analyte "R," unusable. Alternatively, the lab should calculate first or second order regression fit of the calibration curve and select the fit which introduces the least amount of error.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

13.4 Did the laboratory calculate the calibration curve by the least squares regression fit? ___ ☑ ___

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) ___ ☑ ___

ACTION: Circle Errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

13.5 Do the target compounds for this SDG include Pesticides? ☐ ☑ ___

YES NO N/A

13.6 If the pesticide compounds include DDT, was the percent breakdown of DDT to DDD and DDE greater than 20%? ___ ☐ ☑

ACTION: If DDT percent breakdown exceeds 20%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE results are positive, qualify the quantitation limit for DDT as unusable, "R".

ii. Qualify all positive results for DDD and DDE as presumptively present at an approximate concentration "JN".

14.0 GC/MS Calibration Verification (Form VII/Equivalent)

14.1 Are the Calibration Verification Forms (Form VII) present and complete for all compounds of interest? ☑ ___ ___

14.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ☑ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

_____

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed within twelve hours of every sample analysis,

YES NO N/A

call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

14.3 Do any of the SPCCs have an RRF <0.05? ___ ☑ ___

If YES, make a note in data assessment if the lab did not take corrective action specified in section 7.4.4, page 8270D-18. ☐ ___ ___

14.4 Do any of the CCCs have a %D between the initial and continuing RRF which exceeds 20.0%?

ACTION: If yes, make a note in data assessment.

14.5 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds 20.0%? ___ ☑ ___

ACTION: Circle all outliers in red. Only surr no good

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is above 90%, qualify all non-detects for that analyte as "R", unusable.

14.6 Do any semivolatile compounds have a RRF < 0.05? ___ ☐ ___

ACTION: Circle all outliers in red.

ACTION: If RRF < 0.05, qualify as unusable ("R") associated non-detects and "J" associated positive values.

14.7 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or percent difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more). ___ ☑ ___

CONTINUING CALIBRATION CHECK
SW8270D

Laboratory:	Empirical Laboratories, LLC	SDG:	1305150
Client:	CH2M HILL Inc.	Project:	Vitusco East SWMU 20
Instrument ID:	MS-BNA4	Calibration:	3122001
Lab File ID:	SEQ-CCV1.D	Calibration Date:	05/01/13 00:00
Sequence:	3E14207	Injection Date:	05/21/13
Lab Sample ID:	3E14207-CCV1	Injection Time:	13:03

COMPOUND	TYPE	CONC. (ug/mL) STD	CONC. (ug/mL) CCV	RESPONSE FACTOR ICAL	RESPONSE FACTOR CCV	RESPONSE FACTOR MIN (#)	% DIFF / DRIFT CCV	% DIFF / DRIFT LIMIT (#)	
1,4-Dioxane	A	10.00	8.474	0.1401567	0.1187769		-15.3	20	
2-Fluorobiphenyl	A	10.00	10.90	0.6701778	0.7305305		9.0	20	
Terphenyl-d14	A	10.00	11.77	0.8784264	1.034137		17.7	20	
2,4,6-Tribromophenol	A	20.00	24.58	0.1373566	0.1688456		22.9	20	*

No Qual

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USEPA Region II
SW846 Method 8270D (Rev.4, January 1998)

Date: August, 2008
SOP HW-22 Rev.4

YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect(s) in the data assessments.

15.0 Internal Standards (Form VIII)

15.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to + 100%) for each continuing calibration? ✓

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area	LowerLimit	Upper Limit

(Attach additional sheets if necessary.)

Note: Check Table 5, 8270D-41 for associated analytes.

ACTION: i. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

ii. Non-detects associated with IS > 100% should not be qualified.

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USEPA Region II
SW846 Method 8270D (Rev.4, January 1998)

Date: August, 2008
SOP HW-22 Rev.4

YES NO N/A

iii. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

15.2 Are the retention times of all internal standards within 30 seconds of the associated calibration standard? ✓

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

No Qual

16.0 Laboratory Control Samples (LCS)

16.1 Were any LCS samples run in order to verify analytes which failed criteria for spike recovery? ✓

16.2 Did the lab spike LCS sample spiked with the same analytes and the same concentrations as the matrix spike? ✓

16.3 Were the mean and standard deviation of all analytes within the QC acceptance ranges as shown in Table 6, 8270D-43? ✓

ACTION: If the recovery of any analyte falls out of the designated range, the analytical results for that compound is suspect and should be qualified "J" in the unspiked samples.

17.0 Field Duplicates

17.1 Were any field duplicates submitted for semivolatile analysis? ✓

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INTERNAL STANDARD AREA AND RT SUMMARY
SW8270D

Laboratory:	Empirical Laboratories, LLC	SDG:	1305150
Client:	CH2M Hill, Inc.	Project:	Vitusco East SWMU 20
Sequence:	3E14207	Instrument:	MS-BNA4
		Calibration:	3122001

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Calibration Check (3E14207-CCV1)			Lab File ID: SEQ-CCV1.D			Analyzed: 05/21/13 13:03			
Phenanthrene-d10	256619	10.207	321039	10.545	80	50 - 200	-0.3380	+/-0.50	
Perylene-d12	313978	16.506	337266	17.137	93	50 - 200	-0.6310	+/-0.50	*
Blank (3E20021-BLK2)			Lab File ID: E20021B1.D			Analyzed: 05/21/13 13:30			
Phenanthrene-d10	336519	10.207	321039	10.545	105	50 - 200	-0.3380	+/-0.50	
Perylene-d12	405763	16.506	337266	17.137	120	50 - 200	-0.6310	+/-0.50	*
LCS (3E20021-BS2)			Lab File ID: E20021L1.D			Analyzed: 05/21/13 13:57			
Phenanthrene-d10	322031	10.207	321039	10.545	100	50 - 200	-0.3380	+/-0.50	
Perylene-d12	390132	16.501	337266	17.137	116	50 - 200	-0.6360	+/-0.50	*
LCS Dup (3E20021-BSD2)			Lab File ID: E20021L2.D			Analyzed: 05/21/13 14:24			
Phenanthrene-d10	340775	10.207	321039	10.545	106	50 - 200	-0.3380	+/-0.50	
Perylene-d12	404046	16.501	337266	17.137	120	50 - 200	-0.6360	+/-0.50	*
VEP4-GW01-0513 (1305150-01)			Lab File ID: 0515001.D			Analyzed: 05/21/13 17:09			
Phenanthrene-d10	394971	10.207	321039	10.545	123	50 - 200	-0.3380	+/-0.50	
Perylene-d12	469605	16.506	337266	17.137	139	50 - 200	-0.6310	+/-0.50	*
VEP4-EB01-051413-GW (1305150-02)			Lab File ID: 0515002.D			Analyzed: 05/21/13 17:36			
Phenanthrene-d10	353507	10.207	321039	10.545	110	50 - 200	-0.3380	+/-0.50	
Perylene-d12	411157	16.506	337266	17.137	122	50 - 200	-0.6310	+/-0.50	*

Tab not based w/ target Compd

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YES NO N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

Initial Calibration Date: 5/1/2013
RRF and %RSD Calculations:
Compound Name: 1,4-dioxane
Lab Value: 0.130

Area of Compound	394986
Area of Internal STD	243500
Conc. of Internal STD	4
Conc. of Compound	50
Calculated RRF	0.130

Compound Name: 1,4-dioxane
Lab Value: 13.4

RRF of STD 1	0.185
RRF of STD 2	0.1450523
RRF of STD 3	0.1304524
RRF of STD 4	0.1265765
RRF of STD 5	0.133586
RRF of STD 6	0.1360939
RRF of STD 7	0.1351959
RRF of STD 8	0.1297695
Calculated % RSD	13.4

Continuing Calibration File ID: 5/21/2013
RRF and %D Calculations:
Compound Name: 1,4-dioxane
Lab Value: 0.119

Area of Compound	76201
Area of Internal STD	256619
Conc. of Internal STD	4
Conc. of Compound	10
Calculated RRF	0.119

Compound Name: 1,4-dioxane
Lab Value: 15.300

Average RRF	0.140
Calibration Check RRF	0.1187769
Calculated % D	15.3

DataQual
Environmental Services, LLC

CH2M HILL-VBO
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

December 11, 2013
SDG# 1305172, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1305172. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24 and 8270D-Rev 4, August 2008-SOP #HW-22,), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA	SVOA
VEP4-GW06-0513	1305172-01	water	X	X
VEP4-GW05-0513	1305172-02	water	X	X
VEP4-GW05P-0513	1305172-03	water	X	X
VEP4-EB01-051513-GW	1305172-04	water	X	X
VEP4-TB01-051513-GW	1305172-05	water	X	

The following quality control samples were provided with this SDG: sample VEP4-GW05P-0513- field duplicate of sample VEP4-GW05-0513; sample VEP4-EB01-051513-GW - equipment blank and sample VEP4-TB01-051513-GW- trip blank.

The samples were evaluated based on the following criteria:

- Data Completeness
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Field Duplicates *

- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

No qualifications were required to the data.

SVOA

No qualifications were required to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were required as the raw data was not printed dark enough to read in the original package. The laboratory was contacted and updated pages were submitted.

Technical Holding Times

According to chain of custody records, sampling was performed on 5/15/13 and samples were received at the laboratory 5/16/13. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

SVOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U not detected above the reported sample quantitation limit
J estimated value
UJ reported quantitation limit is qualified as estimated
N analyte has been tentatively identified
JN analyte has been tentatively identified, estimated value
R result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.

U* The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.

RL** The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.

J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.
Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL reporting limit
PQL practical quantitation limit
IDL instrument detection limit
MDL method detection limit
CRDL contract required detection limit
CRQL contract required quantitation limit
+ positive result
- non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1305172

007

ANALYSIS DATA SHEET

VEP4-GW06-0513

Laboratory: Empirical Laboratories, LLC — SDG: 1305172
Client: CH2M Hill, Inc. — Project: Vieques East SWMU 20
Matrix: Water — Laboratory ID: 1305172-01 — File ID: 0517201.D
Sampled: 05/15/13 09:10 — Prepared: 05/22/13 00:00 — Analyzed: 05/22/13 10:49
Solids: — Preparation: 5030B — Dilution: 1
Batch: 3E22012 — Sequence: 3E14301 — Calibration: 3140001 — Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	31.51	105	75 - 120	
Dibromofluoromethane	30.00	31.74	106	85 - 115	
1,2-Dichloroethane-d4	30.00	30.45	102	70 - 120	
Toluene-d8	30.00	30.04	100	85 - 120	

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ANALYSIS DATA SHEET

VEP4-GW05-0513

Laboratory: Empirical Laboratories, LLC — SDG: 1305172
Client: CH2M Hill, Inc. — Project: Vieques East SWMU 20
Matrix: Water — Laboratory ID: 1305172-02 — File ID: 0517202D.D
Sampled: 05/15/13 11:20 — Prepared: 05/22/13 00:00 — Analyzed: 05/22/13 12:42
Solids: — Preparation: 5030B — Dilution: 2
Batch: 3E22012 — Sequence: 3E14301 — Calibration: 3140001 — Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.500	1.00	2.00	U
156-59-2	cis-1,2-Dichloroethene	**0.540**	0.500	1.00	2.00	JB
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.500	1.00	2.00	U
79-01-6	Trichloroethene	**2.50**	0.200	0.400	1.00	B
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	32.12	107	75 - 120	
Dibromofluoromethane	30.00	31.29	104	85 - 115	
1,2-Dichloroethane-d4	30.00	29.42	98.1	70 - 120	
Toluene-d8	30.00	31.38	105	85 - 120	

009

ANALYSIS DATA SHEET

VEP4-GW05P-0513

Laboratory: Empirical Laboratories, LLC — SDG: 1305172
Client: CH2M Hill, Inc. — Project: Vieques East SWMU 20
Matrix: Water — Laboratory ID: 1305172-03 — File ID: 0517203D.D
Sampled: 05/15/13 11:25 — Prepared: 05/22/13 00:00 — Analyzed: 05/22/13 13:10
Solids: — Preparation: 5030B — Dilution: 2
Batch: 3E22012 — Sequence: 3E14301 — Calibration: 3140001 — Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.500	1.00	2.00	U
156-59-2	cis-1,2-Dichloroethene	**0.620**	0.500	1.00	2.00	JD
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.500	1.00	2.00	U
79-01-6	Trichloroethene	**2.56**	0.200	0.400	1.00	D
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	32.03	107	75 - 120	
Dibromofluoromethane	30.00	32.57	109	85 - 115	
1,2-Dichloroethane-d4	30.00	30.77	103	70 - 120	
Toluene-d8	30.00	31.33	104	85 - 120	

010

ANALYSIS DATA SHEET

VEP4-EB01-051513-GW

Laboratory: Empirical Laboratories, LLC | SDG: 1305172
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1305172-04 | File ID: 0517204.D
Sampled: 05/15/13 12:20 | Prepared: 05/23/13 00:00 | Analyzed: 05/24/13 02:56
Solids: | Preparation: 5030B | Dilution: 1
Batch: 3E23024 | Sequence: 3E14402 | Calibration: 3140001 | Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	32.54	108	75 - 120	
Dibromofluoromethane	30.00	30.20	101	85 - 115	
1,2-Dichloroethane-d4	30.00	29.89	99.6	70 - 150	
Toluene-d8	30.00	30.66	102	85 - 120	

ANALYSIS DATA SHEET

VEP4-TB01-051513-GW

Laboratory: Empirical Laboratories, LLC | SDG: 1305172
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1305172-05 | File ID: 0517205.D
Sampled: 05/15/13 12:35 | Prepared: 05/23/13 00:00 | Analyzed: 05/24/13 03:24
Solids: | Preparation: 5030B | Dilution: 1
Batch: 3E23024 | Sequence: 3E14402 | Calibration: 3140001 | Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	32.88	110	75 - 120	
Dibromofluoromethane	30.00	30.67	102	85 - 115	
1,2-Dichloroethane-d4	30.00	30.62	102	70 - 150	
Toluene-d8	30.00	30.79	103	85 - 120	

ANALYSIS DATA SHEET

VEP4-GW04-0513

Laboratory: Empirical Laboratories, LLC | SDG: 1305172
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1305172-01 | File ID: 0517201.D
Sampled: 05/15/13 09:05 | Prepared: 05/20/13 15:00 | Analyzed: 05/21/13 18:31
Solids: | Preparation: EXT_3510 | Dilution: 1
Batch: 3E20021 | Sequence: 3E14207 | Calibration: 3122001 | Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.250	0.500	1.00	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	50.00	45.23	90.5	50 - 110	
Terphenyl-d14	50.00	37.14	74.3	50 - 135	
2,4,6-Tribromophenol	100.0	100.5	101	40 - 125	X

ANALYSIS DATA SHEET

VEP4-GW05-0513

Laboratory: Empirical Laboratories, LLC | SDG: 1305172
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1305172-02 | File ID: 0517202.D
Sampled: 05/15/13 11:20 | Prepared: 05/20/13 15:00 | Analyzed: 05/21/13 16:59
Solids: | Preparation: EXT_3510 | Dilution: 1
Batch: 3E20021 | Sequence: 3E14207 | Calibration: 3122001 | Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.231	0.463	0.926	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	46.30	41.93	90.6	50 - 110	
Terphenyl-d14	46.30	32.86	71.0	50 - 135	
2,4,6-Tribromophenol	92.59	84.58	91.3	40 - 125	X

ANALYSIS DATA SHEET

VEP4-GW05P-0513

Laboratory:	Empirical Laboratories, LLC		SDG:	1305172	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1305172-03	File ID:	0517203.D
Sampled:	05/15/13 11:25	Prepared:	05/20/13 15:00	Analyzed:	05/21/13 19:26
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3E20021	Sequence:	3E15207	Calibration:	3122001

Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.245	0.490	0.980	U
Total Target Analytes Reported: 1						

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	49.02	42.86	87.4	50 - 110	
Terphenyl-d14	49.02	36.61	74.7	50 - 135	
2,4,6-Tribromophenol	98.04	88.69	90.5	40 - 125	X

ANALYSIS DATA SHEET

VEP4-EB01-051513-GW

Laboratory:	Empirical Laboratories, LLC		SDG:	1305172	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1305172-04	File ID:	0517204.D
Sampled:	05/15/13 12:20	Prepared:	05/21/13 16:30	Analyzed:	06/07/13 19:08
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3E21028	Sequence:	3F16002	Calibration:	3122001

Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.236	0.472	0.943	U
Total Target Analytes Reported: 1						

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	47.17	39.82	84.4	50 - 110	
Terphenyl-d14	47.17	40.70	86.3	50 - 135	
2,4,6-Tribromophenol	94.34	88.44	93.7	40 - 125	

EMPIRICAL
621 Mainstream Dr.
Suite 270
Nashville, TN 37228

1305172

phone: 615-345-1115

ELECTRONIC CHAIN OF CUSTODY RECORD

C.O.C. 20130515-GW-EMP-01

Report to: (PLEASE PRINT)
Company Name: CH2MHILL
Address: 15010 Conference Dr. ; 200
Chantilly, VA 20151
Attn: Mike Zamboni
Phone: 703.376.5301
Fax: 703.376.5801

Invoice to: (PLEASE PRINT)
Company Name: See Contact
Address:
Attn:
Phone:
Fax:

Project Name/Number: Sample (Print): not required
Purchase Order Number: 943380
Sample (Signature): not required

Sample Identification	Location	Date Collected	Time Collected	Time Zone	No. of Containers	Matrix: Aq.	Sed.	Soil	Grab	Composite	Analysis Requested/Method Number								Comments
VEP4-GW06-0513		5/15/13	09:05	AST	5				✓	X	X			-01					7 day TAT
VEP4-GW05-0513		5/15/13	11:20	AST	5				✓	X	X			-02					7DAY TAT
VEP4-GW05P-0513		5/15/13	11:25	AST	5				✓	X	X			-03					7 DAY TAT
VEP4-EB01-051513-GW		5/15/13	12:20	AST	5	✓				X	X			-04					7DAY TAT
VEP4-TB01-051513		5/15/13	12:35	AST	2	✓				X				-05					7DAY TAT

Date Shipped: 5/15/13
Carrier: FedEx
Waybill No.:
Comments:

Shuttle Temperature:
Turnaround Requested: Check one ☐ Rush (20 days) ☐ One week ☐ 24/48 Hrs ☑ Other
Sample Disposal: ☐ Return to client ☐ Disposal by Lab (30 day storage) ☐ Disposal by Lab (90 day storage) not applicable

Relinquished by sampler: Date 5/15/13 Time 1255
Received by:
Relinquished by: Date Time
Received by:
Relinquished by: Date Time
Received at lab by:

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

Note: The first sampled date of the ARF will be used as the COC number unless indicated otherwise.

1305172 Summ Package

EMPIRICAL LABORATORIES COOLER RECEIPT FORM

Cooler Received/Opened On: 05/16/13 @ 0830 Workorder# 1305172

1. Tracking # 1448 (last 4 digits, FedEx)
   Courier: FED-EX
2. Temperature of rep. sample or temp blank when opened: 1.2 °C - correction factor (-0.1) = 1.1 °C
3. If item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA
4. Were custody seals on outside of cooler? YES NO NA
   If yes, how many and where: 2-FRONT; BACK
5. Were the seals intact, signed, and dated correctly? YES NO NA
6. Were custody papers inside cooler? YES NO NA
   I certify that I opened the cooler and answered questions 1-6 (initial) A
7. Were custody seals on containers: YES NO and intact YES NO NA
   Were these signed and dated correctly? YES NO NA
8. Packing material used? Bubblewrap Plastic Bag Peanuts Vermiculite Foam Insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry Ice Other None
10. Did all containers arrive in good condition (unbroken)? YES NO NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES NO NA
12. Did all container labels and tags agree with custody papers? YES NO NA
13. a. Were VOA vials received? YES NO NA
    b. Was there any observable headspace present in any VOA vial? YES NO NA
14. Was there a Trip Blank in this cooler? YES NO NA If multiple coolers, sequence #
    I certify that I unloaded the cooler and answered questions 7-14 (initial) A
15. a. Did pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES NO NA
    b. Did the bottle labels indicate that the correct preservatives were used YES NO NA
16. Was residual chlorine present? YES NO NA
    I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial) A
17. Were custody papers properly filled out (ink, signed, etc)? YES NO NA
18. Did you sign the custody papers in the appropriate place? YES NO NA
19. Were correct containers used for the analysis requested? YES NO NA
20. Was sufficient amount of sample sent in each container? YES NO NA
    I certify that I entered this project into LIMS and answered questions 17-20 (initial) A
    I certify that I attached a label with the unique LIMS number to each container (initial) A
    I certify that I have performed a second check of the LIMS information against the COC to confirm accuracy (initial)
21. Were there Non-Conformance issues at login? YES NO Was a NCR generated? YES NO #

Additional Details:

JG

[illegible]

MEMORANDUM

CH2MHILL

Corrections to COCs

TO: Sonya Gordon, Empirical

COPIES: File
Data Validation Package
Laboratory Package SDG: 1305172

FROM: Juliana Dean
Project Chemist

DATE: May 17, 2013

This memo is to document corrections made to entries on the Chains of Custody (COC) and Logins for Vieques, SWMU20, CTO-013.

The corrections include changes to the sample IDs on the COC and Login:

Sample ID on Login	Correct Sample ID	Date Collected	Time Collected	SDG
VEP4-TB01-0513	VEP4-TB01-051513-GW	5/15/13	12:35	1305172

019

Sample Delivery Group Case Narrative

Receipt Information
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

As per the client, the sample listed on the COC as VEP4-TB01-051513 should have the client ID of VEP4-TB01-051513-GW.

Changes to the Revision
Revision 01: The package was revised to replace the raw data that was not dark enough to be read in the original package.

Analytical Information
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:
The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

023

SW8260B:
Note – Samples 1305172-02 and -03 were analyzed at a 2x due to the samples foaming during screening. No lower analyses were able to be performed.

No additional anomalies or deviations are noted.

SW8270D BNA:
The following internal standard exceeded the retention time window of +/-0.5 min:
Perylene-d12 in 3E14207-CCV1, 3E20021-BLK2, -BS2, -BSD2, 3E21028-BLK2, -BS2, 1305172-01, -02, -03, and -04
Phenanthrene-d12 in 3F16002-CCV1, 3E21028-BLK2, -BS2, and 1305172-04
Note – While the internal standards shifted outside +/-0.5min from the initial calibration, they are identified by the mass spectrum. This minimal shift would have no impact on the reported results.

The following continuing calibration verifications exceeded criteria:
3E14207-CCV1 with a positive bias for 2,4,6-Tribromophenol

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

021

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 1305172 LAB: Empirical

SITE NAME: Vieques SWMU 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ☑ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ☑ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ☑ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. VOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ☑ ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ☑ ___ ___

1.3 Sample Conditions/Problems

- 6 VOA -

021A

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

A 5/15/13 a 5/22-24
R 5/16 t 1.1°C

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ ✓ ___

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water ✓ ___ ___

b. Soil ___ ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water ✓ ___ ___

b. Soil ___ ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. lab ✓ ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? ___ ___ ✓

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. ___ ✓ ___

If yes, were samples reanalyzed? ___ ___ ✓

Were method blanks reanalyzed? ___ ___ ✓

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? ___ ✓ ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. ✓ ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ [✓]

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] [✓] ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent) No MS/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] ___ [✓]

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] ___ [✓]

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month [page 8000C, section 9.5.])

a. Water [ ] ___ [✓]

b. Waste [ ] ___ [✓]

c. Soil/Solid [ ] ___ [✓]

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [ ] ___ [✓]

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ [✓]

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? ✓

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? ✓

6.3 Has a method blank been analyzed for each GC/MS system used ? ✓

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? ✓

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ✓

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ✓

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	≥ CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	≥ CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone
** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) [✓] ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? [✓] ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? [✓] ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ [✓] ___

9.7 Have the appropriate number of significant figures (two) been reported? [✓] ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. [✓] ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates [✓] ___ ___

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) [✓] ___ ___

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? [✓] ___ ___

YES NO N/A

Resolution? [✓] ___ ___

Peak shape? [✓] ___ ___

Full-scale graph (attenuation)? [✓] ___ ___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reportec compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

NO TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [✓] ___ ___

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Blanks [✓] ___ ___

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ ✓

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ ___ ✓

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] ✓ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ ✓

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? ✓ ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? ✓ ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39)qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. ✓ ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) [ ] ✓ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? ✓ ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). ___ ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? ✓ ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:
1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.
2. Do not qualify non-detects when the associated IS are counts area > + 100%.
3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".
4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ✓ ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

VEP4-GW05-0513
VEP4-GW05P-0513 > no qual see attached form

DataQual VOA

FIELD DUPLICATE SAMPLE SUMMARY

Sample ID: VEP4-GW05-0513
Duplicate Sample ID: VEP4-GW05P-0513

Water: RPD>25%
Soil: RPD>30%

Compound	Sample Conc.	Dup. Sample Conc.	%RPD
trichloroethene	2.5	2.56	2
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!

COMMENTS: No qualifications

* one of the results below the LOD
if both results are below the LOD the results are not compared

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DataQual VOA

Initial Calibration Date: 5/17/2013
RRF and %RSD Calculations:
Compound Name: vinyl chloride
Lab Value: 0.3017

Area of Compound	2851807
Area of Internal STD	1417697
Conc. of Internal STD	30
Conc. of Compound	200
Calculated RRF	0.302

Compound Name: 1,1-dichloroethene
Lab Value: 4.5

RRF of STD 1	0.2386
RRF of STD 2	0.2355
RRF of STD 3	0.2203
RRF of STD 4	0.2268
RRF of STD 5	0.2172
RRF of STD 6	0.2369
RRF of STD 7	0.2420
RRF of STD 8	0.2500
RRF of STD 9	0.2350
Calculated % RSD	4.5

Continuing Calibration File ID: 5/23/2013
RRF and %D Calculations:
Compound Name: cis-1,2-dichloroethene
Lab Value: 0.270

Area of Compound	1074177
Area of Internal STD	1195726
Conc. of Internal STD	30
Conc. of Compound	100
Calculated RRF	0.270

Compound Name: trichloroethene
Lab Value: 2.0

Average RRF	0.304
Calibration Check RRF	0.298
Calculated % D	2.0

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YES NO N/A

E - The concentration of this analyte exceeds the calibration range of the instrument.

A - Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 130572 LAB: Empirical
SITE NAME: Hegins Summit 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the data assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative or cover letter present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

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YES NO N/A

II. SEMIVOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? ✓ ___ ___

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, all non-detects data are qualified as unusable (R), and detects are flagged "J".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (10°C), flag all positive results "J" and all non-detects "UJ". t 1.1°C

2.0 Holding Times a 5/15/13 a 5/16 a 5/20-21 a 5/21-6/7

2.1 Have any semivolatile technical holding times, determined from date of collection to date of extraction, been exceeded? ___ ✓ ___

Continuous extraction of water samples for semivolatile analysis must be started within 7 days of the date of collection. Soil/sediment samples must be extracted within 14 days of collection. Extracts must be analyzed within

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YES NO N/A

40 days of the date of extraction.

Table of Holding Time Violations

(See Traffic Report)

Sample ID	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted	Date Analyzed

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

YES NO N/A

3.0 Surrogate Recovery (Form II/Equivalent)

3.1 Have the semi volatile surrogate recoveries been listed on CLP Surrogate Recovery forms (Form II) for each of the following matrices:

a. Low Water [✓] ___ ___

b. Low/Med Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery Summary forms for each matrix:

a. Low Water [✓] ___ ___

b. Low/Med Soil [ ] ___ ___

ACTION: If CLP deliverables are unavailable, document the effect(s) in data assessments. In some cases the lab may have to be contacted to obtain the data necessary to complete the validation.

3.3 Were outliers marked correctly with an asterisk? [✓] ___ ___

ACTION: Circle all outliers in red.

3.4 Were two or more base neutral OR acid surrogate recoveries out of specification for any sample or method blank (Reviewer should use lab in house recovery limits. Use surrogate recovery limits from USEPA National Functional Guidlines January 2005 page 130, if in house limits are not available. See Method 8000B-43 or 8000C-24). [ ] [✓] ___

Note: Examine lab in house limits for reasonableness.

If yes, were samples re-analyzed? [ ] ___ [✓]

SURROGATE STANDARD RECOVERY AND RT SUMMARY
SW8270D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Sequence: 3E14207

SDG: 1305172
Project: Vieques East SWMU 20
Instrument: MS-BNA4
Calibration: 1122001

Surrogate Compound	Spike Level	% Recovery	Recovery Limits	RT	CCV RT	RT Diff	RT Diff Limit	Q
Calibration Check (3E14207-CCV1) ug/mL				Lab File ID: SEQ-CCV1.D		Analyzed: 05/21/13 13:03		
2-Fluorobiphenyl	10.00	109	80 - 120	7.631	7.631	0.0000	+/-0.500	
Terphenyl-d14	10.00	118	80 - 120	12.186	12.186	0.0000	+/-0.500	
2,4,6-Tribromophenol	20.00	123	80 - 120	9.403	9.403	0.0000	+/-0.500	*
Blank (3E20021-BLK2) ug/L				Lab File ID: E20021B1.D		Analyzed: 05/21/13 13:30		
2-Fluorobiphenyl	50.00	81.0	50 - 110	7.631	7.631	0.0000	+/-0.500	
Terphenyl-d14	50.00	83.0	50 - 135	12.191	12.186	0.0050	+/-0.500	
2,4,6-Tribromophenol	100.0	88.0	40 - 125	9.403	9.403	0.0000	+/-0.500	
LCS (3E20021-BS2) ug/L				Lab File ID: E20021L1.D		Analyzed: 05/21/13 13:57		
2-Fluorobiphenyl	50.00	82.3	50 - 110	7.631	7.631	0.0000	+/-0.500	
Terphenyl-d14	50.00	82.3	50 - 135	12.191	12.186	0.0050	+/-0.500	
2,4,6-Tribromophenol	100.0	93.6	40 - 125	9.403	9.403	0.0000	+/-0.500	
LCS Dup (3E20021-BSD2) ug/L				Lab File ID: E20021L2.D		Analyzed: 05/21/13 14:24		
2-Fluorobiphenyl	50.00	81.7	50 - 110	7.631	7.631	0.0000	+/-0.500	
Terphenyl-d14	50.00	80.9	50 - 135	12.191	12.186	0.0050	+/-0.500	
2,4,6-Tribromophenol	100.0	94.6	40 - 125	9.403	9.403	0.0000	+/-0.500	
VEP4-GW06-0513 (1305172-01) ug/L				Lab File ID: 0517201.D		Analyzed: 05/21/13 18:31		
2-Fluorobiphenyl	50.00	90.5	50 - 110	7.631	7.631	0.0000	+/-0.500	
Terphenyl-d14	50.00	74.3	50 - 135	12.191	12.186	0.0050	+/-0.500	
2,4,6-Tribromophenol	100.0	101	40 - 125	9.403	9.403	0.0000	+/-0.500	
VEP4-GW05-0513 (1305172-02) ug/L				Lab File ID: 0517202.D		Analyzed: 05/21/13 18:59		
2-Fluorobiphenyl	46.30	90.6	50 - 110	7.631	7.631	0.0000	+/-0.500	
Terphenyl-d14	46.30	71.0	50 - 135	12.191	12.186	0.0050	+/-0.500	
2,4,6-Tribromophenol	92.59	91.3	40 - 125	9.403	9.403	0.0000	+/-0.500	
VEP4-GW05P-0513 (1305172-03) ug/L				Lab File ID: 0517203.D		Analyzed: 05/21/13 19:26		
2-Fluorobiphenyl	49.02	87.4	50 - 110	7.631	7.631	0.0000	+/-0.500	
Terphenyl-d14	49.02	74.7	50 - 135	12.191	12.186	0.0050	+/-0.500	
2,4,6-Tribromophenol	98.04	90.5	40 - 125	9.403	9.403	0.0000	+/-0.500	

No final

052

YES NO N/A

Were method blanks re-analyzed? [ ] ___ [✓]

ACTION: If all surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet method specifications, for the affected fraction only (i.e. either base-neutral or acid compounds):

1. Flag all positive results as estimated ("J").

2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.

3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Positive results for the fraction with < 10% surrogate recovery are qualified with "J".

2. Non-detects for that fraction should be qualified as unusable (R) .

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ [✓] ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document

YES NO N/A

effect in data assessments.

4.0 Matrix Spikes (Form III/Equivalent)

No MS/MSD

4.1 Have the semivolatile Matrix Spike and Matrix Spike Duplicate/or duplicate unspiked Sample recoveries been listed on the Recovery Form (Form III)? ___ ___ ✓

NOTE: Method 3500B/page 4 states the spiking compounds:

Base/neutrals	Acids
1,2,4-Trichlorobenzene	Pentachlorophenol
Acenaphthene	Phenol
2,4-Dinitrotoluene	2-Chlorophenol
Pyrene	4-Chloro-3-methylphenol
N-Nitroso-di-n-propylamine	4-Nitrophenol
1,4-Dichlorobenzene	

Note: Some projects may require the spiking of specific compounds of interest.

Note: See Method 8270D-sec 8.4.2 for deciding on whether to prepare and analyze cuplicate samples or a martix spike/matrix spike duplicate. If samples are expected to contain target analytes, then laboratory may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratory should use a matrix spike and matrix spike duplicate pair.

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water ___ ___ ✓

b. Low Solid ___ ___ ✓

c. Med Solid ___ ___ ✓

YES NO N/A

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. It may be necessary to contact the lab to obtain the required data.

NOTE: If the data has not been reported on CLP equivalent form, then the laboratory must provide the information necessary to evaluate the spike recoveries in the MS and MSD. The required data which should have been provided by the lab include the analytes and concentrations used for spiking, background concentrations of the spiked analytes (i.e., concentrations in unspiked sample), methods and equations used to calculate the QC acceptance criteria for the spiked analytes, percent recovery data for all spiked analytes.

The data reviewer must verify that all reported equations and percent recoveries are correct before proceeding to the next section.

4.3 Were matrix spikes performed at concentration equal to 100ug/L for acid compounds, and 200ug/l for base compounds (Method 3500B-4), or those specified in project plan. ___ ___ ✓

4.4 How many semivolatile spike recoveries are outside Laboratory in house MS/MSD recovery limits (use recovery limits values in Method 8270D-43644 Table 6 if in house values not available).

Water	Solids
____ out of ____	____ out of ____

YES NO N/A

4.5 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water	Solids
____ out of ____	____ out of ____

ACTION: Circle all outliers with red pencil.

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria to determine the need for some qualification of the data.

4.6 Was a Laboratory Control Sample (LCS) analyzed with each analytical batch? N/A ___ ___

NOTE: When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

5.0 Blanks (Form IV/Equivalent)

5.1 Is the Method Blank Summary (Form IV) present? ✓ ___ ___

5.2 Frequency of Analysis:

Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? ✓ ___ ___

5.3 Has a method blank been analyzed either after

YES NO N/A

the calibration standard or at any other time during the analytical shift for each GC/MS system used ? ✓ ___ ___

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, use professional judgement to determine if the associated sample data should be qualified.

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for the semivolatiles? ✓ ___ ___

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ✓ ___

6.2 Do any field/rinse/ blanks have positive results for target analytes and/or TICs (if required, see section 10 below)? ___ ✓ ___

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field Blanks must be qualified for outlying surrogates, poor spectra, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify sample results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

YES NO N/A

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

NOTE: If the laboratory did not report TIC analyses, check the project plans to verify whether or not it was required.

6.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

6.4 Was a instrument blank analyzed after each sample/dilution which contained a target compound

YES NO N/A

that exceeded the initial calibration range. ✓ ___ ___

6.5 Does the instrument blank have positive results for target analytes and/or TICs? ___ ✓ ___

Note: Use professional judgement to determine if carryover occurred and qualify analytes accordingly.

7.0 GC/MS Apparatus and Materials

7.1 Did the lab use the proper gas chromatographic column for analysis of semivolatiles by Method 8270D? Check raw data, instrument logs or contact the lab to determine what type of column was used. The method requires the use of 30 m x 0.25 mm ID (or 0.32 mm ID), silicone-coated, fused silica, capillary column. ✓ ___ ___

ACTION: If the specified column, or equivalent, was not used, document the effects in the data assessment. Use professional judgement to determine the acceptability of the data.

8.0 GC/MS Instrument Performance Check (Form V/Equivalent)

8.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)? ✓ ___ ___

NOTE: The performance solution should also contain 4,4-DDT, pentachlorophenol, and benzidine to verify injection port inertness and column performance. The degradation of DDT to DDE and DDD must be less than 20% total and the response of pentachlorophenol and benzidine should be within normal ranges for these compounds (based upon lab experience) and show no peak degradation or tailing before samples are analyzed. (see section 5.5

YES NO N/A

page 8270D-12).

8.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? ✓ ___ ___

8.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

8.4 Have the ion abundances been normalized to m/z 198? ✓ ___ ___

8.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

	YES	NO	N/A
ACTION: If ion abundance criteria are not met, take action specified in section 3.2			
8.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.)		✓	
8.7 Have the appropriate number of significant figures (two) been reported?	✓		
ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.			
8.8 Are the spectra of the mass calibration compound acceptable?	✓		
ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.			
9.0 Target Analytes			
9.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate	✓		
b. Matrix spikes and matrix spike duplicates			✓
c. Blanks	✓		
9.2 Has any special cleanup, such as GPC, been performed on all soil/sediment sample extracts (see section 7.2, page 8270D-14)?			✓

	YES	NO	N/A
ACTION: If data suggests that extract cleanup was not performed, use professional judgement. Make note in the data assessment narrative.			
9.3 Are the Reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?			
a. Samples and/or fractions as appropriate	✓		
b. Matrix spikes and matrix spike duplicates (Mass spectra not required)			✓
c. Blanks	✓		
ACTION: If any data are missing, take action specified in 3.2 above.			
9.4 Are the response factors shown in the Quant Report?	✓		
9.5 Is chromatographic performance acceptable with respect to:			
Baseline stability?	✓		
Resolution?	✓		
Peak shape?	✓		
Full-scale graph (attenuation)?	✓		
Other:_____			
ACTION: Use professional judgement to determine the acceptability of the data.			
9.6 Are the lab-generated standard mass spectra of identified semivolatile compounds present for			

	YES	NO	N/A
each sample?	✓		
ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the data assessment narrative. If spectra are missing, reject all positive data.			
9.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	✓		
9.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum?	✓		
9.9 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum?	✓		
ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 9.7, 9.8, and 9.9.			
ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.			

	YES	NO	N/A
10.0 Tentatively Identified Compounds (TIC)			
10.1 If Tentatively Identified Compounds were required for this project, are all Form Is, Part B present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier?			
NOTE: Review sampling reports to determine if the lab was required to identify non target analytes (refer to section 7.6.2, page 8270D-21).			
10.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:			✓
a. Samples and/or fractions as appropriate			✓
b. Blanks			✓
ACTION: If any TIC data are missing, take action specified in 3.2 above.			
ACTION: Add "JN" qualifier only to analytes identified by CAS #.			
10.3 Are any target compounds from one fraction listed as TIC compounds in another (e.g., an acid compound listed as a base neutral TIC)?			✓
ACTION: i. Flag with "R" any target compound listed as a TIC.			
ii. Make sure all rejected compounds are properly reported in the other fraction.			
10.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the			

no TICs

YES NO N/A

sample mass spectrum? [ ] ___ ✓

10.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate and remove "JN". Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R."

11.0 Compound Quantitation and Reported Detection Limits

11.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found? ___ [✓] ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

11.2 Are the method detection limits adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ ✓

YES NO N/A

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I (if present) and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red " X" across the entire page of all Form I's that should not be used, including any in the summary package.

12.0 Standards Data (GC/MS)

12.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

13.0 GC/MS Initial Calibration (Form VI/Equivalent)

13.1 Is the Initial Calibration Form (Form VI/ Equivalent) present and complete for the semivolatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard row data are missing, take action specified in 3.2 above.

13.2 Are all base neutral or acid RRFs > 0.050? [✓] ___ ___

YES NO N/A

Check the **average RRFs** of the four System Performance Check Compounds (SPCCs): N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. These compounds must have **average RRFs** greater than or equal to 0.05 before running samples and should not show any peak tailing.

ACTION: Circle all outliers in red.

ACTION: For any target analyte with **average RRF <0.05**

1. "R" all non-detects;

2. "J" all positive results.

13.3 Are response factors for base neutral or acid target analytes stable over the concentration range of the calibration (% Relative standard deviation [%RSD] < 20.0%)? [✓] ___ ___

NOTE: The % RSD for each individual Calibration Check Compound (CCC, Method 8270D-40 see Table 4) must be less than 30% before analysis can begin. If grater 30%, the lab must clean and recalibrate the instrument.

CALIBRATION CHECK COMPOUNDS

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol

YES NO N/A

Benzo(a)pyrene

ACTION: If the %RSD for any CCC >30% and no corrective action taken, then "J" qualify all positive hits and "UJ" qualify all non-detects.

ACTION: Circle all outliers in red.

ACTION: If the % RSD is ≥ 20.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non- detect results for that analyte "R," unusable. Alternatively, the lab should calculate first or second order regression fit of the calibration curve and select the fit which introduces the least amount of error.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

13.4 Did the laboratory calculate the calibration curve by the least squares regression fit? ___ [✓] ___

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) ___ [✓] ___

ACTION: Circle Errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

13.5 Do the target compounds for this SDG include Pesticides? [ ] ___ ✓ ___

YES NO N/A

13.6 If the pesticide compounds include DDT, was the percent breakdown of DDT to DDD and DDE greater than 20%? ___ [ ] ✓

ACTION: If DDT percent breakdown exceeds 20%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE results are positive, qualify the quantitation limit for DDT as unusable, "R".

ii. Qualify all positive results for DDD and DDE as presumptively present at an approximate concentration "JN".

14.0 GC/MS Calibration Verification (Form VII/Equivalent)

14.1 Are the Calibration Verification Forms (Form VII) present and complete for all compounds of interest? [✓] ___ ___

14.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? [✓] ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

_____

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed within twelve hours of every sample analysis,

YES NO N/A

call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

14.3 Do any of the SPCCs have an RRF <0.05? ___ [✓] ___

If YES, make a note in data assessment if the lab did not take corrective action specified in section 7.4.4, page 8270D-19. [ ] [✓] ___

14.4 Do any of the CCCs have a %D between the initial and continuing RRF which exceeds 20.0%?

ACTION: If yes, make a note in data assessment.

14.5 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds 20.0%? ___ [✓] ___

ACTION: Circle all outliers in red.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is above 90%, qualify all non-detects for that analyte as "R", unusable.

14.6 Do any semivolatile compounds have a RRF < 0.05? ___ [✓] ___

ACTION: Circle all outliers in red.

ACTION: If RRF < 0.05, qualify as unusable ("R") associated non-detects and "J" associated positive values.

14.7 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or percent difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more). ___ [✓] ___

YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect(s) in the data assessments.

15.0 Internal Standards (Form VIII)

15.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to + 100%) for each continuing calibration? [✓] ___ ___

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area	LowerLimit	Upper Limit

(Attach additional sheets if necessary.)

Note: Check Table 5, 8270D-41 for associated analytes.

ACTION: i. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

ii. Non-detects associated with IS > 100% should not be qualified.

YES NO N/A

iii. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

15.2 Are the retention times of all internal standards within 30 seconds of the associated calibration standard? [ ] [✓] ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds. NA

16.0 Laboratory Control Samples (LCS)

16.1 Were any LCS samples run in order to verify analytes which failed criteria for spike recovery? [ ] [✓] ___

16.2 Did the lab spike LCS sample spiked with the same analytes and the same concentrations as the matrix spike? [ ] ___ [✓]

16.3 Were the mean and standard deviation of all analytes within the QC acceptance ranges as shown in Table 6, 8270D-43? [✓] ___ ___

ACTION: If the recovery of any analyte falls out of the designated range, the analytical results for that compound is suspect and should be qualified "J" in the unspiked samples.

17.0 Field Duplicates

17.1 Were any field duplicates submitted for semivolatile analysis? [✓] ___ ___

INTERNAL STANDARD AREA AND RT SUMMARY
SW8270D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Sequence: 3E14207

SDG: 1305172
Project: Vieques East SWMU 20
Instrument: MS-BNA4
Calibration: 3122001

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Calibration Check (3E14207-CCV1)			Lab File ID: SEQ-CCV1.D			Analyzed: 05/21/13 13:03			
Phenanthrene-d10	256619	10.207	321039	10.545	80	50 - 200	-0.3380	+/-0.50	
Perylene-d12	313978	16.506	337266	17.137	93	50 - 200	-0.6310	+/-0.50	*
Blank (3E20021-BLK2)			Lab File ID: E20021B1.D			Analyzed: 05/21/13 13:30			
Phenanthrene-d10	336519	10.207	321039	10.545	105	50 - 200	-0.3380	+/-0.50	
Perylene-d12	405763	16.506	337266	17.137	120	50 - 200	-0.6310	+/-0.50	*
LCS (3E20021-BS2)			Lab File ID: E20021L1.D			Analyzed: 05/21/13 13:57			
Phenanthrene-d10	322031	10.207	321039	10.545	100	50 - 200	-0.3380	+/-0.50	
Perylene-d12	390132	16.501	337266	17.137	116	50 - 200	-0.6360	+/-0.50	*
LCS Dup (3E20021-BSD2)			Lab File ID: E20021L2.D			Analyzed: 05/21/13 14:24			
Phenanthrene-d10	340775	10.207	321039	10.545	106	50 - 200	-0.3380	+/-0.50	
Perylene-d12	404046	16.501	337266	17.137	120	50 - 200	-0.6360	+/-0.50	*
VEP4-GW06-0513 (1305172-01)			Lab File ID: 0517201.D			Analyzed: 05/21/13 18:31			
Phenanthrene-d10	286267	10.203	321039	10.545	89	50 - 200	-0.3420	+/-0.50	
Perylene-d12	338626	16.501	337266	17.137	100	50 - 200	-0.6360	+/-0.50	*
VEP4-GW05-0513 (1305172-02)			Lab File ID: 0517202.D			Analyzed: 05/21/13 18:59			
Phenanthrene-d10	304203	10.202	321039	10.545	95	50 - 200	-0.3430	+/-0.50	
Perylene-d12	365154	16.501	337266	17.137	108	50 - 200	-0.6360	+/-0.50	*
VEP4-GW05P-0513 (1305172-03)			Lab File ID: 0517203.D			Analyzed: 05/21/13 19:26			
Phenanthrene-d10	368758	10.203	321039	10.545	115	50 - 200	-0.3420	+/-0.50	
Perylene-d12	441575	16.501	337266	17.137	131	50 - 200	-0.6360	+/-0.50	*

Not associated w/ target compd

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INTERNAL STANDARD AREA AND RT SUMMARY
SW8270D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Sequence: 3F16002

SDG: 1305172
Project: Vieques East SWMU 20
Instrument: MS-BNA4
Calibration: 3122001

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Calibration Check (3F16002-CCV1)			Lab File ID: SEQ-CCV1.D			Analyzed: 06/07/13 14:30			
Phenanthrene-d10	346723	9.98	321039	10.545	108	50 - 200	-0.5650	+/-0.50	*
Perylene-d12	385867	16.64	337266	17.137	114	50 - 200	-0.4970	+/-0.50	
Blank (3E21028-BLK2)			Lab File ID: E21028B1.D			Analyzed: 06/07/13 14:58			
Phenanthrene-d10	276011	9.975	321039	10.545	86	50 - 200	-0.5700	+/-0.50	*
Perylene-d12	309233	16.63	337266	17.137	92	50 - 200	-0.5070	+/-0.50	*
LCS (3E21028-BS2)			Lab File ID: E21028L1.D			Analyzed: 06/07/13 15:25			
Phenanthrene-d10	342959	9.975	321039	10.545	107	50 - 200	-0.5700	+/-0.50	*
Perylene-d12	380431	16.63	337266	17.137	113	50 - 200	-0.5070	+/-0.50	*
VEP4-EB01-051513-GW (1305172-04)			Lab File ID: 0517204.D			Analyzed: 06/07/13 19:08			
Phenanthrene-d10	211326	9.975	321039	10.545	66	50 - 200	-0.5700	+/-0.50	*
Perylene-d12	227820	16.633	337266	17.137	68	50 - 200	-0.5020	+/-0.50	*

* All good
Check both just cases
w/ target compd

075

USEPA Region II
SW846 Method 8270D (Rev.4, January 1998)

Date: August, 2008
SOP HW-22 Rev.4

	YES	NO	N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

VEP4-GW05-0513
VEP4-GW05P-0513 > MS/MSD

- 31 -

076

DataQual SVOA

Initial Calibration Date: 5/1/2013
RRF and %RSD Calculations:
Compound Name: 1,4-dioxane
Lab Value: 0.130

Area of Compound	394986
Area of Internal STD	243500
Conc. of Internal STD	4
Conc. of Compound	50
Calculated RRF	0.130

Compound Name: 1,4-dioxane
Lab Value: 13.4

RRF of STD 1	0.185
RRF of STD 2	0.1450523
RRF of STD 3	0.1304524
RRF of STD 4	0.1265765
RRF of STD 5	0.133586
RRF of STD 6	0.1360939
RRF of STD 7	0.1351959
RRF of STD 8	0.1297695
Calculated % RSD	13.4

Continuing Calibration File ID: 6/7/2013
RRF and %D Calculations:
Compound Name: 1,4-dioxane
Lab Value: 0.151

Area of Compound	131237
Area of Internal STD	346723
Conc. of Internal STD	4
Conc. of Compound	10
Calculated RRF	0.151

Compound Name: 1,4-dioxane
Lab Value: 8.000

Average RRF	0.140
Calibration Check RRF	0.1514027
Calculated % D	-8.0

077

DataQual

Environmental Services, LLC

CH2M HILL-VBO
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

December 11, 2013
SDG# 1305177, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1305177. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24 and 8270D-Rev 4, August 2008-SOP #HW-22.), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA	SVOA
VEP4-GW02-0513	1305177-01	water	X	X
VEP4-GW03-0513	1305177-02	water	X	X
VEP4-EB01-051613-GW	1305177-04	water	X	X
VEP4-TB01-051613-GW	1305177-05	water	X	

The following quality control samples were provided with this SDG: sample VEP4-EB01-051613-GW - equipment blank and sample VEP4-TB01-051613- trip blank.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Field Duplicates NA
- Identification/Quantitation *
- Reporting Limits *

5830 Amberway Drive • St. Louis, MO 63128 • 314-330-1327 • Fax 314-849-6264

- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

No qualifications were required to the data.

SVOA

No qualifications were required to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to chain of custody records, sampling was performed on 5/16/13 and samples were received at the laboratory 5/17/13. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

SVOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U not detected above the reported sample quantitation limit
J estimated value
UJ reported quantitation limit is qualified as estimated
N analyte has been tentatively identified
JN analyte has been tentatively identified, estimated value
R result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.

U* The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.

RL** The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.

J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.
Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL reporting limit
PQL practical quantitation limit
IDL instrument detection limit
MDL method detection limit
CRDL contract required detection limit
CRQL contract required quantitation limit
\+ positive result
\- non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

ANALYSIS DATA SHEET

VEP4-GW02-0513

Laboratory: Empirical Laboratories, LLC
SDG: 1305177
Client: CH2M Hill, Inc.
Project: Vieques East SWMU 20
Matrix: Water
Laboratory ID: 1305177-01
File ID: 0512701.D
Sampled: 05/16/13 11:20
Prepared: 05/24/13 07:29
Analyzed: 05/24/13 07:29
Solids:
Preparation: 5030B
Dilution: 1
Batch: 3E23019
Sequence: 3E14802
Calibration: 5127004
Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U
Total Target Analytes Reported: 6						

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	26.70	89.0	73 - 120	
Dibromofluoromethane	30.00	29.62	98.7	85 - 115	
1,2-Dichloroethane-d4	30.00	30.18	101	70 - 120	
Toluene-d8	30.00	30.58	102	85 - 120	

ANALYSIS DATA SHEET

VEP4-GW03-0513

Laboratory: Empirical Laboratories, LLC | SDG: 1305177
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1305177-02 | File ID: 0517702.D
Sampled: 05/16/13 09:35 | Prepared: 05/24/13 07:57 | Analyzed: 05/24/13 07:57
Solids: | Preparation: 5030B | Dilution: 1
Batch: 3E23019 | Sequence: 3E14802 | Calibration: 3127004 | Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	26.86	89.5	75 - 120	
Dibromofluoromethane	30.00	29.92	99.7	85 - 115	
1,2-Dichloroethane-d4	30.00	30.86	103	70 - 120	
Toluene-d8	30.00	30.37	101	85 - 120	

UM 12/09/13

009

ANALYSIS DATA SHEET

VEP4-EB01-051613-GW

Laboratory: Empirical Laboratories, LLC | SDG: 1305177
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1305177-04 | File ID: 0517704.D
Sampled: 05/16/13 12:10 | Prepared: 05/25/13 02:11 | Analyzed: 05/25/13 02:11
Solids: | Preparation: 5030B | Dilution: 1
Batch: 3E24019 | Sequence: 3E14503 | Calibration: 3127004 | Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	26.34	87.8	75 - 120	
Dibromofluoromethane	30.00	29.99	100	85 - 115	
1,2-Dichloroethane-d4	30.00	31.25	104	70 - 120	
Toluene-d8	30.00	29.91	99.7	85 - 120	

UM 12/09/13

010

ANALYSIS DATA SHEET

VEP4-TB01-051613-GW

Laboratory: Empirical Laboratories, LLC | SDG: 1305177
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1305177-05 | File ID: 0517705.D
Sampled: 05/16/13 12:25 | Prepared: 05/25/13 02:38 | Analyzed: 05/25/13 02:38
Solids: | Preparation: 5030B | Dilution: 1
Batch: 3E24019 | Sequence: 3E14503 | Calibration: 3127004 | Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.49	91.6	75 - 120	
Dibromofluoromethane	30.00	29.45	98.2	85 - 115	
1,2-Dichloroethane-d4	30.00	29.31	97.7	70 - 120	
Toluene-d8	30.00	30.35	101	85 - 120	

UM 12/09/13

011

ANALYSIS DATA SHEET

VEP4-GW02-0513

Laboratory: Empirical Laboratories, LLC | SDG: 1305177
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1305177-01 | File ID: 0517701.D
Sampled: 05/16/13 11:30 | Prepared: 05/20/13 15:00 | Analyzed: 05/21/13 19:53
Solids: | Preparation: EXT_3510 | Dilution: 1
Batch: 3E30021 | Sequence: 3E14207 | Calibration: 3122001 | Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.240	0.481	0.962	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	48.08	39.48	82.1	50 - 110	
Terphenyl-d14	48.08	37.85	78.3	50 - 135	
2,4,6-Tribromophenol	96.15	91.59	95.3	40 - 125	X

UM 12/09/13

01[illegible]

ANALYSIS DATA SHEET

VEP4-GW03-0513

Laboratory:	Empirical Laboratories, LLC		SDG:	1305177	
Client:	CH2M Hill, Inc.		Project:	Vinegar East SWMU 20	
Matrix:	Water	Laboratory ID:	1305177-02	File ID:	0517702.D
Sampled:	05/16/13 09:35	Prepared:	05/20/13 15:00	Analyzed:	05/21/13 20:20
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3E20021	Sequence:	3E14207	Calibration:	3122001
				Instrument:	MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.240	0.481	0.962	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	48.08	43.28	90.0	50 - 110	
Terphenyl-d14	48.08	39.93	83.1	50 - 135	
2,4,6-Tribromophenol	96.15	96.94	101	40 - 125	

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ANALYSIS DATA SHEET

VEP4-EB01-051613-GW

Laboratory:	Empirical Laboratories, LLC		SDG:	1305177	
Client:	CH2M Hill, Inc.		Project:	Vinegar East SWMU 20	
Matrix:	Water	Laboratory ID:	1305177-04	File ID:	0517704.D
Sampled:	05/16/13 12:10	Prepared:	05/21/13 16:30	Analyzed:	06/07/13 19:35
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3E21028	Sequence:	3E16002	Calibration:	3122001
				Instrument:	MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.231	0.463	0.926	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	46.30	35.56	76.8	50 - 110	
Terphenyl-d14	46.30	37.28	80.5	50 - 135	
2,4,6-Tribromophenol	92.59	77.22	83.4	40 - 125	

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1305177

EMPIRICAL
621 Mainstream Dr.
Suite 270
Nashville, TN 37228

phone: 615-345-1115

ELECTRONIC CHAIN OF CUSTODY RECORD

C.O.C. 20130515-GW-CMP-01

Report to: (PLEASE PRINT)
Company Name: CH2MHILL
Address: 15010 Conference Dr. ; 200
Chantilly, VA 20151
Phone: 703.376.5301
Fax: 703.376.5801
Attn: Mike Zamboni

Service to: (PLEASE PRINT)
Company Name: See Contact
Address:
Phone:
Fax:
Attn:

Project Name/Number: not required
Sampler (Print): not required
Purchase Order Number: 943380
Sampler (Signature): not required
Date Shipped: 5/16/13
Carrier: FedEx
Waybill No.: 7867794519 52
Comments:

Sample Identification	Location	Date Collected	Time Collected	Time Zone	No. of Containers	Matrix Air	Matrix Soil	Matrix Sed	Matrix GW	Analysis Requested/Method Number													
VEP4-GW02-0513		5/16/13	11:30	AST	5				✓	x	x												7 day TAT
VEP4-GW03-0513		5/16/13	09:35	AST	5				✓	x	x												7 day TAT
VEP4-GW16-051613		5/16/13	10:52	AST	5				✓	x	x												next day TAT
VEP4-EB01-051613-GW		5/16/13	12:10	AST	5	✓				x	x												
VEP4-TB01-051613-GW		5/16/13	12:25	AST	2	✓				x													

Shuttle Temperature:
Forwarded Remarks: Check one: ☐ Swift/CR (days) ☐ Site work ☐ Sold Site ☐ Other:
Sample Disposal: ☐ Return to client ☐ Dispose by Lab (charge incurred) not applicable
Relinquished by sampler: Date: 5/16/13 Time: 15:45
Relinquished by: Date: Time:
Received by:
Relinquished by: Date: Time:
Received by:
Relinquished by: Date: Time:
Received at lab by:

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

Note: The first sampled date of the ARF will be used as the COC number unless indicated otherwise.

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EMPIRICAL LABORATORIES
COOLER RECEIPT FORM

Cooler Received/Opened On: 05/17/13 @ 0835 Workorder# 1305177

1. Tracking # 1952 (last 4 digits, FedEx)
   Courier: FED-EX
2. Temperature of rep. sample or temp blank when opened: 0.6 °C + correction factor (-0.1) = 0.5 °C
3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA
4. Were custody seals on outside of cooler? YES NO NA
   If yes, how many and where: 2-FRONT ; BACK
5. Were the seals intact, signed, and dated correctly? YES NO NA
6. Were custody papers inside cooler? YES NO NA

I certify that I opened the cooler and answered questions 1-6 (initial) BZ

7. Were custody seals on containers: YES NO and intact YES NO NA
   Were these signed and dated correctly? YES NO NA
8. Packing material used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry Ice Other None
10. Did all containers arrive in good condition (unbroken)? YES NO NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES NO NA
12. Did all container labels and tags agree with custody papers? YES NO NA
13. a. Were VOA vials received? YES NO NA
    b. Was there any observable headspace present in any VOA vial? YES NO NA
14. Was there a Trip Blank in this cooler? YES NO NA If multiple coolers, sequence # ____

I certify that I unloaded the cooler and answered questions 7-14 (initial) BZ

15. a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES NO NA
    b. Did the bottle labels indicate that the correct preservatives were used YES NO NA
16. Was residual chlorine present? YES NO NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial) BZ

17. Were custody papers properly filled out (ink, signed, etc)? YES NO NA
18. Did you sign the custody papers in the appropriate place? YES NO NA
19. Were correct containers used for the analysis requested? YES NO NA
20. Was sufficient amount of sample sent in each container? YES NO NA

I certify that I entered this project into LIMS and answered questions 17-20 (initial) BZ

I certify that I attached a label with the unique LIMS number to each container (initial) BZ

I certify that I have performed a second check of the LIMS information against the COC to confirm accuracy (initial) BZ

21. Were there Non-Conformance issues at login? YES NO Was a NCR generated? YES NO #____

Additional Details:

I:\Documents and Settings\bwright\Desktop\New CRF.doc1.doc

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Sample Delivery Group Case Narrative

Receipt Information
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Changes to the Revision
This is an original submittal of the final report package.

Analytical Information
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:
The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

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SW8260B:
No anomalies or deviations are noted.

SW8270D BNA:
The following internal standard exceeded the retention time window of +/-0.5 min:
Perylene-d12 in 3E14035-CCV1, 3E14207-CCV1, 3E16039-BLK2, -BS2, 3E20021-BLK2, -BS2, -BSD2, 3E21028-BLK2, -BS2, 1305177-01, -02, -03, and -04
Phenanthrene-d12 in 3F16002-CCV1, 3E21028-BLK2, -BS2, and 1305177-04
Note – While the internal standards shifted outside +/-0.5min from the initial calibration, they are identified by the mass spectrum. This minimal shift would have no impact on the reported results.

The following continuing calibration verifications exceeded criteria:
3E14207-CCV1 with a positive bias for 2,4,6-Tribromophenol

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

018

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 1305177 LAB: Empirical

SITE NAME: Vieques Summ 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓ __ __

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓ __ __

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ __ __

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. VOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓ __ __

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓ __ __

1.3 Sample Conditions/Problems

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USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? __ ✓ __

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? __ ✓ __

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

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YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water [✓] ___ ___

b. Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water [✓] ___ ___

b. Soil [ ] ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. [✓] ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ [✓]

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] ___ ___

If yes, were samples reanalyzed? [ ] ___ ___

Were method blanks reanalyzed? [ ] ___ ___

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] [✓] ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ [✓]

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] [✓] ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent)

All MS/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] ___ ✓

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] ___ ✓

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month (page 8000C, section 9.5.1)

a. Water [ ] ___ ✓

b. Waste [ ] ___ ✓

c. Soil/Solid [ ] ___ ✓

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [ ] ___ ✓

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ ___

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? [✓] ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? [✓] ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? [✓] ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? [✓] ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. [ ] ___ ✓

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contamination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone
** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates [ ] ___ [✓]

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) [ ] ___ [✓]

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [ ] [✓] ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? [✓] ___ ___

YES NO N/A

Resolution? [✓] ___ ___

Peak shape? [✓] ___ ___

Full-scale graph (attenuation)? [ ] ___ ___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

MATICS

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ [✓]

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ [✓]

b. Blanks [ ] ___ [✓]

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ [✓]

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ [✓]

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ [✓]

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] [✓] ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ ✓

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? ✓ ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? ✓ ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39)qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. ✓ ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) [ ] ✓ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? ✓ ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? [ ] ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). [ ] ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? N/A ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds in section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? N/A ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:
1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.
2. Do not qualify non-detects when the associated IS are counts area > + 100%.
3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".
4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? N/A ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ___ ✓ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

YES NO N/A

E - The concentration of this analyte exceeds the calibration range of the instrument.

A - Indicates a Tentatively Identified Compound (TIC) is a suspected aldol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 1805177 LAB: Empirical

SITE NAME: Vieques Sanitary Landfill

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format? N/A ___ ___

ACTION: If not, note the effect on review of the data in the data assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative or cover letter present? Y ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? Y ___ ___

YES NO N/A

II. SEMIVOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? ✓ __ __

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? __ ✓ __

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, all non-detects data are qualified as unusable (R), and detects are flagged "J".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (10°C), flag all positive results "J" and all non-detects "UJ". t 6.9°C

t 5/16/13 t 5/20-21
r 5/17 a 5/21-6/7

2.0 Holding Times

2.1 Have any semivolatile technical holding times, determined from date of collection to date of extraction, been exceeded? __ ✓ __

Continuous extraction of water samples for semivolatile analysis must be started within 7 days of the date of collection. Soil/sediment samples must be extracted within 14 days of collection. Extracts must be analyzed within

YES NO N/A

40 days of the date of extraction.

Table of Holding Time Violations

(See Traffic Report)

Sample ID	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted	Date Analyzed

NA

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

YES NO N/A

3.0 Surrogate Recovery (Form II/Equivalent)

3.1 Have the semi volatile surrogate recoveries been listed on CLP Surrogate Recovery forms (Form II) for each of the following matrices:

a. Low Water ✓ __ __

b. Low/Med Soil [ ] __ __

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery Summary forms for each matrix:

a. Low Water ✓ __ __

b. Low/Med Soil [ ] __ __

ACTION: If CLP deliverables are unavailable, document the effect(s) in data assessments. In some cases the lab may have to be contacted to obtain the data necessary to complete the validation.

3.3 Were outliers marked correctly with an asterisk? ✓ __ __

ACTION: Circle all outliers in red.

3.4 Were two or more base neutral OR acid surrogate recoveries out of specification for any sample or method blank (Reviewer should use lab in house recovery limits. Use surrogate recovery limits from USEPA National Functional Guidlines January 2005 page 130, if in house limits are not available. See Method 8000B-43 or 8000C-24). [ ] ✓ __

Note: Examine lab in house limits for reasonableness.

If yes, were samples re-analyzed? [ ] __ ✓

SURROGATE STANDARD RECOVERY AND RT SUMMARY
SW8270D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Sequence: 3E14207
SDG: 1305177
Project: Niagara East SWMU 20
Instrument: MS-BNA4
Calibration: 3122001

Surrogate Compound	Spike Level	% Recovery	Recovery Limits	RT	CCV RT	RT Diff	RT Diff Limit	Q
Calibration Check (3E14207-CCV1) ug/mL				Lab File ID: SEQ-CCV1.D		Analyzed: 05/21/13 13:03		
2-Fluorobiphenyl	10.00	109	80 - 120	7.631	7.631	0.0000	+/-0.500	
Terphenyl-d14	10.00	118	80 - 120	12.186	12.186	0.0000	+/-0.500	
2,4,6-Tribromophenol	20.00	123	80 - 120	9.403	9.403	0.0000	+/-0.500	*
Blank (3E20021-BLK2) ug/L				Lab File ID: E20021B1.D		Analyzed: 05/21/13 12:30		
2-Fluorobiphenyl	50.00	81.0	50 - 110	7.631	7.631	0.0000	+/-0.500	
Terphenyl-d14	50.00	83.0	50 - 135	12.191	12.186	0.0050	+/-0.500	
2,4,6-Tribromophenol	100.0	86.0	40 - 125	9.403	9.403	0.0000	+/-0.500	
LCS (3E20021-BS2) ug/L				Lab File ID: E20021L1.D		Analyzed: 05/21/13 13:57		
2-Fluorobiphenyl	50.00	82.3	50 - 110	7.631	7.631	0.0000	+/-0.500	
Terphenyl-d14	50.00	82.3	50 - 135	12.191	12.186	0.0050	+/-0.500	
2,4,6-Tribromophenol	100.0	93.6	40 - 125	9.403	9.403	0.0000	+/-0.500	
LCS Dup (3E20021-BSD2) ug/L				Lab File ID: E20021L2.D		Analyzed: 05/21/13 14:24		
2-Fluorobiphenyl	50.00	81.7	50 - 110	7.631	7.631	0.0000	+/-0.500	
Terphenyl-d14	50.00	80.0	50 - 135	12.191	12.186	0.0050	+/-0.500	
2,4,6-Tribromophenol	100.0	94.6	40 - 125	9.403	9.403	0.0000	+/-0.500	
VEP4-GW02-0513 (1305177-01) ug/L				Lab File ID: 0517701.D		Analyzed: 05/21/13 19:53		
2-Fluorobiphenyl	48.08	82.1	50 - 110	7.631	7.631	0.0000	+/-0.500	
Terphenyl-d14	48.08	78.3	50 - 135	12.191	12.186	0.0050	+/-0.500	
2,4,6-Tribromophenol	96.15	95.3	40 - 125	9.403	9.403	0.0000	+/-0.500	
VEP4-GW03-0513 (1305177-02) ug/L				Lab File ID: 0517702.D		Analyzed: 05/21/13 20:20		
2-Fluorobiphenyl	48.08	90.0	50 - 110	7.631	7.631	0.0000	+/-0.500	
Terphenyl-d14	48.08	83.1	50 - 135	12.191	12.186	0.0050	+/-0.500	
2,4,6-Tribromophenol	96.15	101	40 - 125	9.403	9.403	0.0000	+/-0.500	

No flags

YES NO N/A

Were method blanks re-analyzed? [ ] ___ ✓

ACTION: If all surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet method specifications, for the affected fraction only (i.e. either base-neutral or acid compounds):

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Positive results for the fraction with < 10% surrogate recovery are qualified with "J".
2. Non-detects for that fraction should be qualified as unusable (R) .

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and form II? ___ ✓ ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document

YES NO N/A

effect in data assessments.

4.0 Matrix Spikes (Form III/Equivalent)

No MS/MSD

4.1 Have the semivolatile Matrix Spike and Matrix Spike Duplicate/or duplicate unspiked Sample recoveries been listed on the Recovery Form (Form III)? [ ] ___ ✓

NOTE: Method 3500B/page 4 states the spiking compounds:

Base/neutrals	Acids
1,2,4-Trichlorobenzene	Pentachlorophenol
Acenaphthene	Phenol
2,4-Dinitrotoluene	2-Chlorophenol
Pyrene	4-Chloro-3-methylphenol
N-Nitroso-di-n-propylamine	4-Nitrophenol
1,4-Dichlorobenzene	

Note: Some projects may require the spiking of specific compounds of interest.

Note: See Method 8270D-sec 8.4.2 for deciding on whether to prepare and analyze duplicate samples or a matrix spike/matrix spike duplicate. If samples are expected to contain target analytes, then laboratory may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratory should use a matrix spike and matrix spike duplicate pair.

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water [ ] ___ ✓
b. Low Solid [ ] ___ ✓
c. Med Solid [ ] ___ ✓

YES NO N/A

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. It may be necessary to contact the lab to obtain the required data.

NOTE: If the data has not been reported on CLP equivalent form, then the laboratory must provide the information necessary to evaluate the spike recoveries in the MS and MSD. The required data which should have been provided by the lab include the analytes and concentrations used for spiking, background concentrations of the spiked analytes (i.e., concentrations in unspiked sample), methods and equations used to calculate the QC acceptance criteria for the spiked analytes, percent recovery data for all spiked analytes.

The data reviewer must verify that all reported equations and percent recoveries are correct before proceeding to the next section.

4.3 Were matrix spikes performed at concentration equal to 100ug/L for acid compounds, and 200ug/l for base compounds (Method 3500B-4), or those specified in project plan. [ ] ___ ✓

4.4 How many semivolatile spike recoveries are outside Laboratory in house MS/MSD recovery limits (use recovery limits values in Method 8270D-43&44 Table 6 if in house values not available).

Water ____ out of ____
Solids ____ out of ____

YES NO N/A

4.5 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water ____ out of ____
Solids ____ out of ____

ACTION: Circle all outliers with red pencil.

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria to determine the need for some qualification of the data.

4.6 Was a Laboratory Control Sample (LCS) analyzed with each analytical batch? ✓ ___ ___

NOTE: When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

5.0 Blanks (Form IV/Equivalent)

5.1 Is the Method Blank Summary (Form IV) present? ✓ ___ ___

5.2 Frequency of Analysis:

Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? ✓ ___ ___

5.3 Has a method blank been analyzed either after

YES NO N/A

the calibration standard or at any other time during the analytical shift for each GC/MS system used ? ✓

ACTION: If any method blank data are miseing, call lab for explanation/resubmittal. If not available, use professional judgement to determine if the associated sample data should be qualified.

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for the semivolatiles? ✓

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ✓

6.2 Do any field/rinse/ blanks have positive results for target analytes and/or TICs (if required, see section 10 below)? ✓

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field Blanks must be qualified for outlying surrogates, poor spectra, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify sample results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

YES NO N/A

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

NOTE: If the laboratory did not report TIC analyses, check the project plans to verify whether or not it was required.

6.3 Are there field/rinse/equipment blanks associated with every sample? ✓

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

6.4 Was a instrument blank analyzed after each sample/dilution which contained a target compound

YES NO N/A

that exceeded the initial calibration range. ✓

6.5 Does the instrument blank have positive results for target analytes and/or TICs? ✓

Note: Use professional judgement to determine if carryover occurred and qualify analytes accordingly.

7.0 GC/MS Apparatus and Materials

7.1 Did the lab use the proper gas chromatographic column for analysis of semivolatiles by Method 8270D? Check raw data, instrument logs or contact the lab to determine what type of column was used. The method requires the use of 30 m x 0.25 mm ID (or 0.32 mm ID), silicone-coated, fused silica, capillary column. ✓

ACTION: If the specified column, or equivalent, was not used, document the effects in the data assessment. Use professional judgement to determine the acceptability of the data.

8.0 GC/MS Instrument Performance Check (Form V/Equivalent)

8.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)? ✓

NOTE: The performance solution should also contain 4,4-DDT, pentachlorophenol, and benzidine to verify injection port inertness and column performance. The degradation of DDT to DDE and DDD must be less than 20% total and the response of pentachlorophenol and benzidine should be within normal ranges for these compounds (based upon lab experience) and show no peak degradation or tailing before samples are analyzed. (see section 5.5

YES NO N/A

page 8270D-12).

8.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? [✓] ___ ___

8.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument? [✓] ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

8.4 Have the ion abundances been normalized to m/z 198? [✓] ___ ___

8.5 Have the ion abundance criteria been met for each instrument used? [✓] ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

YES NO N/A

ACTION: If ion abundance criteria are not met, take action specified in section 3.2

8.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.) ___ [✓] ___

8.7 Have the appropriate number of significant figures (two) been reported? [✓] ___ ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.

8.8 Are the spectra of the mass calibration compound acceptable? [✓] ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

9.0 Target Analytes

9.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates [✓] ___ ___

c. Blanks [✓] ___ ___

9.2 Has any special cleanup, such as GPC, been performed on all soil/sediment sample extracts (see section 7.2, page 8270D-14)? [✓] ___ ___

YES NO N/A

ACTION: If data suggests that extract cleanup was not performed, use professional judgement. Make note in the data assessment narrative.

9.3 Are the Reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) [✓] ___ ___

c. Blanks [✓] ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

9.4 Are the response factors shown in the Quant Report? [✓] ___ ___

9.5 Is chromatographic performance acceptable with respect to:

Baseline stability? [✓] ___ ___

Resolution? [✓] ___ ___

Peak shape? [✓] ___ ___

Full-scale graph (attenuation)? [✓] ___ ___

Other:_____ [✓] ___ ___

ACTION: Use professional judgement to determine the acceptability of the data.

9.6 Are the lab-generated standard mass spectra of identified semivolatile compounds present for

YES NO N/A

each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the data assessment narrative. If spectra are missing, reject all positive data.

9.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

9.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

9.9 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 9.7, 9.8, and 9.9.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

YES NO N/A

10.0 Tentatively Identified Compounds (TIC)

10.1 If Tentatively Identified Compounds were required for this project, are all Form Is, Part B present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier? NA TICs

NOTE: Review sampling reports to determine if the lab was required to identify non target analytes (refer to section 7.6.2,page 8270D-21).

10.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following: [ ] ___ ✓

a. Samples and/or fractions as appropriate [ ] ___ ✓

b. Blanks [ ] ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by CAS #.

10.3 Are any target compounds from one fraction listed as TIC compounds in another (e.g., an acid compound listed as a base neutral TIC)? ___ [ ] ✓

ACTION: i. Flag with "R" any target compound listed as a TIC.

ii. Make sure all rejected compounds are properly reported in the other fraction.

10.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the

YES NO N/A

sample mass spectrum? [ ] ___ ✓

10.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate and remove "JN". Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R."

11.0 Compound Quantitation and Reported Detection Limits

11.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found? ___ [✓] ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

11.2 Are the method detection limits adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ ✓

YES NO N/A

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I (if present) and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red " X" across the entire page of all Form I's that should not be used, including any in the summary package.

12.0 Standards Data (GC/MS)

12.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

13.0 GC/MS Initial Calibration (Form VI/Equivalent)

13.1 Is the Initial Calibration Form (Form VI/ Equivalent) present and complete for the semivolatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard row data are missing, take action specified in 3.2 above.

13.2 Are all base neutral or acid RRFs > 0.050? [✓] ___ ___

YES NO N/A

Check the **average RRFs** of the four System Performance Check Compounds (SPCCs): N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. These compounds must have **average RRFs** greater than or equal to 0.05 before running samples and should not show any peak tailing.

ACTION: Circle all outliers in red.

ACTION: For any target analyte with **average RRF <0.05**

1. "R" all non-detects;

2. "J" all positive results.

13.3 Are response factors for base neutral or acid target analytes stable over the concentration range of the calibration (% Relative standard deviation [%RSD] < 20.0%)? [✓] ___ ___

NOTE: The % RSD for each individual Calibration Check Compound (CCC, Method 8270D-40 see Table 4) must be less than 30% before analysis can begin. If grater 30%, the lab must clean and recalibrate the instrument.

CALIBRATION CHECK COMPOUNDS

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol

YES NO N/A

Benzo(a)pyrene

ACTION: If the %RSD for any CCC >30% and no corrective action taken, then "J" qualify all positive hits and "UJ" qualify all non-detects.

ACTION: Circle all outliers in red.

ACTION: If the % RSD is ≥ 20.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non- detect results for that analyte "R," unusable. Alternatively, the lab should calculate first or second order regression fit of the calibration curve and select the fit which introduces the least amount of error.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

13.4 Did the laboratory calculate the calibration curve by the least squares regression fit? ___ ☑ ___

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) ___ ☑ ___

ACTION: Circle Errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

13.5 Do the target compounds for this SDG include Pesticides? ☐ ___ ___

YES NO N/A

13.6 If the pesticide compounds include DDT, was the percent breakdown of DDT to DDD and DDE greater than 20%? ___ ☐ ___

ACTION: If DDT percent breakdown exceeds 20%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE results are positive, qualify the quantitation limit for DDT as unusable, "R".

ii. Qualify all positive results for DDD and DDE as presumptively present at an approximate concentration "JN".

14.0 GC/MS Calibration Verification (Form VII/Equivalent)

14.1 Are the Calibration Verification Forms (Form VII) present and complete for all compounds of interest? ☑ ___ ___

14.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ☑ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

_____

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed within twelve hours of every sample analysis,

YES NO N/A

call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

14.3 Do any of the SPCCs have an RRF <0.05? ___ ☑ ___

If YES, make a note in data assessment if the lab did not take corrective action specified in section 7.4.4, page 8270D-18. ☐ ___ ___

14.4 Do any of the CCCs have a %D between the initial and continuing RRF which exceeds 20.0%?

ACTION: If yes, make a note in data assessment.

14.5 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds 20.0%? ___ ☑ ___

ACTION: Circle all outliers in red.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is above 90%, qualify all non-detects for that analyte as "R", unusable.

14.6 Do any semivolatile compounds have a RRF < 0.05? ___ ☑ ___

ACTION: Circle all outliers in red.

ACTION: If RRF < 0.05, qualify as unusable ("R") associated non-detects and "J" associated positive values.

14.7 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or percent difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more). ___ ☑ ___

YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect(s) in the data assessments.

15.0 Internal Standards (Form VIII)

15.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to + 100%) for each continuing calibration? ☑ ___ ___

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area	LowerLimit	Upper Limit

(Attach additional sheets if necessary.)

Note: Check Table 5, 8270D-41 for associated analytes.

ACTION: i. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

ii. Non-detects associated with IS > 100% should not be qualified.

YES NO N/A

iii. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

15.2 Are the retention times of all internal standards within 30 seconds of the associated calibration standard? [ ] [✓] [ ]

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds. No qual

16.0 Laboratory Control Samples (LCS)

16.1 Were any LCS samples run in order to verify analytes which failed criteria for spike recovery? [ ] [✓] [ ]

16.2 Did the lab spike LCS sample spiked with the same analytes and the same concentrations as the matrix spike? [ ] [ ] [✓]

16.3 Were the mean and standard deviation of all analytes within the QC acceptance ranges as shown in Table 6, 8270D-43? [✓] [ ] [ ]

ACTION: If the recovery of any analyte falls out of the designated range, the analytical results for that compound is suspect and should be qualified "J" in the unspiked samples.

17.0 Field Duplicates

17.1 Were any field duplicates submitted for semivolatile analysis? [ ] [✓] [ ]

INTERNAL STANDARD AREA AND RT SUMMARY
SW8270D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Sequence: 3E14035
SDG: 1305177
Project: Vieques East SWMU 20
Instrument: MS-BNA4
Calibration: 3122001

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Calibration Check (3E14035-CCV1)			Lab File ID: SEQ-CCV1.D			Analyzed: 05/19/13 12:02			
Phenanthrene-d10	270298	10.264	321039	10.545	84	50 - 200	-0.2810	+/-0.50	
Perylene-d12	328783	16.611	337266	17.137	97	50 - 200	-0.5260	+/-0.50	*
Blank (3E16039-BLK2)			Lab File ID: E16039B1.D			Analyzed: 05/19/13 12:59			
Phenanthrene-d10	297420	10.264	321039	10.545	93	50 - 200	-0.2810	+/-0.50	
Perylene-d12	359693	16.611	337266	17.137	107	50 - 200	-0.5260	+/-0.50	*
LCS (3E16039-BS2)			Lab File ID: E16039L1.D			Analyzed: 05/19/13 13:27			
Phenanthrene-d10	248957	10.264	321039	10.545	78	50 - 200	-0.2810	+/-0.50	
Perylene-d12	304070	16.606	337266	17.137	90	50 - 200	-0.5310	+/-0.50	*
VEP4-GW16-051613 (1305177-03)			Lab File ID: 0517703.D			Analyzed: 05/19/13 13:55			
Phenanthrene-d10	304592	10.264	321039	10.545	95	50 - 200	-0.2810	+/-0.50	
Perylene-d12	373276	16.606	337266	17.137	111	50 - 200	-0.5310	+/-0.50	*

No qual
No target detected

INTERNAL STANDARD AREA AND RT SUMMARY
SW8270D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Sequence: 3F16002
SDG: 1305177
Project: Vieques East SWMU 20
Instrument: MS-BNA4
Calibration: 3122001

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Calibration Check (3F16002-CCV1)			Lab File ID: SEQ-CCV1.D			Analyzed: 06/07/13 14:30			
Phenanthrene-d10	346723	9.98	321039	10.545	108	50 - 200	-0.5650	+/-0.50	*
Perylene-d12	385867	16.64	337266	17.137	114	50 - 200	-0.4970	+/-0.50	
Blank (3E21028-BLK2)			Lab File ID: E21028B1.D			Analyzed: 06/07/13 14:58			
Phenanthrene-d10	279011	9.975	321039	10.545	86	50 - 200	-0.5700	+/-0.50	*
Perylene-d12	309233	16.63	337266	17.137	92	50 - 200	-0.5070	+/-0.50	*
LCS (3E21028-BS2)			Lab File ID: E21028L1.D			Analyzed: 06/07/13 15:25			
Phenanthrene-d10	342959	9.975	321039	10.545	107	50 - 200	-0.5700	+/-0.50	*
Perylene-d12	380431	16.63	337266	17.137	113	50 - 200	-0.5070	+/-0.50	*
VEP4-EB01-051613-GW (1305177-04)			Lab File ID: 0517704.D			Analyzed: 06/07/13 19:35			
Phenanthrene-d10	241714	9.975	321039	10.545	75	50 - 200	-0.5700	+/-0.50	*
Perylene-d12	271044	16.635	337266	17.137	80	50 - 200	-0.5020	+/-0.50	*

No qual

INTERNAL STANDARD AREA AND RT SUMMARY
SW8270D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Sequence: 3E14707
SDG: 1305177
Project: Vieques East SWMU 20
Instrument: MS-BNA4
Calibration: 3122001

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Calibration Check (3E14707-CCV1)			Lab File ID: SEQ-CCV1.D			Analyzed: 05/21/13 13:03			
Phenanthrene-d10	256619	10.207	321039	10.545	80	50 - 200	-0.3380	+/-0.50	
Perylene-d12	313978	16.506	337266	17.137	93	50 - 200	-0.6310	+/-0.50	*
Blank (3E20021-BLK2)			Lab File ID: E20021B1.D			Analyzed: 05/21/13 13:30			
Phenanthrene-d10	336519	10.207	321039	10.545	105	50 - 200	-0.3380	+/-0.50	
Perylene-d12	405763	16.506	337266	17.137	120	50 - 200	-0.6310	+/-0.50	*
LCS (3E20021-BS2)			Lab File ID: E20021L1.D			Analyzed: 05/21/13 13:57			
Phenanthrene-d10	322031	10.207	321039	10.545	100	50 - 200	-0.3380	+/-0.50	
Perylene-d12	390132	16.501	337266	17.137	116	50 - 200	-0.6360	+/-0.50	*
LCS Dup (3E20021-BSD2)			Lab File ID: E20021L2.D			Analyzed: 05/21/13 14:24			
Phenanthrene-d10	340775	10.207	321039	10.545	106	50 - 200	-0.3380	+/-0.50	
Perylene-d12	404046	16.501	337266	17.137	120	50 - 200	-0.6360	+/-0.50	*
VEP4-GW02-0513 (1305177-01)			Lab File ID: 0517701.D			Analyzed: 05/21/13 19:53			
Phenanthrene-d10	306212	10.202	321039	10.545	95	50 - 200	-0.3430	+/-0.50	
Perylene-d12	377907	16.501	337266	17.137	112	50 - 200	-0.6360	+/-0.50	*
VEP4-GW03-0513 (1305177-02)			Lab File ID: 0517702.D			Analyzed: 05/21/13 20:20			
Phenanthrene-d10	387780	10.203	321039	10.545	121	50 - 200	-0.3420	+/-0.50	
Perylene-d12	470374	16.501	337266	17.137	139	50 - 200	-0.6360	+/-0.50	*

No qual

YES NO N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

DataQual
Environmental Services, LLC

CH2M HILL-VBO
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

December 11, 2013
SDG# 1305193, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1305193. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24 and 8270D-Rev 4, August 2008-SOP #HW-22,), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA	SVOA
VEP4-EB01-051713-GW	1305193-01	water	X	X
VEP4-TB01-051713-GW	1305193-02	water	X	
VEP4-GW07-0513	1305193-03	water	X	X

The following quality control samples were provided with this SDG: sample VEP4-EB01-051713-GW- equipment blank and sample VEP4-TB01-052013-GW- trip blank.

The samples were evaluated based on the following criteria:

- Data Completeness
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Field Duplicates NA
- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

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* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

No qualifications were required to the data.

SVOA

No qualifications were required to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were required as the raw data was not printed dark enough to read in the original package. The laboratory was contacted and updated pages were submitted.

Technical Holding Times

According to chain of custody records, sampling was performed on 5/17/13 and samples were received at the laboratory 5/18/13. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

SVOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1305193

004

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U not detected above the reported sample quantitation limit
J estimated value
UJ reported quantitation limit is qualified as estimated
N analyte has been tentatively identified
JN analyte has been tentatively identified, estimated value
R result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.

U* The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.

RL** The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1305193

005

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.

J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.
Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL reporting limit
PQL practical quantitation limit
IDL instrument detection limit
MDL method detection limit
CRDL contract required detection limit
CRQL contract required quantitation limit
+ positive result
- non-detect result

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1305193

006

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1305193

007

ANALYSIS DATA SHEET

VEP4-EB01-051713-GW

Laboratory: Empirical Laboratories, LLC | SDG: 1305193
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1305193-01 | File ID: 0519301.D
Sampled: 05/17/13 10:25 | Prepared: 05/25/13 00:00 | Analyzed: 05/26/13 15:15
Solids: | Preparation: 5030B | Dilution: 1
Batch: 3E25007 | Sequence: 3E14813 | Calibration: 3140001 | Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.60	102	75 - 120	
Dibromofluoromethane	30.00	30.50	102	85 - 115	
1,2-Dichloroethane-d4	30.00	29.64	99.5	70 - 120	
Toluene-d8	30.00	30.59	102	85 - 120	

WM 12.03.13

ANALYSIS DATA SHEET

VEP4-TB01-051713-GW

Laboratory: Empirical Laboratories, LLC | SDG: 1305193
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1305193-02 | File ID: 0519302.D
Sampled: 05/17/13 11:00 | Prepared: 05/25/13 00:00 | Analyzed: 05/26/13 15:43
Solids: | Preparation: 5030B | Dilution: 1
Batch: 3E25007 | Sequence: 3E14813 | Calibration: 3140001 | Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	31.59	105	75 - 120	
Dibromofluoromethane	30.00	30.81	103	85 - 115	
1,2-Dichloroethane-d4	30.00	30.94	103	70 - 120	
Toluene-d8	30.00	31.34	104	85 - 120	

WM 12.03.13

ANALYSIS DATA SHEET

VEP4-GW07-0513

Laboratory: Empirical Laboratories, LLC | SDG: 1305193
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1305193-03 | File ID: 0519303.D
Sampled: 05/17/13 09:20 | Prepared: 05/24/13 16:29 | Analyzed: 05/24/13 16:29
Solids: | Preparation: 5030B | Dilution: 1
Batch: 3E14013 | Sequence: 3E14503 | Calibration: 3127004 | Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	26.94	89.8	75 - 120	
Dibromofluoromethane	30.00	29.80	99.3	85 - 115	
1,2-Dichloroethane-d4	30.00	30.14	100	70 - 120	
Toluene-d8	30.00	30.89	103	85 - 120	

WM 12.03.13

ANALYSIS DATA SHEET

VEP4-EB01-051713-GW

Laboratory: Empirical Laboratories, LLC | SDG: 1305193
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1305193-01 | File ID: 0519301.D
Sampled: 05/17/13 10:25 | Prepared: 05/21/13 16:30 | Analyzed: 06/07/13 21:26
Solids: | Preparation: EXT_3510 | Dilution: 1
Batch: 3E21028 | Sequence: 3E16002 | Calibration: 3122001 | Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.240	0.481	0.962	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	48.08	39.10	81.3	50 - 110	
Terphenyl-d14	48.08	42.31	88.0	50 - 135	
2,4,6-Tribromophenol	96.15	85.33	88.7	40 - 125	

WM 12.03.13

ANALYSIS DATA SHEET

VEP4-GW07-0513

Laboratory:	Empirical Laboratories, LLC		SDG:	1305193	
Client:	CH2M Hill, Inc.		Project:	Niagara Falls SWMU 20	
Matrix:	Water	Laboratory ID:	1305193-03	File ID:	0519303.D
Sampled:	05/17/13 09:20	Prepared:	05/20/13 15:00	Analyzed:	05/21/13 20:47
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	1E30021	Sequence:	1E14207	Calibration:	3122001

Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.250	0.500	1.00	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	50.00	42.31	84.6	50 - 110	
Terphenyl-d14	50.00	41.03	82.1	50 - 135	
2,4,6-Tribromophenol	100.0	59.50	59.5	40 - 125	X

1305193 Summ Package

73

EMPIRICAL LABORATORIES, LLC - CHAIN OF CUSTODY RECORD

SHIP TO: 621 Mainstream Drive, Suite 270 • Nashville, TN 37228 • 615-345-1115 • (fax) 615-846-5426

18757

1305193

Send Results to: Name Mike Zambrotta; Company CH2M Hill; Address [illegible]; City Chantilly; State, Zip VA 20151; Phone 703 376 5301; Fax 703 376 5301; E-mail [illegible]

Send Invoice to: Name See Contract; Company Empirical Laboratories; Address; City; State, Zip; Phone; Fax; E-mail

Project No./Name:

Sampler's (Signature):

Analysis Requirements: VOCs 8260B; SVOCs 8270C

Lab Use Only:

VOA Headspace	Y	N	NA
Field Filtered	Y	N	NA
Correct Containers	Y	N	NA
Discrepancies	Y	N	NA
Cust. Seals Intact	Y	N	NA
Containers Intact	Y	N	NA

AirBill # 3020 6195 4733

CAR #

Lab Use Only Lab #	Date/Time Sampled	Sample Description	Sample Matrix	VOCs 8260B	SVOCs 8270C	Comments	No. of Bottles	Lab Use Only Containers/Pres
-01	5/17/13 1630	VEP4-EB01-051713-WG	AQ	X	X		5	
-02	5/17/13 1700	VEP4-TB01-051713-WG	AQ	X			2	
-03	5/17/13 0920	VEP4-GW07-0513	GW	X	X	7 day TAT	5	

Sample Kit Prepd by: (Signature) — Date/Time — Received By: (Signature)

Relinquished by: (Signature) — Date/Time 5/17/13 1130 — Received By: (Signature)

Relinquished by: (Signature) — Date/Time — Received By: (Signature)

Received for Laboratory by: (Signature) — Date/Time 5/18/13 0820 — Temperature 3.1 INIT.

REMARKS:

Details: Page ___ of ___; Cooler No. 1 of 1; Date Shipped; Shipped By; Tracking #

Distribution: Original and yellow copies accompany sample shipment to laboratory. Pink retained by sampler.

1305193 Summ Package

EMPIRICAL LABORATORIES
COOLER RECEIPT FORM

Cooler Received/Opened On: 05/18/13 @ 0820 Workorder# 1305193

1. Tracking # 4733 (last 4 digits, FedEx)
   Courier: FEDEX
2. Temperature of rep. sample or temp blank when opened: 3.1 °C + correction factor (-0.1) = 3.0 °C
3. If item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA
4. Were custody seals on outside of cooler? YES NO NA
   If yes, how many and where: 1-FRONT
5. Were the seals intact, signed, and dated correctly? YES NO NA
6. Were custody papers inside cooler? YES NO NA

I certify that I opened the cooler and answered questions 1-6 (initial) [illegible]

7. Were custody seals on containers: YES NO and intact YES NO NA
   Were these signed and dated correctly? YES NO NA
8. Packing material used? Bubblewrap Plastic bags Peanuts Vermiculite Foam Insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry Ice Other None
10. Did all containers arrive in good condition (unbroken)? YES NO NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES NO NA
12. Did all container labels and tags agree with custody papers? YES NO NA
13. a. Were VOA vials received? YES NO NA
    b. Was there any observable headspace present in any VOA vial? YES NO NA
14. Was there a Trip Blank in this cooler? YES NO NA If multiple coolers, sequence #

I certify that I unloaded the cooler and answered questions 7-14 (initial) [illegible]

15. a. On preso'd bottles, did pH test strips suggest preservation reached the correct pH level? YES NO NA
    b. Did the bottle labels indicate that the correct preservatives were used YES NO NA
16. Was residual chlorine present? YES NO NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial) [illegible]

17. Were custody papers properly filled out (ink, signed, etc)? YES NO NA
18. Did you sign the custody papers in the appropriate place? YES NO NA
19. Were correct containers used for the analysis requested? YES NO NA
20. Was sufficient amount of sample sent in each container? YES NO NA

I certify that I entered this project into LIMS and answered questions 17-20 (initial) [illegible]

I certify that I attached a label with the unique LIMS number to each container (initial) [illegible]

I certify that I have performed a second check of the LIMS information against the COC to confirm accuracy (initial) [illegible]

21. Were there Non-Conformance issues at login? YES NO Was a NCR generated? YES NO #

Additional Details:

© Documents and Settings/Jim Wright/Desktop/New CRF.doc Line

014

1305193 Summ Package

Sample Delivery Group Case Narrative

Receipt Information

The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Changes to the Revision

Revision 01: The package was revised to replace the raw data that was not dark enough to be read in the original package.

Analytical Information

All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:

The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

015

1305193 Summ Package

3

SW8260B:
No anomalies or deviations are noted.

SW8270D BNA:
The following internal standard exceeded the retention time window of +/-0.5 min:
Perylene-d12 in 3E14207-CCV1, 3E20021-BLK2, -BS2, -BSD2, 3E21028-BLK2, -BS2, 1305193-01 and -03
Phenanthrene-d12 in 3F16002-CCV1, 3E21028-BLK2, -BS2, and 1305193-01
Note – While the internal standards shifted outside +/-0.5min from the initial calibration, they are identified by the mass spectrum. This minimal shift would have no impact on the reported results.

The following continuing calibration verifications exceeded criteria:
3E14207-CCV1 with a positive bias for 2,4,6-Tribromophenol

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

019

YES NO N/A

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 1305193 LAB: Empirical

SITE NAME: Vieques Summ 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. VOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓ ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓ ___ ___

1.3 Sample Conditions/Problems

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YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

a 5/17/13 a 5/24-26
r 5/18 t 3.0°C

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ ✓ ___

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

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YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water ✓ ___ ___

b. Soil ☐ ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water ✓ ___ ___

b. Soil ☐ ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

019

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. lab [✓] ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ [✓]

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] [✓] ___

If yes, were samples reanalyzed? [ ] ___ [✓]

Were method blanks reanalyzed? [ ] ___ [✓]

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] [✓] ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ [✓]

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] [✓] ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent) No MS/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] ___ [✓]

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] ___ [✓]

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month [page 8000C, section 9.5.])

a. Water [ ] ___ ✓

b. Waste [ ] ___ ✓

c. Soil/Solid [ ] ___ ✓

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7) for each matrix. [ ] ___ ✓

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ ✓

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? [✓] ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? [✓] ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? [✓] ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data – chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? [✓] ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. [ ] ___ ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ [✓] ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ☑ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ☑ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ☑ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ☑ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ☑ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ☑ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ☑ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ☑ ___

9.7 Have the appropriate number of significant figures (two) been reported? ☑ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ☑ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ☑ ___ ___

b. Matrix spikes and matrix spike duplicates ☑ ___ ___

c. Blanks ☑ ___ ___

d. Laboratory Control Samples ☑ ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ☑ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ☑ ___ ___

c. Blanks ☑ ___ ___

d. Laboratory Control Samples ☑ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? ☑ ___ ___

YES NO N/A

Resolution? [✓] ___ ___

Peak shape? [✓] ___ ___

Full-scale graph (attenuation)? [✓] ___ ___

Other: _____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reportec compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") – Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

No TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ [✓]

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ [✓]

b. Blanks [ ] ___ [✓]

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ [✓]

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ [✓]

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ [✓]

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] [✓] ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ [✓]

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? ✓ ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39) qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. ✓ ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) ___ ✓ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 <u>GC/MS Calibration Verification (CLP Form VII Equivalent)</u>

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? ✓ ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). ___ ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? ___ ✓ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 <u>Internal Standards (CLP Form VIII Equivalent)</u>

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? ✓ ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:
1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.
2. Do not qualify non-detects when the associated IS are counts area > + 100%.
3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".
4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ☑ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ___ ☑ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

Initial Calibration Date: 5/17/2013
RRF and %RSD Calculations:
Compound Name: vinyl chloride
Lab Value: 0.3017

Area of Compound	2851807
Area of Internal STD	1417697
Conc. of Internal STD	30
Conc. of Compound	200
Calculated RRF	0.302

Compound Name: 1,1-dichloroethene
Lab Value: 4.5

RRF of STD 1	0.2386
RRF of STD 2	0.2355
RRF of STD 3	0.2203
RRF of STD 4	0.2268
RRF of STD 5	0.2172
RRF of STD 6	0.2369
RRF of STD 7	0.2420
RRF of STD 8	0.2500
RRF of STD 9	0.2350
Calculated % RSD	4.5

Continuing Calibration File ID: 5/26/2013
RRF and %D Calculations:
Compound Name: cis-1,2-dichloroethene
Lab Value: 0.255

Area of Compound	1194145
Area of Internal STD	1405100
Conc. of Internal STD	30
Conc. of Compound	100
Calculated RRF	0.255

Compound Name: trichloroethene
Lab Value: 6.8

Average RRF	0.304
Calibration Check RRF	0.283
Calculated % D	6.8

YES NO N/A

E - The concentration of this analyte exceeds the calibration range of the instrument.

A - Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 1305193 LAB: Empirical
SITE NAME: Vieques 3WMU20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format? ☑ ___ ___

ACTION: If not, note the effect on review of the data in the data assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative or cover letter present? ☑ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ☑ ___ ___

YES NO N/A

II. **SEMIVOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? ✓ __ __

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? __ ✓ __

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, all non-detects data are qualified as unusable (R), and detects are flagged "J".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (10°C), flag all positive results "J" and all non-detects "UJ". t 3.0°C

2.0 Holding Times a 5/17/13 e 5/20-21 r 5/18 a 5/21+6/7

2.1 Have any semivolatile technical holding times, determined from date of collection to date of extraction, been exceeded? __ ✓ __

Continuous extraction of water samples for semivolatile analysis must be started within 7 days of the date of collection. Soil/sediment samples must be extracted within **14** days of collection. Extracts must be analyzed within

YES NO N/A

40 days of the date of extraction.

Table of Holding Time Violations

(See Traffic Report)

Sample ID	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted	Date Analyzed

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

YES NO N/A

3.0 Surrogate Recovery (Form II/Equivalent)

3.1 Have the semi volatile surrogate recoveries been listed on CLP Surrogate Recovery forms (Form II) for each of the following matrices:

a. Low Water ✓ __ __

b. Low/Med Soil __ __ __

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery Summary forms for each matrix:

a. Low Water ✓ __ __

b. Low/Med Soil __ __ __

ACTION: If CLP deliverables are unavailable, document the effect(s) in data assessments. In some cases the lab may have to be contacted to obtain the data necessary to complete the validation.

3.3 Were outliers marked correctly with an asterisk? ✓ __ ___

ACTION: Circle all outliers in red.

3.4 Were two or more base neutral OR acid surrogate recoveries out of specification for any sample or method blank (Reviewer should use lab in house recovery limits. Use surrogate recovery limits from USEPA National Functional Guidlines January 2005 page 130, if in house limits are not available. See Method 8000B-43 or 8000C-24). __ ✓ __

Note: Examine lab in house limits for reasonableness.

If yes, were samples re-analyzed? __ __ ✓

SURROGATE STANDARD RECOVERY AND RT SUMMARY
SW8270D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Sequence: 3E14207
SDG: 1305193
Project: Vieques East SWMU 20
Instrument: MS-BNA4
Calibration: 3122001

Surrogate Compound	Spike Level	% Recovery	Recovery Limits	RT	CCV RT	RT Diff	RT Diff Limit	Q
Calibration Check (3E14207-CCV1) ug/mL				Lab File ID: SEQ-CCV1.D		Analyzed: 05/21/13 13:03		
2-Fluorobiphenyl	10.00	109	80 - 120	7.631	7.631	0.0000	+/-0.500	
Terphenyl-d14	10.00	118	80 - 120	12.186	12.186	0.0000	+/-0.500	
2,4,6-Tribromophenol	20.00	123	80 - 120	9.403	9.403	0.0000	+/-0.500	*
Blank (3E20021-BLK2) ug/L				Lab File ID: E20021B1.D		Analyzed: 05/21/13 13:30		
2-Fluorobiphenyl	50.00	81.0	50 - 110	7.631	7.631	0.0000	+/-0.500	
Terphenyl-d14	50.00	83.0	50 - 135	12.191	12.186	0.0050	+/-0.500	
2,4,6-Tribromophenol	100.0	86.0	40 - 125	9.403	9.403	0.0000	+/-0.500	
LCS (3E20021-BS2) ug/L				Lab File ID: E20021L1.D		Analyzed: 05/21/13 13:57		
2-Fluorobiphenyl	50.00	82.3	50 - 110	7.631	7.631	0.0000	+/-0.500	
Terphenyl-d14	50.00	82.3	50 - 135	12.191	12.186	0.0050	+/-0.500	
2,4,6-Tribromophenol	100.0	93.6	40 - 125	9.403	9.403	0.0000	+/-0.500	
LCS Dup (3E20021-BSD2) ug/L				Lab File ID: E20021L2.D		Analyzed: 05/21/13 14:24		
2-Fluorobiphenyl	50.00	81.7	50 - 110	7.631	7.631	0.0000	+/-0.500	
Terphenyl-d14	50.00	80.9	50 - 135	12.191	12.186	0.0050	+/-0.500	
2,4,6-Tribromophenol	100.0	94.6	40 - 125	9.403	9.403	0.0000	+/-0.500	
VEP4-GW07-0513 (1305193-03) ug/L				Lab File ID: 0519303.D		Analyzed: 05/21/13 20:47		
2-Fluorobiphenyl	50.00	84.6	50 - 110	7.631	7.631	0.0000	+/-0.500	
Terphenyl-d14	50.00	82.1	50 - 135	12.191	12.186	0.0050	+/-0.500	
2,4,6-Tribromophenol	100.0	59.5	40 - 125	9.398	9.403	-0.0050	+/-0.500	

No Qual

YES NO N/A

Were method blanks re-analyzed? ___ ___ ✓

ACTION: If all surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet method specifications, for the affected fraction only (i.e. either base-neutral or acid compounds):

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Positive results for the fraction with < 10% surrogate recovery are qualified with "J".
2. Non-detects for that fraction should be qualified as unusable (R) .

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ ✓ ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document

YES NO N/A

effect in data assessments.

4.0 Matrix Spikes (Form III/Equivalent) No MS/MSD

4.1 Have the semivolatile Matrix Spike and Matrix Spike Duplicate/or duplicate unspiked Sample recoveries been listed on the Recovery Form (Form III)? ___ ___ ✓

NOTE: Method 3500B/page 4 states the spiking compounds:

Base/neutrals	Acids
1,2,4-Trichlorobenzene	Pentachlorophenol
Acenaphthene	Phenol
2,4-Dinitrotoluene	2-Chlorophenol
Pyrene	4-Chloro-3-methylphenol
N-Nitroso-di-n-propylamine	4-Nitrophenol
1,4-Dichlorobenzene	

Note: Some projects may require the spiking of specific compounds of interest.

Note: See Method 8270D-sec 8.4.2 for deciding on whether to prepare and analyze duplicate samples or a martix spike/matrix spike duplicate. If samples are expected to contain target analytes, then laboratory may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratory should use a matrix spike and matrix spike duplicate pair.

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water ___ ___ ✓
b. Low Solid ___ ___ ✓
c. Med Solid ___ ___ ✓

YES NO N/A

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. It may be necessary to contact the lab to obtain the required data.

NOTE: If the data has not been reported on CLP equivalent form, then the laboratory must provide the information necessary to evaluate the spike recoveries in the MS and MSD. The required data which should have been provided by the lab include the analytes and concentrations used for spiking, background concentrations of the spiked analytes (i.e., concentrations in unspiked sample), methods and equations used to calculate the QC acceptance criteria for the spiked analytes, percent recovery data for all spiked analytes.

The data reviewer must verify that all reported equations and percent recoveries are correct before proceeding to the next section.

4.3 Were matrix spikes performed at concentration equal to 100ug/L for acid compounds, and 200ug/l for base compounds (Method 3500B-4), or those specified in project plan. ___ ___ ✓

4.4 How many semivolatile spike recoveries are outside Laboratory in house MS/MSD recovery limits (use recovery limits values in Method 8270D-43&44 Table 6 if in house values not available).

Water ____ out of ____ Solids ____ out of ____

YES NO N/A

4.5 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water ____ out of ____ Solids ____ out of ____

ACTION: Circle all outliers with red pencil.

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria to determine the need for some qualification of the data.

4.6 Was a Laboratory Control Sample (LCS) analyzed with each analytical batch? ✓ ___ ___

NOTE: When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

5.0 Blanks (Form IV/Equivalent)

5.1 Is the Method Blank Summary (Form IV) present? ✓ ___ ___

5.2 Frequency of Analysis:

Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? ✓ ___ ___

5.3 Has a method blank been analyzed either after

YES NO N/A

the calibration standard or at any other time during the analytical shift for each GC/MS system used ? ✓ ___ ___

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, use professional judgement to determine if the associated sample data should be qualified.

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for the semivolatiles? ✓ ___ ___

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ✓ ___

6.2 Do any field/rinse/ blanks have positive results for target analytes and/or TICs (if required, see section 10 below)? ___ ✓ ___

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field Blanks must be qualified for outlying surrogates, poor spectra, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify sample results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

YES NO N/A

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

NOTE: If the laboratory did not report TIC analyses, check the project plans to verify whether or not it was required.

6.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

6.4 Was a instrument blank analyzed after each sample/dilution which contained a target compound

YES NO N/A

that exceeded the initial calibration range. ___ ___ ✓

6.5 Does the instrument blank have positive results for target analytes and/or TICs? ___ ✓ ___

Note: Use professional judgement to determine if carryover occurred and qualify analytes accordingly.

7.0 GC/MS Apparatus and Materials

7.1 Did the lab use the proper gas chromatographic column for analysis of semivolatiles by Method 8270D? Check raw data, instrument logs or contact the lab to determine what type of column was used. The method requires the use of 30 m x 0.25 mm ID (or 0.32 mm ID), silicone-coated, fused silica, capillary column. ✓ ___ ___

ACTION: If the specified column, or equivalent, was not used, document the effects in the data assessment. Use professional judgement to determine the acceptability of the data.

8.0 GC/MS Instrument Performance Check (Form V/Equivalent)

8.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)? ✓ ___ ___

NOTE: The performance solution should also contain 4,4-DDT, pentachlorophenol, and benzidine to verify injection port inertness and column performance. The degradation of DDT to DDE and DDD must be less than 20% total and the response of pentachlorophenol and benzidine should be within normal ranges for these compounds (based upon lab experience) and show no peak degradation or tailing before samples are analyzed. (see section 5.5

YES NO N/A

page 8270D-12).

8.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? ☑ ___ ___

8.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument? ☑ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

8.4 Have the ion abundances been normalized to m/z 198? ☑ ___ ___

8.5 Have the ion abundance criteria been met for each instrument used? ☑ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

YES NO N/A

ACTION: If ion abundance criteria are not met, take action specified in section 3.2

8.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.) ___ ☑ ___

8.7 Have the appropriate number of significant figures (two) been reported? ☑ ___ ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.

8.8 Are the spectra of the mass calibration compound acceptable? ☑ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

9.0 Target Analytes

9.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ☑ ___ ___

b. Matrix spikes and matrix spike duplicates ☐ ___ ☑

c. Blanks ☑ ___ ___

9.2 Has any special cleanup, such as GPC, been performed on all soil/sediment sample extracts (see section 7.2, page 8270D-14)? ☐ ___ ☑

YES NO N/A

ACTION: If data suggests that extract cleanup was not performed, use professional judgement. Make note in the data assessment narrative.

9.3 Are the Reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ☑ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ☑ ___ ___

c. Blanks ☑ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

9.4 Are the response factors shown in the Quant Report? ☑ ___ ___

9.5 Is chromatographic performance acceptable with respect to:

Baseline stability? ☑ ___ ___

Resolution? ☑ ___ ___

Peak shape? ☑ ___ ___

Full-scale graph (attenuation)? ☑ ___ ___

Other:_____ ☐ ___ ___

ACTION: Use professional judgement to determine the acceptability of the data.

9.6 Are the lab-generated standard mass spectra of identified semivolatile compounds present for

YES NO N/A

each sample? ☑ ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the data assessment narrative. If spectra are missing, reject all positive data.

9.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? ☑ ___ ___

9.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ☑ ___ ___

9.9 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ☑ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 9.7, 9.8, and 9.9.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

YES NO N/A

10.0 Tentatively Identified Compounds (TIC)

no TICs

10.1 If Tentatively Identified Compounds were required for this project, are all Form Is, Part B present: and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier?

NOTE: Review sampling reports to determine if the lab was required to identify non target analytes (refer to section 7.6.2,page 8270D-21).

10.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following: [ ] ___ ✓

a. Samples and/or fractions as appropriate [ ] ___ ✓

b. Blanks [ ] ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by CAS #.

10.3 Are any target compounds from one fraction listed as TIC compounds in another (e.g., an acid compound listed as a base neutral TIC)? ___ [ ] ✓

ACTION: i. Flag with "R" any target compound listed as a TIC.

ii. Make sure all rejected compounds are properly reported in the other fraction.

10.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the

YES NO N/A

sample mass spectrum? [ ] ___ ✓

10.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate and remove "JN". Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R."

11.0 Compound Quantitation and Reported Detection Limits

11.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found? ___ [✓] ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

11.2 Are the method detection limits adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ ✓

YES NO N/A

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I (if present) and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red " X" across the entire page of all Form I's that should not be used, including any in the summary package.

12.0 Standards Data (GC/MS)

12.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

13.0 GC/MS Initial Calibration (Form VI/Equivalent)

13.1 Is the Initial Calibration Form (Form VI/ Equivalent) present and complete for the semivolatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard row data are missing, take action specified in 3.2 above.

13.2 Are all base neutral or acid RRFs > 0.050? [✓] ___ ___

YES NO N/A

Check the **average RRFs** of the four System Performance Check Compounds (SPCCs): N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. These compounds must have **average RRFs** greater than or equal to 0.05 before running samples and should not show any peak tailing.

ACTION: Circle all outliers in red.

ACTION: For any target analyte with **average RRF <0.05**

1. "R" all non-detects;

2. "J" all positive results.

13.3 Are response factors for base neutral or acid target analytes stable over the concentration range of the calibration (% Relative standard deviation (%RSD) < 20.0%)? [✓] ___ ___

NOTE: The % RSD for each individual Calibration Check Compound (CCC, Method 8270D-40 see Table 4) must be less than 30% before analysis can begin. If grater 30%, the lab must clean and recalibrate the instrument.

CALIBRATION CHECK COMPOUNDS

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol

YES NO N/A

Benzo(a)pyrene

ACTION: If the %RSD for any CCC >30% and no corrective action taken, then "J" qualify all positive hits and "UJ" qualify all non-detects.

ACTION: Circle all outliers in red.

ACTION: If the % RSD is ≥ 20.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non- detect results for that analyte "R," unusable. Alternatively, the lab should calculate first or second order regression fit of the calibration curve and select the fit which introduces the least amount of error.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

13.4 Did the laboratory calculate the calibration curve by the least squares regression fit? ___ ✓ ___

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) ___ ✓ ___

ACTION: Circle Errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

13.6 Do the target compounds for this SDG include Pesticides? ✓ ___ ___

YES NO N/A

13.6 If the pesticide compounds include DDT, was the percent breakdown of DDT to DDD and DDE greater than 20%? ___ ___ ✓

ACTION: If DDT percent breakdown exceeds 20%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE results are positive, qualify the quantitation limit for DDT as unusable, "R".

ii. Qualify all positive results for DDD and DDE as presumptively present at an approximate concentration "JN".

14.0 GC/MS Calibration Verification (Form VII/Equivalent)

14.1 Are the Calibration Verification Forms (Form VII) present and complete for all compounds of interest? ✓ ___ ___

14.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

ACTION: If any forms are missing or no calibration verification standard has been analyzed within twelve hours of every sample analysis,

YES NO N/A

call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

14.3 Do any of the SPCCs have an RRF <0.05? ___ ✓ ___

If YES, make a note in data assessment if the lab did not take corrective action specified in section 7.4.4, page 8270D-18. ✓ ___ ___

14.4 Do any of the CCCs have a %D between the initial and continuing RRF which exceeds 20.0%?

ACTION: If yes, make a note in data assessment.

14.5 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds 20.0%? ___ ✓ ___

ACTION: Circle all outliers in red. pick out – no qual

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is above 90%, qualify all non-detects for that analyte as "R", unusable.

14.6 Do any semivolatile compounds have a RRF < 0.05? ___ ✓ ___

ACTION: Circle all outliers in red.

ACTION: If RRF < 0.05, qualify as unusable ("R") associated non-detects and "J" associated positive values.

14.7 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or percent difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more). ✓ ___ ___

CONTINUING CALIBRATION CHECK
SW8270D

Laboratory:	Empirical Laboratories, LLC	SDG:	1305193
Client:	CH2M Hill, Inc.	Project:	Vicinity East SWMU 20
Instrument ID:	MS-BNA4	Calibration:	3132001
Lab File ID:	SEQ-CCV1.D	Calibration Date:	05/01/11 00:00
Sequence:	3E14207	Injection Date:	05/21/13
Lab Sample ID:	3E14207-CCV1	Injection Time:	13:03

COMPOUND	TYPE	CONC. (ug/mL) STD	CONC. (ug/mL) CCV	RESPONSE FACTOR iCAL	RESPONSE FACTOR CCV	RESPONSE FACTOR MIN (#)	% DIFF / DRIFT CCV	% DIFF / DRIFT LIMIT (#)
1,4-Dioxane	A	10.00	8.474	0.1401567	0.1187769		-15.3	20
2-Fluorobiphenyl	A	10.00	10.90	0.6701778	0.7305305		9.0	20
Terphenyl-d14	A	10.00	11.77	0.8784264	1.034157		17.7	20
2,4,6-Tribromophenol	A	20.00	24.58	0.1373566	0.1688456		22.9	20 *

no qual

YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect(s) in the data assessments.

15.0 Internal Standards (Form VIII)

15.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to + 100%) for each continuing calibration? ✓

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area	LowerLimit	Upper Limit

(Attach additional sheets if necessary.)

Note: Check Table 5, 8270D-41 for associated analytes.

ACTION: i. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

ii. Non-detects associated with IS > 100% should not be qualified.

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YES NO N/A

iii. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

13.2 Are the retention times of all internal standards within 30 seconds of the associated calibration standard? ✓

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds. See attached forms

16.0 Laboratory Control Samples (LCS)

16.1 Were any LCS samples run in order to verify analytes which failed criteria for spike recovery? ✓

16.2 Did the lab spike LCS sample spiked with the same analytes and the same concentrations as the matrix spike? ✓

16.3 Were the mean and standard deviation of all analytes within the QC acceptance ranges as shown in Table 6, 8270D-43? ✓

ACTION: If the recovery of any analyte falls out of the designated range, the analytical results for that compound is suspect and should be qualified "J" in the unspiked samples.

17.0 Field Duplicates

17.1 Were any field duplicates submitted for semivolatile analysis? ✓

068

INTERNAL STANDARD AREA AND RT SUMMARY
SW8270D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Sequence: 3F16002
SDG: 1305193
Project: Vieques East SWMU 20
Instrument: MS-BNA4
Calibration: 3122001

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Calibration Check (3F16002-CCV1)			Lab File ID: SEQ-CCV1.D			Analyzed: 06/07/13 14:30			
Phenanthrene-d10	346723	9.98	321039	10.545	108	50 - 200	-0.5650	+/-0.50	*
Perylene-d12	385867	16.64	337266	17.137	114	50 - 200	-0.4970	+/-0.50	
Blank (3E21028-BLK2)			Lab File ID: E21028B1.D			Analyzed: 06/07/13 14:58			
Phenanthrene-d10	276011	9.975	321039	10.545	86	50 - 200	-0.5700	+/-0.50	*
Perylene-d12	309233	16.63	337266	17.137	92	50 - 200	-0.5070	+/-0.50	*
LCS (3E21028-BS2)			Lab File ID: E21028L1.D			Analyzed: 06/07/13 13:25			
Phenanthrene-d10	342959	9.975	321039	10.545	107	50 - 200	-0.5700	+/-0.50	*
Perylene-d12	380431	16.63	337266	17.137	113	50 - 200	-0.5070	+/-0.50	*
VEP4-EB01-051713-GW (1305193-01)			Lab File ID: 0519301.D			Analyzed: 06/07/13 21:26			
Phenanthrene-d10	270746	9.975	321039	10.545	84	50 - 200	-0.5700	+/-0.50	*
Perylene-d12	300999	16.63	337266	17.137	89	50 - 200	-0.5070	+/-0.50	*

ISTDs perylene-d12 not assoc'd w/ target compd - no qual

* no ⓓ results, no qual

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INTERNAL STANDARD AREA AND RT SUMMARY
SW8270D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Sequence: 3E14207
SDG: 1305193
Project: Vieques East SWMU 20
Instrument: MS-BNA4
Calibration: 3122001

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Calibration Check (3E14207-CCV1)			Lab File ID: SEQ-CCV1.D			Analyzed: 05/21/13 13:03			
Phenanthrene-d10	256619	10.207	321039	10.545	80	50 - 200	-0.3380	+/-0.50	
Perylene-d12	313978	16.506	337266	17.137	93	50 - 200	-0.6310	+/-0.50	*
Blank (3E20021-BLK2)			Lab File ID: E20021B1.D			Analyzed: 05/21/13 13:30			
Phenanthrene-d10	336519	10.207	321039	10.545	105	50 - 200	-0.3380	+/-0.50	
Perylene-d12	405763	16.506	337266	17.137	120	50 - 200	-0.6310	+/-0.50	*
LCS (3E20021-BS2)			Lab File ID: E20021L1.D			Analyzed: 05/21/13 13:57			
Phenanthrene-d10	322031	10.207	321039	10.545	100	50 - 200	-0.3380	+/-0.50	
Perylene-d12	390132	16.501	337266	17.137	116	50 - 200	-0.6360	+/-0.50	*
LCS Dup (3E20021-BSD2)			Lab File ID: E20021L2.D			Analyzed: 05/21/13 14:24			
Phenanthrene-d10	340775	10.207	321039	10.545	106	50 - 200	-0.3380	+/-0.50	
Perylene-d12	404046	16.501	337266	17.137	120	50 - 200	-0.6360	+/-0.50	*
VEP4-GW07-0513 (1305193-03)			Lab File ID: 0519303.D			Analyzed: 05/21/13 20:47			
Phenanthrene-d10	299197	10.202	321039	10.545	93	50 - 200	-0.3430	+/-0.50	
Perylene-d12	358794	16.496	337266	17.137	106	50 - 200	-0.6410	+/-0.50	*

ISTD not associated w/ target compd - no qual

071

YES NO N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

Initial Calibration Date: 5/1/2013
RRF and %RSD Calculations:

Compound Name: 1,4-dioxane
Lab Value: 0.130

Area of Compound	394986
Area of Internal STD	243500
Conc. of Internal STD	4
Conc. of Compound	50
Calculated RRF	0.130

Compound Name: 1,4-dioxane
Lab Value: 13.4

RRF of STD 1	0.185
RRF of STD 2	0.1450523
RRF of STD 3	0.1304524
RRF of STD 4	0.1265765
RRF of STD 5	0.133586
RRF of STD 6	0.1360939
RRF of STD 7	0.1351959
RRF of STD 8	0.1297695
Calculated % RSD	13.4

Continuing Calibration File ID: 6/7/2013
RRF and %D Calculations:

Compound Name: 1,4-dioxane
Lab Value: 0.151

Area of Compound	131237
Area of Internal STD	346723
Conc. of Internal STD	4
Conc. of Compound	10
Calculated RRF	0.151

Compound Name: 1,4-dioxane
Lab Value: 8.000

Average RRF	0.140
Calibration Check RRF	0.1514027
Calculated % D	-8.0

DataQual
Environmental Services, LLC

CH2M HILL-VBO
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

December 11, 2013
SDG# 1305237, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1305237. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24 and 8270D-Rev 4, August 2008-SOP #HW-22,), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA	SVOA
VEP4-GW08-0513	1305237-01	water	X	X
VEP4-GW08P-0513	1305237-02	water	X	X
VEP4-EB01-052013-GW	1305237-03	water	X	X
VEP4-GW10-0513	1305237-05	water	X	X
VEP4-EB01-052113-GW	1305237-06	water	X	X
VEP4-TB01-052113	1305237-07	water	X	

The following quality control samples were provided with this SDG: sample VEP4-GW08P-0513 –field duplicate of sample VEP4-GW08-0513; sample VEP4-EB01-052013-GW and VEP4-EB01-052113-GW - equipment blank and sample VEP4-TB01-052113- trip blank.

The samples were evaluated based on the following criteria:

- Data Completeness
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA

- Matrix Duplicate RPDs NA
- Field Duplicates *
- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

No qualifications were required to the data.

SVOA

No qualifications were required to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were required as the raw data was not printed dark enough to read in the original package. The laboratory was contacted and updated pages were submitted.

Technical Holding Times

According to chain of custody records, sampling was performed on 5/20-21/13 and samples were received at the laboratory 5/22/13. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

SVOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U not detected above the reported sample quantitation limit
J estimated value
UJ reported quantitation limit is qualified as estimated
N analyte has been tentatively identified
JN analyte has been tentatively identified, estimated value
R result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.

U* The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.

RL** The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.

J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.
Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL reporting limit
PQL practical quantitation limit
IDL instrument detection limit
MDL method detection limit
CRDL contract required detection limit
CRQL contract required quantitation limit
\+ positive result
\- non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1305237

007

ANALYSIS DATA SHEET

VEP4-GW08-0513

Laboratory: Empirical Laboratories, LLC SDG: 1305237
Client: CH2M Hill, Inc. Project: Vieques East SWMU 20
Matrix: Water Laboratory ID: 1305237-01 File ID: 0523701.D
Sampled: 05/20/13 12:55 Prepared: 05/28/13 17:28 Analyzed: 05/28/13 17:28
Solids: Preparation: 5030B Dilution: 1
Batch: 3E28009 Sequence: 3E14901 Calibration: 3140001 Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene	**0.380**	0.250	0.500	1.00	J
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene	**2.44**	0.100	0.200	0.500	
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	32.60	109	75 - 120	
Dibromofluoromethane	30.00	30.68	102	85 - 115	
1,2-Dichloroethane-d4	30.00	30.10	100	70 - 120	
Toluene-d8	30.00	29.70	99.0	85 - 120	

WM 112513

ANALYSIS DATA SHEET

VEP4-GW08P-0513

Laboratory: Empirical Laboratories, LLC SDG: 1305237
Client: CH2M Hill, Inc. Project: Vieques East SWMU 20
Matrix: Water Laboratory ID: 1305237-02 File ID: 0523702.D
Sampled: 05/20/13 13:00 Prepared: 05/28/13 17:56 Analyzed: 05/28/13 17:56
Solids: Preparation: 5030B Dilution: 1
Batch: 3E28009 Sequence: 3E14901 Calibration: 3140001 Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene	**0.440**	0.250	0.500	1.00	J
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene	**2.31**	0.100	0.200	0.500	
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	31.55	105	75 - 120	
Dibromofluoromethane	30.00	32.09	107	85 - 115	
1,2-Dichloroethane-d4	30.00	30.02	100	70 - 120	
Toluene-d8	30.00	30.17	101	85 - 120	

WM 112513

ANALYSIS DATA SHEET

VEP4-EB01-052013-GW

Laboratory: Empirical Laboratories, LLC SDG: 1305237
Client: CH2M Hill, Inc. Project: Vieques East SWMU 20
Matrix: Water Laboratory ID: 1305237-03 File ID: 0523703.D
Sampled: 05/20/13 14:30 Prepared: 05/28/13 18:24 Analyzed: 05/28/13 18:24
Solids: Preparation: 5030B Dilution: 1
Batch: 3E28009 Sequence: 3E14901 Calibration: 3140001 Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	31.06	104	75 - 120	
Dibromofluoromethane	30.00	31.03	103	85 - 115	
1,2-Dichloroethane-d4	30.00	28.77	95.9	70 - 120	
Toluene-d8	30.00	29.32	97.7	85 - 120	

WM 112513

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ANALYSIS DATA SHEET

VEP4-GW10-0513

Laboratory:	Empirical Laboratories, LLC		SDG:	1305237	
Client:	CH2M Hill, Inc.		Project:	Vinyard East SWMU 20	
Matrix:	Water	Laboratory ID:	1305237-05	File ID:	0521705.D
Sampled:	05/21/13 10:15	Prepared:	05/28/13 18:52	Analyzed:	05/28/13 18:52
Solids:		Preparation:	5030B	Dilution:	1
Batch:	3E28009	Sequence: 3E14901	Calibration:	3140001	Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene	**0.510**	0.250	0.500	1.00	J
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene	**6.71**	0.100	0.200	0.500	
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.77	103	75 - 120	
Dibromofluoromethane	30.00	31.33	104	85 - 115	
1,2-Dichloroethane-d4	30.00	29.76	99.2	70 - 120	
Toluene-d8	30.00	30.27	101	85 - 120	

WM 11/2/13

01

ANALYSIS DATA SHEET

VEP4-EB01-052113-GW

Laboratory:	Empirical Laboratories, LLC		SDG:	1305237	
Client:	CH2M Hill, Inc.		Project:	Vinyard East SWMU 20	
Matrix:	Water	Laboratory ID:	1305237-06	File ID:	0521706.D
Sampled:	05/21/13 11:30	Prepared:	05/28/13 12:19	Analyzed:	05/28/13 12:19
Solids:		Preparation:	5030B	Dilution:	1
Batch:	3E28009	Sequence: 3E14901	Calibration:	3140001	Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	31.89	106	75 - 120	
Dibromofluoromethane	30.00	30.92	103	85 - 115	
1,2-Dichloroethane-d4	30.00	31.41	105	70 - 120	
Toluene-d8	30.00	31.70	106	85 - 120	

WM 11/2/13

013

ANALYSIS DATA SHEET

VEP4-TB01-052113

Laboratory:	Empirical Laboratories, LLC		SDG:	1305237	
Client:	CH2M Hill, Inc.		Project:	Vinyard East SWMU 20	
Matrix:	Water	Laboratory ID:	1305237-07	File ID:	0523707.D
Sampled:	05/21/13 11:35	Prepared:	05/28/13 12:47	Analyzed:	05/28/13 12:47
Solids:		Preparation:	5030B	Dilution:	1
Batch:	3E28009	Sequence: 3E14901	Calibration:	3140001	Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	32.09	107	75 - 120	
Dibromofluoromethane	30.00	31.31	104	85 - 115	
1,2-Dichloroethane-d4	30.00	31.60	105	70 - 120	
Toluene-d8	30.00	31.00	103	85 - 120	

WM 11/2/13

01

ANALYSIS DATA SHEET

VEP4-GW08-0513

Laboratory: Empirical Laboratories, LLC | SDG: 1305237
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1305237-01 | File ID: 0523701.D
Sampled: 05/20/13 12:55 | Prepared: 05/22/13 12:03 | Analyzed: 05/23/13 22:21
Solids: | Preparation: EXT_3510 | Dilution: 1
Batch: 1E22014 | Sequence: 3E14405 | Calibration: 3122001 | Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.248	0.495	0.990	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	49.50	42.04	84.9	50 - 110	
Terphenyl-d14	49.50	36.32	73.4	50 - 135	
2,4,6-Tribromophenol	99.01	71.66	72.4	40 - 125	

WM 11/25/13

015

ANALYSIS DATA SHEET

VEP4-GW08P-0513

Laboratory: Empirical Laboratories, LLC | SDG: 1305237
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1305237-02 | File ID: 0523702.D
Sampled: 05/20/13 13:00 | Prepared: 05/22/13 12:03 | Analyzed: 05/23/13 22:48
Solids: | Preparation: EXT_3510 | Dilution: 1
Batch: 1E22014 | Sequence: 3E14405 | Calibration: 3122001 | Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.240	0.481	0.962	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	48.08	41.81	87.0	50 - 110	
Terphenyl-d14	48.08	37.55	78.1	50 - 135	
2,4,6-Tribromophenol	96.15	60.22	62.6	40 - 125	

WM 11/25/13

015

ANALYSIS DATA SHEET

VEP4-EB01-052013-GW

Laboratory: Empirical Laboratories, LLC | SDG: 1305237
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1305237-03 | File ID: 0523703.D
Sampled: 05/20/13 14:30 | Prepared: 05/22/13 12:03 | Analyzed: 05/23/13 23:15
Solids: | Preparation: EXT_3510 | Dilution: 1
Batch: 1E22014 | Sequence: 3E14405 | Calibration: 3122001 | Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.250	0.500	1.00	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	50.00	29.51	59.0	50 - 110	
Terphenyl-d14	50.00	36.86	73.7	50 - 135	
2,4,6-Tribromophenol	100.0	75.03	75.0	40 - 125	

WM 11/25/13

017

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ANALYSIS DATA SHEET

VEP4-GW10-0513

Laboratory:	Empirical Laboratories, LLC		SDG:	1305237	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1305237-05	File ID:	0523705.D
Sampled:	05/21/13 10:15	Prepared:	05/23/13 12:03	Analyzed:	05/24/13 00:09
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3E22014	Sequence:	3E14405	Calibration:	3122001
				Instrument:	MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.250	0.500	1.00	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	50.00	34.83	69.7	50 - 110	
Terphenyl-d14	50.00	36.41	72.8	50 - 135	
2,4,6-Tribromophenol	100.0	60.12	60.1	40 - 125	

1/24/13

018

ANALYSIS DATA SHEET

VEP4-EB01-052113-GW

Laboratory:	Empirical Laboratories, LLC		SDG:	1305237	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1305237-06	File ID:	0523706.D
Sampled:	05/21/13 11:30	Prepared:	05/22/13 12:03	Analyzed:	05/24/13 00:36
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3E22014	Sequence:	3E14405	Calibration:	3122001
				Instrument:	MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.236	0.472	0.943	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	47.17	34.17	72.4	50 - 110	
Terphenyl-d14	47.17	37.66	79.8	50 - 135	
2,4,6-Tribromophenol	94.34	80.55	85.3	40 - 125	

1/24/13

020

EMPIRICAL
621 Mainstream Dr.
Suite 270
Nashville, TN 37228

phone: 615-345-1115

1305237

ELECTRONIC CHAIN OF CUSTODY RECORD

C.O.C. 20130521-GW-EMP-01

Report to: (PLEASE PRINT)
Company Name: CH2MHILL
Address: 15010 Conference Dr. ; 200
Chantilly, VA 20151
Phone: 703.376.5301
Fax: 703.376.5801
Attn: Mike Zamboni

Invoice to: (PLEASE PRINT)
Company Name: See Contact
Address: P.O. 943380
Phone:
Fax:
Attn:

Project Name/Number: (SWMU 20 MW Installation and GW sampling)
Purchase Order Number: 943380
Sampler (Print): not required
Sampler (Signature): not required

Date Shipped: 5/21/13
Carrier: FedEx
Waybill No.: 7998100133637
Comments: 7998 1021 7719

Sample Identification	Location	Date Collected	Time Collected	Time Zone	No. of Containers	Matrix: Aq	Sed.	Soil	GW	Analysis Requested/Method Number											
VEP4-GW08-0513	7-day	5/20/13	14:55	AT	5				✓	X	X			- 01							
VEP4-GW08F-0513	7-day	5/20/13	13:00	AT	5				✓	X	X			- 02							
VEP4-EB01-052013-GW	STD	5/20/13	19:30	AT	5	✓			X	X	X			- 03							(AQ)
VEP4-GW18-052113	NEXT-DAY	5/21/13	07:25	AT	5				✓	X	X			- 04							
VEP4-GW10-0513	7-day	5/20/13	10:15	AT	5				✓	X	X			- 05							
VEP4-EB01-052113-GW	STD	5/21/13	11:30	AT	5	✓				X	X			- 06							
VEP4-TB01-052113	STD	5/21/13	11:35	AT	2	✓				X				- 07							

Shuttle Temperature:
Temperature Requested: Check one: ☐ Standard Week ☐ One week ☐ 24/48 hr ☐ Other
Sample Disposal: ☐ Return to client ☐ Disposal by Lab (30 day retainer) not applicable

Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received by:
	5/21/13	12:05					
Relinquished by:	Date	Time	Received by:	Relinquished by:	Date	Time	Received at lab by: 5/22/13 0835

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

Note: The first sampled date of the ARF will be used as the COC number unless indicated otherwise.

021

1305237 Summ Package

EMPIRICAL LABORATORIES COOLER RECEIPT FORM

Cooler Received/Opened On: 05/22/13 @ 835 Workorder# 1305237

1. Tracking # 7719 (last 4 digits, FedEx)
   Courier: FEDEX
2. Temperature of rep. sample or temp blank when opened: 1.4 °C + correction factor (-0.1) = 1.3 °C
3. If item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA
4. Were custody seals on outside of cooler? YES NO NA
   If yes, how many and where: 2 - FRONT & BACK
5. Were the seals intact, signed, and dated correctly? YES NO NA
6. Were custody papers inside cooler? YES NO NA

I certify that I opened the cooler and answered questions 1-6 (initial) [illegible]

7. Were custody seals on containers: YES NO and intact YES NO NA
   Were these signed and dated correctly? YES NO NA
8. Packing material used? Bubblewrap Plastic bag Peanuts Vermiculite Foam insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry Ice Other None
10. Did all containers arrive in good condition (unbroken)? YES NO NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES NO NA
12. Did all container labels and tags agree with custody papers? YES NO NA
13. a. Were VOA vials received? YES NO NA
    b. Was there any observable headspace present in any VOA vial? YES NO NA
14. Was there a Trip Blank in this cooler? YES NO NA If multiple coolers, sequence # ____

I certify that I unloaded the cooler and answered questions 7-14 (initial) [illegible]

15. a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES NO NA
    b. Did the bottle labels indicate that the correct preservatives were used YES NO NA
16. Was residual chlorine present? YES NO NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial) [illegible]

17. Were custody papers properly filled out (ink, signed, etc)? YES NO NA
18. Did you sign the custody papers in the appropriate place? YES NO NA
19. Were correct containers used for the analysis requested? YES NO NA
20. Was sufficient amount of sample sent in each container? YES NO NA

I certify that I entered this project into LIMS and answered questions 17-20 (initial) [illegible]

I certify that I attached a label with the unique LIMS number to each container (initial) [illegible]

I certify that I have performed a second check of the LIMS information against the COC to confirm accuracy (initial) [illegible]

21. Were there Non-Conformance issues at login? YES NO Was a NCR generated? YES NO #____

Additional Details:

I:\Documents and Settings\bwright\Desktop\New CRF.doc1.doc Page 1 of 1

022

Sample Delivery Group Case Narrative

Receipt Information
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Changes to the Revision
Revision 01: The package was revised to replace the raw data that was not dark enough to be read in the original package.

Analytical Information
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:
The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

023

SW8260B:
No anomalies or deviations are noted.

SW8270D BNA:
Note – While the Perylene-d12 internal standard shifted outside +/-0.5min from the initial calibration in 3E14405-CCV1, 3E22014-BLK2, -BS2,, 1305237-01, -02, -03, -04, -05, and -06, it is identified by the mass spectrum. This minimal shift would have no impact on the reported results.

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

024

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 1305237 LAB: Empirical

SITE NAME: Vieques Summer 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. **VOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓ ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓ ___ ___

1.3 Sample Conditions/Problems

- 6 VOA -

025

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

A 5/20-21/13 A 5/22-28
N 5/22 A 132

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ ✓ ___

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

- 7 VOA -

025

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water ☑ ___ ___

b. Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water ☑ ___ ___

b. Soil [ ] ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. [ ] ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ ☑

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] ☑ ___

If yes, were samples reanalyzed? [ ] ___ ☑

Were method blanks reanalyzed? [ ] ___ ☑

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] ☑ ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. ☑ ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water ☑ ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). ☑ ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? ☑ ___ ___

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] ☑ ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent)

No MS/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] ___ ✓

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] ___ ✓

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month (page 8000C, section 9.5.1)

a. Water [ ] ___ ✓

b. Waste [ ] ___ ✓

c. Soil/Solid [ ] ___ ✓

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [ ] ___ ✓

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ ✓

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? [✓] ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? [✓] ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? [✓] ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ⊗ all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? [✓] ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. [ ] ___ ✓

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate [✓] __ __

b. Matrix spikes and matrix spike duplicates [ ] __ [✓]

c. Blanks [✓] __ __

d. Laboratory Control Samples [✓] __ __

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate [✓] __ __

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) [ ] __ [✓]

c. Blanks [✓] __ __

d. Laboratory Control Samples [✓] __ __

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? [✓] __ __

YES NO N/A

Resolution? [✓] __ __

Peak shape? [✓] __ __

Full-scale graph (attenuation)? [✓] __ __

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? [✓] __ __

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] __ __

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] __ __

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] __ __

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [✓] __ __

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [✓] __ __

b. Blanks [✓] __ __

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] __ [✓]

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] __ __

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] __ [✓]

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2 (M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [✓] __ __

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ ✓

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39) qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? [✓] ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. [✓] ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) [ ] ✓ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? [✓] ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? [✓] ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). [ ] ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? NA ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds in section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? NA ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION: 1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.

2. Do not qualify non-detects when the associated IS are counts area > + 100%.

3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".

4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? NA ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? NA ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

VEP4-GW08-0513
VEP4-GW08P-0513
> see attached form, no qual

DataQual

VOA

FIELD DUPLICATE SAMPLE SUMMARY

Sample ID: VEP4-GW08-0513
Duplicate Sample ID: VEP4-GW08P-0513

Water: RPD>25%
Soil: RPD>30%

Compound	Sample Conc.	Dup. Sample Conc.	%RPD
trichloroethene	2.44	2.31	5
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
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			#DIV/0!
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			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!

COMMENTS: No qualifications

* one of the results below the LOD
if both results are below the LOD the results are not compared

YES NO N/A

E - The concentration of this analyte exceeds the calibration range of the instrument.

A - Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 1305237 LAB: Empirical

SITE NAME: Vieques Summer

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format? ☑ ___ ___

ACTION: If not, note the effect on review of the data in the data assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative or cover letter present? ☑ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ☑ ___ ___

YES NO N/A

II. SEMIVOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? ☑ ___ ___

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ☑ ___

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, all non-detects data are qualified as unusable (R), and detects are flagged "J".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (10°C), flag all positive results "J" and all non-detects "UJ". 5/20-21/13 5/22 5/22 5/23-24

2.0 Holding Times

2.1 Have any semivolatile technical holding times, determined from date of collection to date of extraction, been exceeded? ___ ☑ ___

Continuous extraction of water samples for semivolatile analysis must be started within 7 days of the date of collection. Soil/sediment samples must be extracted within 14 days of collection. Extracts must be analyzed within

YES NO N/A

40 days of the date of extraction.

Table of Holding Time Violations

(See Traffic Report)

Sample ID	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted	Date Analyzed

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

YES NO N/A

3.0 Surrogate Recovery (Form II/Equivalent)

3.1 Have the semi volatile surrogate recoveries been listed on CLP Surrogate Recovery forms (Form II) for each of the following matrices:

a. Low Water ☑ ___ ___

b. Low/Med Soil ☐ ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery Summary forms for each matrix:

a. Low Water ☑ ___ ___

b. Low/Med Soil ☐ ___ ___

ACTION: If CLP deliverables are unavailable, document the effect(s) in data assessments. In some cases the lab may have to be contacted to obtain the data necessary to complete the validation.

3.3 Were outliers marked correctly with an asterisk? ☐ ___ ☑

ACTION: Circle all outliers in red.

3.4 Were two or more base neutral OR acid surrogate recoveries out of specification for any sample or method blank (Reviewer should use lab in house recovery limits. Use surrogate recovery limits from USEPA National Functional Guidlines January 2005 page 130, if in house limits are not available. See Method 8000B-43 or 8000C-24). ☐ ☑ ___

Note: Examine lab in house limits for reasonableness.

If yes, were samples re-analyzed? ☐ ___ ☑

YES NO N/A

Were method blanks re-analyzed? [ ] ___ ✓

ACTION: If all surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet method specifications, for the affected fraction only (i.e. either base-neutral or acid compounds):

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Positive results for the fraction with < 10% surrogate recovery are qualified with "J".
2. Non-detects for that fraction should be qualified as unusable (R) .

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ [✓] ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document

YES NO N/A

effect in data assessments.

4.0 Matrix Spikes (Form III/Equivalent)

No MS/MSD

4.1 Have the semivolatile Matrix Spike and Matrix Spike Duplicate/or duplicate unspiked Sample recoveries been listed on the Recovery Form (Form III)? [ ] ___ ✓

NOTE: Method 3500B/page 4 states the spiking compounds:

Base/neutrals	Acids
1,2,4-Trichlorobenzene	Pentachlorophenol
Acenaphthene	Phenol
2,4-Dinitrotoluene	2-Chlorophenol
Pyrene	4-Chloro-3-methylphenol
N-Nitroso-di-n-propylamine	4-Nitrophenol
1,4-Dichlorobenzene	

Note: Some projects may require the spiking of specific compounds of interest.

Note: See Method 8270D-sec 8.4.2 for deciding on whether to prepare and analyze duplicate samples or a martix spike/matrix spike duplicate. If samples are expected to contain target analytes, then laboratory may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratory should use a matrix spike and matrix spike duplicate pair.

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water [ ] ___ ✓
b. Low Solid [ ] ___ ✓
c. Med Solid [ ] ___ ✓

YES NO N/A

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. It may be necessary to contact the lab to obtain the required data.

NOTE: If the data has not been reported on CLP equivalent form, then the laboratory must provide the information necessary to evaluate the spike recoveries in the MS and MSD. The required data which should have been provided by the lab include the analytes and concentrations used for spiking, background concentrations of the spiked analytes (i.e., concentrations in unspiked sample), methods and equations used to calculate the QC acceptance criteria for the spiked analytes, percent recovery data for all spiked analytes.

The data reviewer must verify that all reported equations and percent recoveries are correct before proceeding to the next section.

4.3 Were matrix spikes performed at concentration equal to 100ug/L for acid compounds, and 200ug/l for base compounds (Method 3500B-4), or those specified in project plan. [ ] ___ ✓

4.4 How many semivolatile spike recoveries are outside Laboratory in house MS/MSD recovery limits (use recovery limits values in Method 8270D-43&44 Table 6 if in house values not available).

Water ____ out of ____

Solids ____ out of ____

YES NO N/A

4.5 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water ____ out of ____

Solids ____ out of ____

ACTION: Circle all outliers with red pencil.

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria to determine the need for some qualification of the data.

4.6 Was a Laboratory Control Sample (LCS) analyzed with each analytical batch? [✓] ___ ___

NOTE: When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

5.0 Blanks (Form IV/Equivalent)

5.1 Is the Method Blank Summary (Form IV) present? [✓] ___ ___

5.2 Frequency of Analysis:

Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? [✓] ___ ___

5.3 Has a method blank been analyzed either after

YES NO N/A

the calibration standard or at any other time during the analytical shift for each GC/MS system used ? ✓ ___ ___

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, use professional judgement to determine if the associated sample data should be qualified.

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for the semivolatiles? ✓ ___ ___

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ✓ ___

6.2 Do any field/rinse/ blanks have positive results for target analytes and/or TICs (if required, see section 10 below)? ___ ✓ ___

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field Blanks must be qualified for outlying surrogates, poor spectra, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify sample results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

YES NO N/A

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

NOTE: If the laboratory did not report TIC analyses, check the project plans to verify whether or not it was required.

6.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

6.4 Was a instrument blank analyzed after each sample/dilution which contained a target compound

YES NO N/A

that exceeded the initial calibration range. ___ ___ ✓

6.5 Does the instrument blank have positive results for target analytes and/or TICs? ___ ✓ ___

Note: Use professional judgement to determine if carryover occurred and qualify analytes accordingly.

7.0 GC/MS Apparatus and Materials

7.1 Did the lab use the proper gas chromatographic column for analysis of semivolatiles by Method 8270D? Check raw data, instrument logs or contact the lab to determine what type of column was used. The method requires the use of 30 m x 0.25 mm ID (or 0.32 mm ID), silicone-coated, fused silica, capillary column. ✓ ___ ___

ACTION: If the specified column, or equivalent, was not used, document the effects in the data assessment. Use professional judgement to determine the acceptability of the data.

8.0 GC/MS Instrument Performance Check (Form V/Equivalent)

8.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)? ✓ ___ ___

NOTE: The performance solution should also contain 4,4-DDT, pentachlorophenol, and benzidine to verify injection port inertness and column performance. The degradation of DDT to DDE and DDD must be less than 20% total and the response of pentachlorophenol and benzidine should be within normal ranges for these compounds (based upon lab experience) and show no peak degradation or tailing before samples are analyzed. (see section 5.5

YES NO N/A

page 8270D-12).

8.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? ☑ ___ ___

8.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument? ☑ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

8.4 Have the ion abundances been normalized to m/z 198? ☑ ___ ___

8.5 Have the ion abundance criteria been met for each instrument used? ☑ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

YES NO N/A

ACTION: If ion abundance criteria are not met, take action specified in section 3.2

8.6 Are there any transcription/calculation errors between mass lists and Form Va? (Check at least two values but if errors are found, check more.) ___ ☑ ___

8.7 Have the appropriate number of significant figures (two) been reported? ☑ ___ ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.

8.8 Are the spectra of the mass calibration compound acceptable? ☑ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

9.0 Target Analytes

9.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ☑ ___ ___

b. Matrix spikes and matrix spike duplicates ☐ ___ ☑

c. Blanks ☑ ___ ___

9.2 Has any special cleanup, such as GPC, been performed on all soil/sediment sample extracts (see section 7.2, page 8270D-14)? ☐ ___ ☑

YES NO N/A

ACTION: If data suggests that extract cleanup was not performed, use professional judgement. Make note in the data assessment narrative.

9.3 Are the Reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ☑ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ☐ ___ ☑

c. Blanks ☑ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

9.4 Are the response factors shown in the Quant Report? ☑ ___ ___

9.5 Is chromatographic performance acceptable with respect to:

Baseline stability? ☑ ___ ___

Resolution? ☑ ___ ___

Peak shape? ☑ ___ ___

Full-scale graph (attenuation)? ☑ ___ ___

Other:_____ ☐ ___ ___

ACTION: Use professional judgement to determine the acceptability of the data.

9.6 Are the lab-generated standard mass spectra of identified semivolatile compounds present for

YES NO N/A

each sample? ☑ ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the data assessment narrative. If spectra are missing, reject all positive data.

9.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? ☑ ___ ___

9.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ☑ ___ ___

9.9 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ☑ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 9.7, 9.8, and 9.9.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

YES NO N/A

10.0 Tentatively Identified Compounds (TIC)

10.1 If Tentatively Identified Compounds were required for this project, are all Form Is, Part B present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier?

NOTE: Review sampling reports to determine if the lab was required to identify non target analytes (refer to section 7.6.2,page 8270D-21).

10.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate

b. Blanks

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by CAS #.

10.3 Are any target compounds from one fraction listed as TIC compounds in another (e.g., an acid compound listed as a base neutral TIC)?

ACTION: i. Flag with "R" any target compound listed as a TIC.

ii. Make sure all rejected compounds are properly reported in the other fraction.

10.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the

YES NO N/A

sample mass spectrum?

10.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%?

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate and remove "JN". Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R."

11.0 Compound Quantitation and Reported Detection Limits

11.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found?

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

11.2 Are the method detection limits adjusted to reflect sample dilutions and, for soils, sample moisture?

YES NO N/A

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I (if present) and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red " X" across the entire page of all Form I's that should not be used, including any in the summary package.

12.0 Standards Data (GC/MS)

12.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration?

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

13.0 GC/MS Initial Calibration (Form VI/Equivalent)

13.1 Is the Initial Calibration Form (Form VI/ Equivalent) present and complete for the semivolatile fraction?

ACTION: If any calibration forms or standard row data are missing, take action specified in 3.2 above.

13.2 Are all base neutral or acid RRFs > 0.050?

YES NO N/A

Check the **average RRFs** of the four System Performance Check Compounds (SPCCs): N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. These compounds must have **average RRFs** greater than or equal to 0.05 before running samples and should not show any peak tailing.

ACTION: Circle all outliers in red.

ACTION: For any target analyte with **average RRF <0.05**

1. "R" all non-detects;

2. "J" all positive results.

13.3 Are response factors for base neutral or acid target analytes stable over the concentration range of the calibration (% Relative standard deviation [%RSD] < 20.0%)?

NOTE: The % RSD for each individual Calibration Check Compound (CCC, Method 8270D-40 see Table 4) must be less than 30% before analysis can begin. If grater 30%, the lab must clean and recalibrate the instrument.

CALIBRATION CHECK COMPOUNDS

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol

YES NO N/A

Benzo(a)pyrene

ACTION: If the %RSD for any CCC >30% and no corrective action taken, then "J" qualify all positive hits and "UJ" qualify all non-detects.

ACTION: Circle all outliers in red.

ACTION: If the % RSD is ≥ 20.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non- detect results for that analyte "R," unusable. Alternatively, the lab should calculate first or second order regression fit of the calibration curve and select the fit which introduces the least amount of error.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

13.4 Did the laboratory calculate the calibration curve by the least squares regression fit? ___ ☑ ___

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) ___ ☑ ___

ACTION: Circle Errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

13.5 Do the target compounds for this SDG include Pesticides? ☐ ☑ ___

YES NO N/A

13.6 If the pesticide compounds include DDT, was the percent breakdown of DDT to DDD and DDE greater than 20%? ___ ☐ ☑

ACTION: If DDT percent breakdown exceeds 20%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE results are positive, qualify the quantitation limit for DDT as unusable, "R".

ii. Qualify all positive results for DDD and DDE as presumptively present at an approximate concentration "JN".

14.0 GC/MS Calibration Verification (Form VII/Equivalent)

14.1 Are the Calibration Verification Forms (Form VII) present and complete for all compounds of interest? ☑ ___ ___

14.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ☑ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

ACTION: If any forms are missing or no calibration verification standard has been analyzed within twelve hours of every sample analysis.

YES NO N/A

call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

14.3 Do any of the SPCCs have an RRF <0.05? ___ ☑ ___

If YES, make a note in data assessment if the lab did not take corrective action specified in section 7.4.4, page 8270D-18. ☐ ☑ ___

14.4 Do any of the CCCs have a %D between the initial and continuing RRF which exceeds 20.0%?

ACTION: If yes, make a note in data assessment.

14.5 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds 20.0%? ___ ☑ ___

ACTION: Circle all outliers in red.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is above 90%, qualify all non-detects for that analyte as "R", unusable.

14.6 Do any semivolatile compounds have a RRF < 0.05? ___ ☑ ___

ACTION: Circle all outliers in red.

ACTION: If RRF < 0.05, qualify as unusable ("R") associated non-detects and "J" associated positive values.

14.7 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or percent difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more). ___ ☑ ___

YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect(s) in the data assessments.

15.0 Internal Standards (Form VIII)

15.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to + 100%) for each continuing calibration? ☑ ___ ___

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area	LowerLimit	Upper Limit

(Attach additional sheets if necessary.)

Note: Check Table 5, 8270D-41 for associated analytes.

ACTION: i. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

ii. Non-detects associated with IS > 100% should not be qualified.

YES NO N/A

iii. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

15.2 Are the retention times of all internal standards within 30 seconds of the associated calibration standard? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

ISTD not assoc w/ target compd out - no qual as attached form

16.0 Laboratory Control Samples (LCS)

16.1 Were any LCS samples run in order to verify analytes which failed criteria for spike recovery? ___ ___ ✓

16.2 Did the lab spike LCS sample spiked with the same analytes and the same concentrations as the matrix spike? ___ ___ ✓

16.3 Were the mean and standard deviation of all analytes within the QC acceptance ranges as shown in Table 6, 8270D-43? ✓ ___ ___

ACTION: If the recovery of any analyte falls out of the designated range, the analytical results for that compound is suspect and should be qualified "J" in the unspiked samples.

17.0 Field Duplicates

17.1 Were any field duplicates submitted for semivolatile analysis? ✓ ___ ___

INTERNAL STANDARD AREA AND RT SUMMARY
SW8270D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Sequence: 3E14405
SDG: 1305237
Project: Vieques East SWMU 20
Instrument: MS-RNA4
Calibration: 3122601

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Calibration Check (3E14405-CCV1)			Lab File ID: SEQ-CCV1.D			Analyzed: 05/23/13 15:11			
Phenanthrene-d10	319945	10.178	321039	10.545	100	50 - 200	-0.3670	+/-0.50	
Perylene-d12	380868	16.448	337266	17.137	113	50 - 200	-0.6890	+/-0.50	*
Blank (3E22014-BLK2)			Lab File ID: E220140L1.D			Analyzed: 05/23/13 15:38			
Phenanthrene-d10	367022	10.174	321039	10.545	114	50 - 200	-0.3710	+/-0.50	
Perylene-d12	458729	16.443	337266	17.137	136	50 - 200	-0.6940	+/-0.50	*
LCS (3E22014-BS2)			Lab File ID: E220140L1.D			Analyzed: 05/23/13 16:05			
Phenanthrene-d10	416401	10.174	321039	10.545	130	50 - 200	-0.3710	+/-0.50	
Perylene-d12	494749	16.438	337266	17.137	147	50 - 200	-0.6990	+/-0.50	*
VEP4-GW08-0513 (1305237-01)			Lab File ID: 0523701.D			Analyzed: 05/23/13 22:21			
Phenanthrene-d10	443291	10.174	321039	10.545	138	50 - 200	-0.3710	+/-0.50	
Perylene-d12	525952	16.438	337266	17.137	156	50 - 200	-0.6990	+/-0.50	*
VEP4-GW08P-0513 (1305237-02)			Lab File ID: 0523702.D			Analyzed: 05/23/13 22:44			
Phenanthrene-d10	447906	10.174	321039	10.545	140	50 - 200	-0.3710	+/-0.50	
Perylene-d12	526644	16.438	337266	17.137	157	50 - 200	-0.6990	+/-0.50	*
VEP4-EB01-052013-GW (1305237-03)			Lab File ID: 0523703.D			Analyzed: 05/23/13 23:15			
Phenanthrene-d10	430259	10.174	321039	10.545	134	50 - 200	-0.3710	+/-0.50	
Perylene-d12	520371	16.443	337266	17.137	154	50 - 200	-0.6940	+/-0.50	*
VEP4-GW18-052113 (1305237-04)			Lab File ID: 0523704.D			Analyzed: 05/23/13 23:42			
Phenanthrene-d10	425845	10.174	321039	10.545	133	50 - 200	-0.3710	+/-0.50	
Perylene-d12	517762	16.443	337266	17.137	152	50 - 200	-0.6940	+/-0.50	*
VEP4-GW10-0513 (1305237-05)			Lab File ID: 0523705.D			Analyzed: 05/24/13 00:09			
Phenanthrene-d10	412381	10.173	321039	10.545	128	50 - 200	-0.3720	+/-0.50	
Perylene-d12	488227	16.443	337266	17.137	145	50 - 200	-0.6940	+/-0.50	*
VEP4-EB01-052113-GW (1305237-06)			Lab File ID: 0523706.D			Analyzed: 05/24/13 00:36			
Phenanthrene-d10	397125	10.178	321039	10.545	124	50 - 200	-0.3670	+/-0.50	
Perylene-d12	481331	16.443	337266	17.137	143	50 - 200	-0.6940	+/-0.50	*

target compd not assoc w/ ISTD

YES NO N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

VEP4-GW08-0513
VEP4-GW08P-0513 > NA @

DataQual
Environmental Services, LLC

CH2M HILL-VBO
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

December 11, 2013
SDG# 1305218, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1305218. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24 and 8270D-Rev 4, August 2008-SOP #HW-22,), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA	SVOA
VEP4-GW04-0513	1305218-01	water	X	X
VEP4-TB01-052013-GW	1305218-02	water	X	

The following quality control samples were provided with this SDG: sample VEP4-TB01-052013-GW- trip blank.

The samples were evaluated based on the following criteria:

- Data Completeness
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Field Duplicates NA
- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

No qualifications were required to the data.

SVOA

No qualifications were required to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were required as the raw data was not printed dark enough to read in the original package. The laboratory was contacted and updated pages were submitted.

Technical Holding Times

According to chain of custody records, sampling was performed on 5/20/13 and samples were received at the laboratory 5/21/13. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

SVOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.
U*	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.
RL**	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action -	The sample result is greater than the RL and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R -	Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.
J -	Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.
J/UJ -	Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.
Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action -	The sample result is greater than the RL and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.
R -	Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.
J -	Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL	reporting limit
PQL	practical quantitation limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1305218

006

ANALYSIS DATA SHEET

VEP4-GW04-0513

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Water
Sampled: 05/20/13 09:05
Solids:
Batch: 3E25001 Sequence: 3E14810

SDG: 1305218
Project: Vieques East SWMU 20
Laboratory ID: 1305218-01
Prepared: 05/25/13 14:05
Preparation: 5030B
File ID: 0521801.D
Analyzed: 05/25/13 15:05
Dilution: 1
Calibration: 3140001 Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U
Total Target Analytes Reported: 6						

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	31.35	105	75 - 120	
Dibromofluoromethane	30.00	31.92	106	85 - 115	
1,2-Dichloroethane-d4	30.00	30.48	102	70 - 120	
Toluene-d8	30.00	29.93	99.8	85 - 120	

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12/03/13

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ANALYSIS DATA SHEET

VEP4-TB01-052013-GW

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Water
Sampled: 05/20/13 12:00
Solids:
Batch: 3E25001 Sequence: 3E14810

SDG: 1305218
Project: Vieques East SWMU 20
Laboratory ID: 1305218-02
Prepared: 05/25/13 14:37
Preparation: 5030B
File ID: 0521802.D
Analyzed: 05/25/13 14:37
Dilution: 1
Calibration: 3140001 Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U
Total Target Analytes Reported: 6						

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	31.21	104	75 - 120	
Dibromofluoromethane	30.00	32.01	107	85 - 115	
1,2-Dichloroethane-d4	30.00	30.23	101	70 - 120	
Toluene-d8	30.00	30.92	103	85 - 120	

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12/03/13

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ANALYSIS DATA SHEET

VEP4-GW04-0513

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Matrix: Water
Sampled: 05/20/13 09:05
Solids:
Batch: 3E25014 Sequence: 3E14405

SDG: 1305218
Project: Vieques East SWMU 20
Laboratory ID: 1305218-01
Prepared: 05/22/13 12:07
Preparation: EXT_3510
File ID: 0521801.D
Analyzed: 05/23/13 19:14
Dilution: 1
Calibration: 3122001 Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.236	0.472	0.943	U
Total Target Analytes Reported: 1						

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	47.17	32.62	69.2	50 - 110	
Terphenyl-d14	47.17	36.09	76.4	50 - 135	
2,4,6-Tribromophenol	94.34	70.97	75.2	40 - 125	

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12/03/13

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1305218

EMPIRICAL
621 Mainstream Dr
Suite 270
Nashville, TN 37228

phone: 615-345-1115

ELECTRONIC CHAIN OF CUSTODY RECORD

C.O.C. [illegible]

Report to: PLEASE PRINT
Company Name: CH2MHILL
Phone: 703.376.5301
Address: 15010 Conference Dr. ; 200
Chantilly, VA 20151
Fax: 703.376.5801
Attn: Mike Zamboni

Invoice to: PLEASE PRINT
Company Name: See Contact
Phone:
Address:
Fax:
Attn:

Project Name/Number: [illegible]
Sampler (Print): not required
Purchase Order Number: 943380
Sampler (Signature): not required

Date Shipped: 5/20/13
Carrier: FedEx
Waybill No.: [illegible]

Sample Identification	Location	Date Collected	Time Collected	Time Zone	No. of Containers	Matrix	Analysis Requested	Comments
VEP4-GW04-0513		5/20/13	09:05	AST	5	GW ✓	x x — 01	7 day TAT
VEP4-TB01-052013-GW		5/20/13	12:00	AST	2	✓	x — 02	trip blank

Sample Disposal: not applicable

Relinquished by sampler: [signature] Date: 5/20/13 Time: 1205
Received by laboratory: [signature] 5/21/13 0820

White: Return to client with report   Yellow: Laboratory Copy   Pink: Sampler

Note: The first sampled date of the ARF will be used as the COC number unless indicated otherwise.

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011

EMPIRICAL LABORATORIES
COOLER RECEIPT FORM

Cooler Received/Opened On: 05/21/13 @ 0820   Workorder# 1305218

1. Tracking # 8199 (last 4 digits, FedEx)
   Courier: FEDEX
2. Temperature of rep. sample or temp blank when opened: 1.3 °C + correction factor (-0.1) = 1.2 °C
3. If item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO **NA**
4. Were custody seals on outside of cooler? **YES** NO NA
   If yes, how many and where: 2 on front & back
5. Were the seals intact, signed, and dated correctly? **YES** NO NA
6. Were custody papers inside cooler? **YES** NO NA

I certify that I opened the cooler and answered questions 1-6 (initial) JG

7. Were custody seals on containers: YES **NO** and intact YES NO **NA**
   Were these signed and dated correctly? YES NO **NA**
8. Packing material used? **Bubblewrap** **Plastic bag** Peanuts Vermiculite Foam Insert Paper Other None
9. Cooling process: **Ice** Ice-pack Ice (direct contact) Dry ice Other None
10. Did all containers arrive in good condition (unbroken)? **YES** NO NA
11. Were all container labels complete (#, date, signed, pres., etc)? **YES** NO NA
12. Did all container labels and tags agree with custody papers? **YES** NO NA
13. a. Were VOA vials received? **YES** NO NA
    b. Was there any observable headspace present in any VOA vial? YES **NO** NA
14. Was there a Trip Blank in this cooler? YES **NO** NA   If multiple coolers, sequence # ___

I certify that I unloaded the cooler and answered questions 7-14 (initial) [initials]

15. a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES NO **NA**
    b. Did the bottle labels indicate that the correct preservatives were used **YES** NO NA
16. Was residual chlorine present? YES NO **NA**

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial) [initials]

17. Were custody papers properly filled out (ink, signed, etc)? **YES** NO NA
18. Did you sign the custody papers in the appropriate place? **YES** NO NA
19. Were correct containers used for the analysis requested? **YES** NO NA
20. Was sufficient amount of sample sent in each container? **YES** NO NA

I certify that I entered this project into LIMS and answered questions 17-20 (initial) [initials]

I certify that I attached a label with the unique LIMS number to each container (initial) [initials]

I certify that I have performed a second check of the LIMS information against the COC to confirm accuracy (initial)

21. Were there Non-Conformance issues at login? YES **NO**   Was a NCR generated? YES **NO** #____

Additional Details:

1305218 Summ Package

011

Sample Delivery Group Case Narrative

Receipt Information

The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Changes to the Revision

Revision 01: The package was revised to replace the raw data that was not dark enough to be read in the original package.

Analytical Information

All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:

The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

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SW8260B:
No anomalies or deviations are noted.

SW8270D BNA:
Note – While the Perylene-d12 internal standard shifted outside +/-0.5min from the initial calibration in 3E14405-CCV1, 3E22014-BLK2, -BS2,, 1305218-01, it is identified by the mass spectrum. This minimal shift would have no impact on the reported results.

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

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YES NO N/A

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 1305218 LAB: Empirical

SITE NAME: Vieques SWMU 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. **VOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓ ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓ ___ ___

1.3 Sample Conditions/Problems

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ ✓ ___

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water ✓ ___ ___

b. Soil ___ ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water ✓ ___ ___

b. Soil ___ ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. lab ✓ ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? ___ ___ ✓

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. ___ ✓ ___

If yes, Were samples reanalyzed? ___ ___ ✓

Were method blanks reanalyzed? ___ ___ ✓

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] [✓] ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ [✓]

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] [✓] ___

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YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent) No MS/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] ___ [✓]

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] ___ [✓]

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

020

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month (page 8000C, section 9.5.1)

a. Water [ ] ___ [✓]

b. Waste [ ] ___ [✓]

c. Soil/Solid [ ] ___ [✓]

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [ ] ___ [✓]

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ ___

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

021

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgment deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? ☑ ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? ☑ ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? ☑ ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? ☑ ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ☑ ___ ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ☑ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

VEP4-TB01-052013-EW MeCl
* VEP4-EB01-052013-EW MeCl

* in SDG# 1305297

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone
** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates [ ] ___ ✓

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) [ ] ___ ✓

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? ✓ ___ ___

YES NO N/A

Resolution? ✓ ___ ___

Peak shape? ✓ ___ ___

Full-scale graph (attenuation)? [ ] ___ ___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? ✓ ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? ✓ ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ✓ ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ✓ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ ✓

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ ✓

b. Blanks [ ] ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ ✓

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ ✓

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] ✓ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ ✓

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39)qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? [✓] ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. [✓] ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) ___ ✓ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? ✓ ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). ___ ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? ✓ ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:
1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.
2. Do not qualify non-detects when the associated IS are counts area > + 100%.
3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".
4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ___ ✓ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

YES NO N/A

E - The concentration of this analyte exceeds the calibration range of the instrument.

A - Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 1305218 LAB: Empirical

SITE NAME: Vieques Sonnuzo

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the data assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative or cover letter present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

YES NO N/A

II. SEMIVOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? ✓ ___ ___

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, all non-detects data are qualified as unusable (R), and detects are flagged "J".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (10°C), flag all positive results "J" and all non-detects "UJ". t 1.2°C

a 5/20/13 e 5/22
b 5/21 a 5/23

2.0 Holding Times

2.1 Have any semivolatile technical holding times, determined from date of collection to date of extraction, been exceeded? ___ ✓ ___

Continuous extraction of water samples for semivolatile analysis must be started within 7 days of the date of collection. Soil/sediment samples must be extracted within 14 days of collection. Extracts must be analyzed within

YES NO N/A

40 days of the date of extraction.

Table of Holding Time Violations

(See Traffic Report)

Sample ID	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted	Date Analyzed

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

YES NO N/A

3.0 Surrogate Recovery (Form II/Equivalent)

3.1 Have the semi volatile surrogate recoveries been listed on CLP Surrogate Recovery forms (Form II) for each of the following matrices:

a. Low Water [✓] ___ ___

b. Low/Med Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery Summary forms for each matrix:

a. Low Water [✓] ___ ___

b. Low/Med Soil [ ] ___ ___

ACTION: If CLP deliverables are unavailable, document the effect(s) in data assessments. In some cases the lab may have to be contacted to obtain the data necessary to complete the validation.

3.3 Were outliers marked correctly with an asterisk? [ ] ___ [✓]

ACTION: Circle all outliers in red.

3.4 Were two or more base neutral OR acid surrogate recoveries out of specification for any sample or method blank (Reviewer should use lab in house recovery limits. Use surrogate recovery limits from USEPA National Functional Guidlines January 2005 page 130, if in house limits are not available. See Method 8000B-43 or 8000C-24). [ ] [✓] ___

Note: Examine lab in house limits for reasonableness.

If yes, were samples re-analyzed? [ ] ___ [✓]

YES NO N/A

Were method blanks re-analyzed? [ ] ___ [✓]

ACTION: If all surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet method specifications, for the affected fraction only (i.e. either base-neutral or acid compounds):

1. Flag all positive results as estimated ("J").

2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.

3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Positive results for the fraction with < 10% surrogate recovery are qualified with "J".

2. Non-detects for that fraction should be qualified as unusable (R) .

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ [✓] ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document

YES NO N/A

effect in data assessments.

4.0 Matrix Spikes (Form III/Equivalent) No MS/MSD

4.1 Have the semivolatile Matrix Spike and Matrix Spike Duplicate/or duplicate unspiked Sample recoveries been listed on the Recovery Form (Form III)? [ ] ___ [✓]

NOTE: Method 3500B/page 4 states the spiking compounds:

Base/neutrals	Acids
1,2,4-Trichlorobenzene	Pentachlorophenol
Acenaphthene	Phenol
2,4-Dinitrotoluene	2-Chlorophenol
Pyrene	4-Chloro-3-methylphenol
N-Nitroso-di-n-propylamine	4-Nitrophenol
1,4-Dichlorobenzene	

Note: Some projects may require the spiking of specific compounds of interest.

Note: See Method 8270D-sec 8.4.2 for deciding on whether to prepare and analyze duplicate samples or a martix spike/matrix spike duplicate. If samples are expected to contain target analytes, then laboratory may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratory should use a matrix spike and matrix spike duplicate pair.

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water [ ] ___ [✓]

b. Low Solid [ ] ___ [✓]

c. Med Solid [ ] ___ [✓]

YES NO N/A

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. It may be necessary to contact the lab to obtain the required data.

NOTE: If the data has not been reported on CLP equivalent form, then the laboratory must provide the information necessary to evaluate the spike recoveries in the MS and MSD. The required data which should have been provided by the lab include the analytes and concentrations used for spiking, background concentrations of the spiked analytes (i.e., concentrations in unspiked sample), methods and equations used to calculate the QC acceptance criteria for the spiked analytes, percent recovery data for all spiked analytes.

The data reviewer must verify that all reported equations and percent recoveries are correct before proceeding to the next section.

4.3 Were matrix spikes performed at concentration equal to 100ug/L for acid compounds, and 200ug/l for base compounds (Method 3500B-4), or those specified in project plan. [ ] ___ [✓]

4.4 How many semivolatile spike recoveries are outside Laboratory in house MS/MSD recovery limits (use recovery limits values in Method 8270D-43&44 Table 6 if in house values not available).

Water	Solids
___ out of ___	___ out of ___

YES NO N/A

4.5 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water ____ out of ____

Solids ____ out of ____

ACTION: Circle all outliers with red pencil.

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria to determine the need for some qualification of the data.

4.6 Was a Laboratory Control Sample (LCS) analyzed with each analytical batch? ✓ ___ ___

NOTE: When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

5.0 Blanks (Form IV/Equivalent)

5.1 Is the Method Blank Summary (Form IV) present? ✓ ___ ___

5.2 Frequency of Analysis:

Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? ✓ ___ ___

5.3 Has a method blank been analyzed either after

YES NO N/A

the calibration standard or at any other time during the analytical shift for each GC/MS system used ? ✓ ___ ___

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, use professional judgement to determine if the associated sample data should be qualified.

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for the semivolatiles? ✓ ___ ___

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ✓ ___

6.2 Do any field/rinse/ blanks have positive results for target analytes and/or TICs (if required, see section 10 below)? ___ ✓ ___

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field Blanks must be qualified for outlying surrogates, poor spectra, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify sample results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

* VEP4-EB01-052213-RW

* in SDG #/325237

YES NO N/A

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

NOTE: If the laboratory did not report TIC analyses, check the project plans to verify whether or not it was required.

6.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

6.4 Was a instrument blank analyzed after each sample/dilution which contained a target compound

	YES	NO	N/A
that exceeded the initial calibration range.	[ ]		✓
6.5 Does the instrument blank have positive results for target analytes and/or TICs?		✓	

Note: Use professional judgement to determine if carryover occurred and qualify analytes accordingly.

7.0 GC/MS Apparatus and Materials

	YES	NO	N/A
7.1 Did the lab use the proper gas chromatographic column for analysis of semivolatiles by Method 8270D? Check raw data, instrument logs or contact the lab to determine what type of column was used. The method requires the use of 30 m x 0.25 mm ID (or 0.32 mm ID), silicone-coated, fused silica, capillary column.	✓		

ACTION: If the specified column, or equivalent, was not used, document the effects in the data assessment. Use professional judgement to determine the acceptability of the data.

8.0 GC/MS Instrument Performance Check (Form V/Equivalent)

	YES	NO	N/A
8.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)?	✓		

NOTE: The performance solution should also contain 4,4-DDT, pentachlorophenol, and benzidine to verify injection port inertness and column performance. The degradation of DDT to DDE and DDD must be less than 20% total and the response of pentachlorophenol and benzidine should be within normal ranges for these compounds (based upon lab experience) and show no peak degradation or tailing before samples are analyzed. (see section 5.5

	YES	NO	N/A
page 8270D-12).			
8.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift?	✓		
8.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument?	✓		

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

	YES	NO	N/A
8.4 Have the ion abundances been normalized to m/z 198?	✓		
8.5 Have the ion abundance criteria been met for each instrument used?	✓		

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action specified in section 3.2

	YES	NO	N/A
8.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.)		✓	
8.7 Have the appropriate number of significant figures (two) been reported?	✓		

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.

	YES	NO	N/A
8.8 Are the spectra of the mass calibration compound acceptable?	✓		

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

9.0 Target Analytes

	YES	NO	N/A
9.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate	✓		
b. Matrix spikes and matrix spike duplicates	[ ]		✓
c. Blanks	✓		
9.2 Has any special cleanup, such as GPC, been performed on all soil/sediment sample extracts (see section 7.2, page 8270D-14)?	[ ]		✓

ACTION: If data suggests that extract cleanup was not performed, use professional judgement. Make note in the data assessment narrative.

	YES	NO	N/A
9.3 Are the Reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?			
a. Samples and/or fractions as appropriate	✓		
b. Matrix spikes and matrix spike duplicates (Mass spectra not required)	[ ]		✓
c. Blanks	✓		

ACTION: If any data are missing, take action specified in 3.2 above.

	YES	NO	N/A
9.4 Are the response factors shown in the Quant Report?	✓		
9.5 Is chromatographic performance acceptable with respect to:			
Baseline stability?	✓		
Resolution?	✓		
Peak shape?	✓		
Full-scale graph (attenuation)?	✓		
Other:_____	[ ]		

ACTION: Use professional judgement to determine the acceptability of the data.

9.6 Are the lab-generated standard mass spectra of identified semivolatile compounds present for

YES NO N/A

each sample? ☑ ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the data assessment narrative. If spectra are missing, reject all positive data.

9.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? ☑ ___ ___

9.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ☑ ___ ___

9.9 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ☑ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 9.7, 9.8, and 9.9.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

YES NO N/A

10.0 Tentatively Identified Compounds (TIC)

10.1 If Tentatively Identified Compounds were required for this project, are all Form Is, Part B present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier? ☑ ___ ___

NOTE: Review sampling reports to determine if the lab was required to identify non target analytes (refer to section 7.6.2,page 8270D-21).

10.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following: ☐ ___ ☑

a. Samples and/or fractions as appropriate ☐ ___ ☑

b. Blanks ☐ ___ ☑

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by CAS #.

10.3 Are any target compounds from one fraction listed as TIC compounds in another (e.g., an acid compound listed as a base neutral TIC)? ___ ☐ ☑

ACTION: i. Flag with "R" any target compound listed as a TIC.

ii. Make sure all rejected compounds are properly reported in the other fraction.

10.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the

YES NO N/A

sample mass spectrum? ☐ ___ ☑

10.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? ☐ ___ ☑

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate and remove "JN". Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R."

11.0 Compound Quantitation and Reported Detection Limits

11.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found? ___ ☑ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

11.2 Are the method detection limits adjusted to reflect sample dilutions and, for soils, sample moisture? ☐ ___ ☑

YES NO N/A

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I (if present) and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's that should not be used, including any in the summary package.

12.0 Standards Data (GC/MS)

12.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration? ☑ ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

13.0 GC/MS Initial Calibration (Form VI/Equivalent)

13.1 Is the Initial Calibration Form (Form VI/ Equivalent) present and complete for the semivolatile fraction? ☑ ___ ___

ACTION: If any calibration forms or standard row data are missing, take action specified in 3.2 above.

13.2 Are all base neutral or acid RRFs > 0.050? ☑ ___ ___

YES NO N/A

Check the **average RRFs** of the four System Performance Check Compounds (SPCCs): N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. These compounds must have **average RRFs** greater than or equal to 0.05 before running samples and should not show any peak tailing.

ACTION: Circle all outliers in red.

ACTION: For any target analyte with **average RRF <0.05**

1. "R" all non-detects;

2. "J" all positive results.

13.3 Are response factors for base neutral or acid target analytes stable over the concentration range of the calibration (% Relative standard deviation [%RSD] < 20.0%)? ___ ✓ ___

NOTE: The % RSD for each individual Calibration Check Compound (CCC, Method 8270D-40 see Table 4) must be less than 30% before analysis can begin. If grater 30%, the lab must clean and recalibrate the instrument.

CALIBRATION CHECK COMPOUNDS

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol

YES NO N/A

Benzo(a)pyrene

ACTION: If the %RSD for any CCC >30% and no corrective action taken, then "J" qualify all positive hits and "UJ" qualify all non-detects.

ACTION: Circle all outliers in red.

ACTION: If the % RSD is ≥ 20.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non- detect results for that analyte "R," unusable. Alternatively, the lab should calculate first or second order regression fit of the calibration curve and select the fit which introduces the least amount of error.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

13.4 Did the laboratory calculate the calibration curve by the least squares regression fit? ___ ✓ ___

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) ___ ✓ ___

ACTION: Circle Errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

13.5 Do the target compounds for this SDG include Pesticides? ___ ✓ ___

YES NO N/A

13.6 If the pesticide compounds include DDT, was the percent breakdown of DDT to DDD and DDE greater than 20%? ___ ___ ✓

ACTION: If DDT percent breakdown exceeds 20%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE results are positive, qualify the quantitation limit for DDT as unusable, "R".

ii. Qualify all positive results for DDD and DDE as presumptively present at an approximate concentration "JN".

14.0 GC/MS Calibration Verification (Form VII/Equivalent)

14.1 Are the Calibration Verification Forms (Form VII) present and complete for all compounds of interest? ✓ ___ ___

14.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

_____

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed within twelve hours of every sample analysis,

YES NO N/A

call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

14.3 Do any of the SPCCs have an RRF <0.05? ___ ✓ ___

If YES, make a note in data assessment if the lab did not take corrective action specified in section 7.4.4, page 8270D-18. ___ ✓ ___

14.4 Do any of the CCCs have a %D between the initial and continuing RRF which exceeds 20.0%?

ACTION: If yes, make a note in data assessment.

14.5 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds 20.0%? ___ ✓ ___

ACTION: Circle all outliers in red.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is above 90%, qualify all non-detects for that analyte as "R", unusable.

14.6 Do any semivolatile compounds have a RRF < 0.05? ___ ✓ ___

ACTION: Circle all outliers in red.

ACTION: If RRF < 0.05, qualify as unusable ("R") associated non-detects and "J" associated positive values.

14.7 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or percent difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more). ___ ✓ ___

YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect(s) in the data assessments.

15.0 Internal Standards (Form VIII)

15.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to + 100%) for each continuing calibration? ✓

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area	LowerLimit	Upper Limit

(Attach additional sheets if necessary.)

Note: Check Table 5, 8270D-41 for associated analytes.

ACTION: i. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

ii. Non-detects associated with IS > 100% should not be qualified.

YES NO N/A

iii. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

15.2 Are the retention times of all internal standards within 30 seconds of the associated calibration standard? ✓

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

for ISTD associated w/ target compds — see attached forms

16.0 Laboratory Control Samples (LCS)

16.1 Were any LCS samples run in order to verify analytes which failed criteria for spike recovery? ✓

16.2 Did the lab spike LCS sample spiked with the same analytes and the same concentrations as the matrix spike? ✓

16.3 Were the mean and standard deviation of all analytes within the QC acceptance ranges as shown in Table 6, 8270D-43? ✓

ACTION: If the recovery of any analyte falls out of the designated range, the analytical results for that compound is suspect and should be qualified "J" in the unspiked samples.

17.0 Field Duplicates

17.1 Were any field duplicates submitted for semivolatile analysis? ✓

INTERNAL STANDARD AREA AND RT SUMMARY
SW8270D

Laboratory: Empirical Laboratories LLC
Client: CH2M Hill, Inc.
Sequence: 3E14405

SDG: 1305218
Project: Vineyard East SWMU 20
Instrument: MS-BNA4
Calibration: 2122001

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Calibration Check (3E14405-CCV1)			Lab File ID: SEQ-CCV1.D		Analyzed: 05/23/13 15:11				
Phenanthrene-d10	319945	10.178	321039	10.545	100	50 - 200	-0.3670	+/-0.50	
Perylene-d12	380868	16.448	337266	17.137	113	50 - 200	-0.6890	+/-0.50	*
Blank (3E22014-BLK2)			Lab File ID: E220148I.D		Analyzed: 05/23/13 15:38				
Phenanthrene-d10	367022	10.174	321039	10.545	114	50 - 200	-0.3710	+/-0.50	
Perylene-d12	458729	16.443	337266	17.137	136	50 - 200	-0.6940	+/-0.50	*
LCS (3E22014-BS2)			Lab File ID: E220141.I.D		Analyzed: 05/23/13 16:05				
Phenanthrene-d10	416401	10.174	321039	10.545	130	50 - 200	-0.3710	+/-0.50	
Perylene-d12	494749	16.438	337266	17.137	147	50 - 200	-0.6990	+/-0.50	*
VEP4-GW04-0513 (1305218-01)			Lab File ID: 0521801.D		Analyzed: 05/23/13 19:14				
Phenanthrene-d10	454316	10.173	321039	10.545	142	50 - 200	-0.3720	+/-0.50	
Perylene-d12	538365	16.438	337266	17.137	160	50 - 200	-0.6990	+/-0.50	*

ISTD not assoc w/ target compds - no qual

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YES NO N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

DataQual
Environmental Services, LLC

CH2M HILL-VBO
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

December 11, 2013
SDG# 1305255, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1305255. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24 and 8270D-Rev 4, August 2008-SOP #HW-22,), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA	SVOA
VEP4-GW09-0513	1305255-01	water	X	X
VEP4-GW13-0513	1305255-02	water	X	X
VEP4-GW13P-0513	1305255-03	water	X	X
VEP4-TB01-052213	1305255-04	water	X	
VEP4-GW09-0513 MS	1305255-01MS	water	X	X
VEP4-GW09-0513 MSD	1305255-01MSD	water	X	X

The following quality control samples were provided with this SDG: sample VEP4-GW13P-0513- field duplicate of sample VEP4-GW13-0513 and sample VEP4-TB01-052213- trip blank.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries *
- Matrix Duplicate RPDs *

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001

- Field Duplicates
- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

The field duplicate pair exhibited non-compliant results for one compound; qualifications were added to the data.

SVOA

No qualifications were required to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to chain of custody records, sampling was performed on 5/22/13 and samples were received at the laboratory 5/23/13. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

Field Duplicates

VOA

Sample VEP4-GW13-0513 and duplicate sample VEP4-GW13P-0513 did not exhibited comparable results for tetrachloroethene with 24% RPD (QC limit 20%); therefore results were qualified as estimated (J), qualifier code FD.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
VEP4-GW13-0513, VEP4-GW13P-0513	tetrachloroethene	-	J	FD

SVOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U not detected above the reported sample quantitation limit
J estimated value
UJ reported quantitation limit is qualified as estimated
N analyte has been tentatively identified
JN analyte has been tentatively identified, estimated value
R result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.

U* The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.

RL** The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.

J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.
Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL reporting limit
PQL practical quantitation limit
IDL instrument detection limit
MDL method detection limit
CRDL contract required detection limit
CRQL contract required quantitation limit
\+ positive result
\- non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

ANALYSIS DATA SHEET

VEP4-GW09-0513

Laboratory: Empirical Laboratories, LLC SDG: 1305255
Client: CH2M Hill Inc. Project: Vieques East SWMU 20
Matrix: Water Laboratory ID: 1305255-01 File ID: 0525401.D
Sampled: 05/22/13 08:43 Prepared: 05/29/13 11:17 Analyzed: 05/29/13 11:17
Solids: Preparation: 50.00 Dilution: 1
Batch: 3E29016 Sequence: 3E15021 Calibration: 3127904 Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene	0.900	0.100	0.200	0.500	
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.12	90.4	75 - 120	
Dibromofluoromethane	30.00	30.57	102	85 - 115	
1,2-Dichloroethane-d4	30.00	29.57	98.6	70 - 120	
Toluene-d8	30.00	30.70	102	85 - 120	

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ANALYSIS DATA SHEET

VEP4-GW13-0513

Laboratory: Empirical Laboratories, LLC | SDG: 1305255
Client: CH2M Hill, Inc | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1305255-02 | File ID: 0525502.D
Sampled: 05/22/13 11:40 | Prepared: 05/23/13 00:00 | Analyzed: 05/23/13 15:17
Solids: | Preparation: 5030B | Dilution: 1
Batch: 3E23011 | Sequence: 3E13504 | Calibration: 3127004 | Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene	**0.470**	0.250	0.500	1.00	J
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene	**1.25**	0.250	0.500	1.00	J
79-01-6	Trichloroethene	**64.9**	0.100	0.200	0.500	
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

JPD

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.00	90.0	75 - 120	
Dibromofluoromethane	30.00	30.09	100	85 - 115	
1,2-Dichloroethane-d4	30.00	30.13	101	70 - 120	
Toluene-d8	30.00	30.47	102	85 - 120	

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ANALYSIS DATA SHEET

VEP4-GW13P-0513

Laboratory: Empirical Laboratories, LLC | SDG: 1305255
Client: CH2M Hill, Inc | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1305255-03 | File ID: 0525503.D
Sampled: 05/22/13 11:45 | Prepared: 05/29/13 15:56 | Analyzed: 05/29/13 15:56
Solids: | Preparation: 5030B | Dilution: 1
Batch: 3E29016 | Sequence: 3E13671 | Calibration: 3127004 | Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene	**0.470**	0.250	0.500	1.00	J
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene	**1.54**	0.250	0.500	1.00	J
79-01-6	Trichloroethene	**64.9**	0.100	0.200	0.500	
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

JPD

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	26.83	89.4	75 - 120	
Dibromofluoromethane	30.00	30.39	101	85 - 115	
1,2-Dichloroethane-d4	30.00	30.57	102	70 - 120	
Toluene-d8	30.00	30.30	101	85 - 120	

LM 011404

LM 112513

ANALYSIS DATA SHEET

VEP4-TB01-052213

Laboratory: Empirical Laboratories, LLC | SDG: 1305255
Client: CH2M Hill, Inc | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1305255-04 | File ID: 0525504.D
Sampled: 05/22/13 12:40 | Prepared: 05/30/13 10:59 | Analyzed: 05/30/13 10:59
Solids: | Preparation: 5030B | Dilution: 1
Batch: 3E30015 | Sequence: 3E13104 | Calibration: 3127004 | Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.51	91.7	75 - 120	
Dibromofluoromethane	30.00	31.07	104	85 - 115	
1,2-Dichloroethane-d4	30.00	31.80	106	70 - 120	
Toluene-d8	30.00	30.52	102	85 - 120	

LM 112513

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ANALYSIS DATA SHEET

VEP4-GW09-0513

Laboratory: Empirical Laboratories, LLC | SDG: 1305255
Client: CH2M Hill, Inc | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1305255-01 | File ID: 0525501.D
Sampled: 05/22/13 08:15 | Prepared: 05/23/13 13:40 | Analyzed: 05/23/13 13:21
Solids: | Preparation: EXT_3510 | Dilution: 1
Batch: 3E23014 | Sequence: 3E14803 | Calibration: 3127001 | Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.240	0.481	0.962	ND

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	48.08	42.71	88.8	50 - 110	
Terphenyl-d14	48.08	42.17	87.7	50 - 135	
2,4,6-Tribromophenol	96.15	79.49	82.7	40 - 125	

LM 112513

012

ANALYSIS DATA SHEET

VEP4-GW13-0513

Laboratory: Empirical Laboratories, LLC | SDG: 1305255
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1305255-02 | File ID: 0525502.D
Sampled: 05/22/13 11:49 | Prepared: 05/23/13 13:50 | Analyzed: 05/25/13 13:49
Solids: | Preparation: EXT_3510 | Dilution: 1
Batch: 3E23014 | Sequence: 3E14803 | Calibration: 3122001 | Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.240	0.481	0.962	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	48.08	44.58	92.7	50 - 110	
Terphenyl-d14	48.08	43.34	90.2	50 - 135	
2,4,6-Tribromophenol	96.15	95.08	98.9	40 - 125	

1/1/2013

01

ANALYSIS DATA SHEET

VEP4-GW13P-0513

Laboratory: Empirical Laboratories, LLC | SDG: 1305255
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1305255-03 | File ID: 0525503.D
Sampled: 05/22/13 11:45 | Prepared: 05/23/13 13:50 | Analyzed: 05/25/13 14:16
Solids: | Preparation: EXT_3510 | Dilution: 1
Batch: 3E23014 | Sequence: 3E14803 | Calibration: 3122001 | Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.240	0.481	0.962	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	48.08	37.31	77.6	50 - 110	
Terphenyl-d14	48.08	43.63	90.7	50 - 135	
2,4,6-Tribromophenol	96.15	92.24	95.9	40 - 125	

1/1/2013

01

EMPIRICAL LABORATORIES, LLC - CHAIN OF CUSTODY RECORD

SHIP TO: 621 Mainstream Drive, Suite 270 • Nashville, TN 37228 • 615-345-1115 • (fax) 615-846-5426

1305255 | 18758

Send Results to: Name Michael Zamboni; Company CH2M Hill; Address 5010 Cordelia Drive, Suite 200; City Chantilly; State, Zip VA 20151; Phone (703) 376-5701; Fax (703) 376-5801; E-mail MZambon@CH2M.com

Send Invoice to: Name; Company; Address; City See Contract; State, Zip P.O. 943380; Phone; Fax; E-mail

Analysis Requirements: Solid VOC; Solid SVOC

Lab Use Only:

VOA Headspace	Y	N	NA
Field Filtered	Y	N	NA
Correct Containers	Y	N	NA
Discrepancies	Y	N	NA
Cust. Seals Intact	Y	N	NA
Containers Intact	Y	N	NA

Airbill #: 7998 2024 0394

CAR #:

Project No./Name: 4JSM3-FS-FK-20

Sampler's (Signature):

Lab Use Only Lab #	Date/Time Sampled	Sample Description	Sample Matrix	HCl	Non	Comments	No. of Bottles	Lab Use Only Containers/Pres.
01	5/22/13 0845	VEP4-GW09-0513	GW	X	X	7 day TAT	15	
↓	↓	VEP4-GW09-0513-MS	↓	X	X	Run 2 VOC (MS) (MSD)	↓	
		VEP4-GW09-0513-SD		X	X			
02	5/22/13 1140	VEP4-GW13-0513	GW	X	X	7 day TAT	5	
03	5/22/13 1145	VEP4-GW13P-0513	GW	X	X	7 day TAT	5	
04	5/22/13 1430	VEP4-TB01-052213	AQ	X		(STD. TAT)	2	

Sample Kit Prep'd by: (Signature) | Date/Time | Received By: (Signature)
Relinquished by: (Signature) | Date/Time 5/22/13 1630 | Received By: (Signature)
Relinquished by: (Signature) | Date/Time | Received By: (Signature)
Received for Laboratory by: (Signature) | Date/Time 5/23/13 0845 | Temperature 0.3 corr.

REMARKS:

Details: Page 1 of 1; Cooler No. 1 of 1; Date Shipped 5/22/13; Shipped By MZ; Turnaround See above.

Distribution: Original and yellow copies accompany sample shipment to laboratory; Pink retained by samplers.

1305255 Summ Package

EMPIRICAL LABORATORIES COOLER RECEIPT FORM

Cooler Received/Opened On: 05/23/13 @ 0845 | Workorder# 1305255

1. Tracking # 0394 (last 4 digits, FedEx)
   Courier: FEDEX
2. Temperature of rep. sample or temp blank when opened: 0.3 °C + correction factor (-0.1) = 0.2 °C
3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA
4. Were custody seals on outside of cooler? YES NO NA
   If yes, how many and where: 2 - FRONT & BACK
5. Were the seals intact, signed, and dated correctly? YES NO NA
6. Were custody papers inside cooler? YES NO NA

I certify that I opened the cooler and answered questions 1-6 (initial)

7. Were custody seals on containers: YES NO and intact YES NO NA
   Were these signed and dated correctly? YES NO NA
8. Packing material used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry Ice Other None
10. Did all containers arrive in good condition (unbroken)? YES NO NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES NO NA
12. Did all container labels and tags agree with custody papers? YES NO NA
13. a. Were VOA vials received? YES NO NA
    b. Was there any observable headspace present in any VOA vial? YES NO NA
14. Was there a Trip Blank in this cooler? YES NO NA If multiple coolers, sequence # ____

I certify that I unloaded the cooler and answered questions 7-14 (initial)

15. a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES NO NA
    b. Did the bottle labels indicate that the correct preservatives were used YES NO NA
16. Was residual chlorine present? YES NO NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial)

17. Were custody papers properly filled out (ink, signed, etc)? YES NO NA
18. Did you sign the custody papers in the appropriate place? YES NO NA
19. Were correct containers used for the analysis requested? YES NO NA
20. Was sufficient amount of sample sent in each container? YES NO NA

I certify that I entered this project into LIMS and answered questions 17-20 (initial)

I certify that I attached a label with the unique LIMS number to each container (initial)

I certify that I have performed a second check of the LIMS information against the COC to confirm accuracy (initial)

21. Were there Non-Conformance issues at login? YES NO Was a NCR generated? YES NO #____

Additional Details:

C:\Documents and Settings\bwright\Desktop\New CRF.doc1.doc

Page 1 of 1 016

Sample Delivery Group Case Narrative

Receipt Information
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Changes to the Revision
This is an original submittal of the final report package.

Analytical Information
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:
The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

017

SW8260B:
No anomalies or deviations are noted.

SW8270D BNA:
The following matrix spikes exceeded criteria:
3E23014-MS2/MSD2 (1305255-01) exceeded relative percent difference criteria for 1,4-Dioxane

Note – While the Perylene-d12 internal standard shifted outside +/-0.5min from the initial calibration in 3E14803-CCV1, 3E23014-BLK2, -BS2, -MS2, -MSD2, 1305255-01, -02, and -03 it is identified by the mass spectrum. This minimal shift would have no impact on the reported results.

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

018

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 1305255 LAB: Empirical

SITE NAME: Vieques Sumie 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ☑ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ☑ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ☑ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. **VOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ☑ ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ☑ ___ ___

1.3 Sample Conditions/Problems

019

- 6 VOA -

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ☑ ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

A 5/22/13 @ 5/23 30
A 5/23 t 0.1°C

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ ☑ ___

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

020

- 7 VOA -

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water [✓] ___ ___

b. Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water [✓] ___ ___

b. Soil [ ] ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. [✓] ___ ___

lab

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ [✓]

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] [✓] ___

If yes, were samples reanalyzed? [ ] ___ [✓]

Were method blanks reanalyzed? [ ] ___ [✓]

022

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] [✓] ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

023

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ [✓]

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] [✓] ___

024

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent)

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [✓] ___ ___

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [✓] ___ ___

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month [page 8000C, section 9.5.])

a. Water [✓] ___ ___

b. Waste [ ] ___ ___

c. Soil/Solid [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [✓] ___ ___

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ [✓]

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? [✓] ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? [✓] ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? [✓] ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? [✓] ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. [ ] ___ [✓]

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

VEPH-TBC1-05513
VEPH-EBC1-052213-GW
GW SDG# 1305768

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone
** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates [✓] ___ ___

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) [✓] ___ ___

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? [✓] ___ ___

YES NO N/A

Resolution? [✓] ___ ___

Peak shape? [✓] ___ ___

Full-scale graph (attenuation)? [✓] ___ ___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reportec compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

MU TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form 1/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [✓] ___ ___

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Blanks [✓] ___ ___

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [✓] ___ ___

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [✓] ___ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ ✓

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

037

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39)qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? [✓] ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. [✓] ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

038

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) [ ] ✓ ___ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

039

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? [✓] ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? [✓] ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? [ ] ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). [ ] ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

040

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds in section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? ✓ ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION: 1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.

2. Do not qualify non-detects when the associated IS are counts area > + 100%.

3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".

4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ✓ ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

VEP4-GW13-0513
VEP4-GW13P-0513 > see attached form, no qual

DataQual VOA

FIELD DUPLICATE SAMPLE SUMMARY

Sample ID: VEP4-GW13-0513
Duplicate Sample ID: VEP4-GW13P-0513

Water: RPD>25%
Soil: RPD>30%

Compound	Sample Conc.	Dup. Sample Conc.	%RPD
tetrachloroethene	1.25	1.59	24
trichloroethene	61.9	64.9	5
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
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			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!

COMMENTS: No qualifications

* one of the results below the LOD
if both results are below the LOD the results are not compared

YES NO N/A

E - The concentration of this analyte exceeds the calibration range of the instrument.

A - Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 1305255 LAB: Empirical

SITE NAME: Vieques Sumar 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the data assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative or cover letter present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

YES NO N/A

II. SEMIVOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? ✓ ___ ___

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, all non-detects data are qualified as unusable (R), and detects are flagged "J".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (10°C), flag all positive results "J" and all non-detects "UJ". ≥ 0.2°C

A 5/23/13 e 5/23
N 5/23 N 5/25

2.0 Holding Times

2.1 Have any semivolatile technical holding times, determined from date of collection to date of extraction, been exceeded? ___ ✓ ___

Continuous extraction of water samples for semivolatile analysis must be started within 7 days of the date of collection. Soil/sediment samples must be extracted within **14** days of collection. Extracts must be analyzed within

YES NO N/A

40 days of the date of extraction.

Table of Holding Time Violations

(See Traffic Report)

Sample ID	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted	Date Analyzed

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

YES NO N/A

3.0 Surrogate Recovery (Form II/Equivalent)

3.1 Have the semi volatile surrogate recoveries been listed on CLP Surrogate Recovery forms (Form II) for each of the following matrices:

a. Low Water ✓ ___ ___

b. Low/Med Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery Summary forms for each matrix:

a. Low Water ✓ ___ ___

b. Low/Med Soil [ ] ___ ___

ACTION: If CLP deliverables are unavailable, document the effect(s) in data assessments. In some cases the lab may have to be contacted to obtain the data necessary to complete the validation.

3.3 Were outliers marked correctly with an asterisk? [ ] ___ ✓

ACTION: Circle all outliers in red.

3.4 Were two or more base neutral OR acid surrogate recoveries out of specification for any sample or method blank (Reviewer should use lab in house recovery limits. Use surrogate recovery limits from USEPA National Functional Guidlines January 2005 page 130, if in house limits are not available. See Method 8000B-43 or 8000C-24). [ ] ✓ ___

Note: Examine lab in house limits for reasonableness.

If yes, were samples re-analyzed? [ ] ___ ✓

YES NO N/A

Were method blanks re-analyzed? [ ] ___ ✓

ACTION: If all surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet method specifications, for the affected fraction only (i.e. either base-neutral or acid compounds):

1. Flag all positive results as estimated ("J").

2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.

3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Positive results for the fraction with < 10% surrogate recovery are qualified with "J".

2. Non-detects for that fraction should be qualified as unusable (R) .

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ ✓ ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document

YES NO N/A

effect in data assessments.

4.0 Matrix Spikes (Form III/Equivalent)

4.1 Have the semivolatile Matrix Spike and Matrix Spike Duplicate/or duplicate unspiked Sample recoveries been listed on the Recovery Form (Form III)? ✓ ___ ___

NOTE: Method 3500B/page 4 states the spiking compounds:

Base/neutrals	Acids
1,2,4-Trichlorobenzene	Pentachlorophenol
Acenaphthene	Phenol
2,4-Dinitrotoluene	2-Chlorophenol
Pyrene	4-Chloro-3-methylphenol
N-Nitroso-di-n-propylamine	4-Nitrophenol
1,4-Dichlorobenzene	

Note: Some projects may require the spiking of specific compounds of interest.

Note: See Method 8270D-sec 8.4.2 for deciding on whether to prepare and analyze duplicate samples or a martix spike/matrix spike duplicate. If samples are expected to contain target analytes, then laboratory may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratory should use a matrix spike and matrix spike duplicate pair.

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water ✓ ___ ___

b. Low Solid [ ] ___ ___

c. Med Solid [ ] ___ ___

YES NO N/A

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. It may be necessary to contact the lab to obtain the required data.

NOTE: If the data has not been reported on CLP equivalent form, then the laboratory must provide the information necessary to evaluate the spike recoveries in the MS and MSD. The required data which should have been provided by the lab include the analytes and concentrations used for spiking, background concentrations of the spiked analytes (i.e., concentrations in unspiked sample), methods and equations used to calculate the QC acceptance criteria for the spiked analytes, percent recovery data for all spiked analytes.

The data reviewer must verify that all reported equations and percent recoveries are correct before proceeding to the next section.

4.3 Were matrix spikes performed at concentration equal to 100ug/L for acid compounds, and 200ug/l for base compounds (Method 3500B-4), or those specified in project plan. ✓ ___ ___

4.4 How many semivolatile spike recoveries are outside Laboratory in house MS/MSD recovery limits (use recovery limits values in Method 8270D-43&44 Table 6 if in house values not available).

Water	Solids
0 out of 2	___ out of ___

YES NO N/A

4.5 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water	Solids
10 out of 1	___ out of ___

ACTION: Circle all outliers with red pencil.

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria to determine the need for some qualification of the data.

4.6 Was a Laboratory Control Sample (LCS) analyzed with each analytical batch? ✓ ___ ___

NOTE: When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

5.0 Blanks (Form IV/Equivalent)

5.1 Is the Method Blank Summary (Form IV) present? ✓ ___ ___

5.2 Frequency of Analysis:

Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? ✓ ___ ___

5.3 Has a method blank been analyzed either after

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY
SW8270D

VEP4-GW09-0513

Laboratory: Empirical Laboratories, LLC
SDG: 1305255
Client: CH2M Hill, Inc.
Project: Voppert East SWMU 20
Matrix: Water
Batch: 1023014
% Solids:
Source Sample Name: 1305255-01

ANALYTE	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC	Q	QC LIMITS REC
1,4-Dioxane	0.6868	ND	0.3261	47.5		5 - 110

ANALYTE	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC #	% RPD	Q	QC LIMITS RPD	QC LIMITS REC
1,4-Dioxane	0.6868	0.4467	65.0	31.2	*	30	5 - 110

No qual

053

YES NO N/A

the calibration standard or at any other time during the analytical shift for each GC/MS system used ? ☑ ___ ___

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, use professional judgement to determine if the associated sample data should be qualified.

5.4 Chromatography: review the blank raw data – chromatograms (RICs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for the semivolatiles? ☑ ___ ___

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ☑ ___

6.2 Do any field/rinse/ blanks have positive results for target analytes and/or TICs (if required, see section 10 below)? ___ ☑ ___

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field Blanks must be qualified for outlying surrogates, poor spectra, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify sample results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

YES NO N/A

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of Sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

NOTE: If the laboratory did not report TIC analyses, check the project plans to verify whether or not it was required.

6.3 Are there field/rinse/equipment blanks associated with every sample? ☑ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

6.4 Was a instrument blank analyzed after each sample/dilution which contained a target compound

	YES	NO	N/A
that exceeded the initial calibration range.			✓
6.5 Does the instrument blank have positive results for target analytes and/or TICs?		✓	

Note: Use professional judgement to determine if carryover occurred and qualify analytes accordingly.

7.0 GC/MS Apparatus and Materials

	YES	NO	N/A
7.1 Did the lab use the proper gas chromatographic column for analysis of semivolatiles by Method 8270D? Check raw data, instrument logs or contact the lab to determine what type of column was used. The method requires the use of 30 m x 0.25 mm ID (or 0.32 mm ID), silicone-coated, fused silica, capillary column.	✓		

ACTION: If the specified column, or equivalent, was not used, document the effects in the data assessment. Use professional judgement to determine the acceptability of the data.

8.0 GC/MS Instrument Performance Check (Form V/Equivalent)

	YES	NO	N/A
8.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)?	✓		

NOTE: The performance solution should also contain 4,4-DDT, pentachlorophenol, and benzidine to verify injection port inertness and column performance. The degradation of DDT to DDE and DDD must be less than 20% total and the response of pentachlorophenol and benzidine should be within normal ranges for these compounds (based upon lab experience) and show no peak degradation or tailing before samples are analyzed. (see section 5.5

	YES	NO	N/A
page 8270D-12).			
8.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift?	✓		
8.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument?	✓		

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

	YES	NO	N/A
8.4 Have the ion abundances been normalized to m/z 198?	✓		
8.5 Have the ion abundance criteria been met for each instrument used?	✓		

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action specified in section 3.2

	YES	NO	N/A
8.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.)		✓	
8.7 Have the appropriate number of significant figures (two) been reported?	✓		

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.

	YES	NO	N/A
8.8 Are the spectra of the mass calibration compound acceptable?	✓		

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

9.0 Target Analytes

	YES	NO	N/A
9.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate	✓		
b. Matrix spikes and matrix spike duplicates	✓		
c. Blanks	✓		
9.2 Has any special cleanup, such as GPC, been performed on all soil/sediment sample extracts (see section 7.2, page 8270D-14)?			✓

ACTION: If data suggests that extract cleanup was not performed, use professional judgement. Make note in the data assessment narrative.

	YES	NO	N/A
9.3 Are the Reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?			
a. Samples and/or fractions as appropriate	✓		
b. Matrix spikes and matrix spike duplicates (Mass spectra not required)	✓		
c. Blanks	✓		

ACTION: If any data are missing, take action specified in 3.2 above.

	YES	NO	N/A
9.4 Are the response factors shown in the Quant Report?	✓		
9.5 Is chromatographic performance acceptable with respect to:			
Baseline stability?	✓		
Resolution?	✓		
Peak shape?	✓		
Full-scale graph (attenuation)?	✓		
Other:_____			

ACTION: Use professional judgement to determine the acceptability of the data.

9.6 Are the lab-generated standard mass spectra of identified semivolatile compounds present for

	YES	NO	N/A
each sample?	✓		

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the data assessment narrative. If spectra are missing, reject all positive data.

	YES	NO	N/A
9.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	✓		
9.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum?	✓		
9.9 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum?	✓		

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 9.7, 9.8, and 9.9.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

061

	YES	NO	N/A
10.0 Tentatively Identified Compounds (TIC)			
10.1 If Tentatively Identified Compounds were required for this project, are all Form Is, Part B present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier?			

No TICs

NOTE: Review sampling reports to determine if the lab was required to identify non target analytes (refer to section 7.6.2,page 8270D-21).

	YES	NO	N/A
10.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:	[ ]		✓
a. Samples and/or fractions as appropriate	[ ]		✓
b. Blanks	[ ]		✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by CAS #.

	YES	NO	N/A
10.3 Are any target compounds from one fraction listed as TIC compounds in another (e.g., an acid compound listed as a base neutral TIC)?		[ ]	✓

ACTION: i. Flag with "R" any target compound listed as a TIC.

ii. Make sure all rejected compounds are properly reported in the other fraction.

10.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the

06

	YES	NO	N/A
sample mass spectrum?	[ ]		✓
10.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%?	[ ]		✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate and remove "JN". Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R."

11.0 Compound Quantitation and Reported Detection Limits

	YES	NO	N/A
11.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found?		✓	

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

	YES	NO	N/A
11.2 Are the method detection limits adjusted to reflect sample dilutions and, for soils, sample moisture?	[ ]		✓

063

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I (if present) and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red " X" across the entire page of all Form I's that should not be used, including any in the summary package.

12.0 Standards Data (GC/MS)

	YES	NO	N/A
12.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration?	✓		

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

13.0 GC/MS Initial Calibration (Form VI/Equivalent)

	YES	NO	N/A
13.1 Is the Initial Calibration Form (Form VI/ Equivalent) present and complete for the semivolatile fraction?	✓		

ACTION: If any calibration forms or standard row data are missing, take action specified in 3.2 above.

	YES	NO	N/A
13.2 Are all base neutral or acid RRFs > 0.050?	✓		

064

YES NO N/A

Check the **average RRFs** of the four System Performance Check Compounds (SPCCs): N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. These compounds must have **average RRFs** greater than or equal to 0.05 before running samples and should not show any peak tailing.

ACTION: Circle all outliers in red.

ACTION: For any target analyte with **average RRF <0.05**

1. "R" all non-detects;

2. "J" all positive results.

13.3 Are response factors for base neutral or acid target analytes stable over the concentration range of the calibration (% Relative standard deviation [%RSD] < 20.0%)? ✓

NOTE: The % RSD for each individual Calibration Check Compound (CCC, Method 8270D-40 see Table 4) must be less than 30% before analysis can begin. If grater 30%, the lab must clean and recalibrate the instrument.

CALIBRATION CHECK COMPOUNDS

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol

YES NO N/A

Benzo(a)pyrene

ACTION: If the %RSD for any CCC >30% and no corrective action taken, then "J" qualify all positive hits and "UJ" qualify all non-detects.

ACTION: Circle all outliers in red.

ACTION: If the % RSD is ≥ 20.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non- detect results for that analyte "R," unusable. Alternatively, the lab should calculate first or second order regression fit of the calibration curve and select the fit which introduces the least amount of error.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

13.4 Did the laboratory calculate the calibration curve by the least squares regression fit? ✓

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) ✓

ACTION: Circle Errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

13.5 Do the target compounds for this SDG include Pesticides? ✓

YES NO N/A

13.6 If the pesticide compounds include DDT, was the percent breakdown of DDT to DDD and DDE greater than 20%? ✓

ACTION: If DDT percent breakdown exceeds 20%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE results are positive, qualify the quantitation limit for DDT as unusable, "R".

ii. Qualify all positive results for DDD and DDE as presumptively present at an approximate concentration "JN".

14.0 GC/MS Calibration Verification (Form VII/Equivalent)

14.1 Are the Calibration Verification Forms (Form VII) present and complete for all compounds of interest? ✓

14.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

ACTION: If any forms are missing or no calibration verification standard has been analyzed within twelve hours of every sample analysis,

YES NO N/A

call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

14.3 Do any of the SPCCs have an RRF <0.05? ✓

If YES, make a note in data assessment if the lab did not take corrective action specified in section 7.4.4, page 8270D-18. ✓

14.4 Do any of the CCCs have a %D between the initial and continuing RRF which exceeds 20.0%?

ACTION: If yes, make a note in data assessment.

14.5 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds 20.0%? ✓

ACTION: Circle all outliers in red.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is above 90%, qualify all non-detects for that analyte as "R", unusable.

14.6 Do any semivolatile compounds have a RRF < 0.05? ✓

ACTION: Circle all outliers in red.

ACTION: If RRF < 0.05, qualify as unusable ("R") associated non-detects and "J" associated positive values.

14.7 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or percent difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more). ✓

YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect(s) in the data assessments.

15.0 Internal Standards (Form VIII)

15.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to + 100%) for each continuing calibration? ✓ ___ ___

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area	LowerLimit	Upper Limit

(Attach additional sheets if necessary.)

Note: Check Table 5, 8270D-41 for associated analytes.

ACTION: i. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

ii. Non-detects associated with IS > 100% should not be qualified.

YES NO N/A

iii. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

15.2 Are the retention times of all internal standards within 30 seconds of the associated calibration standard? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

ISTD not assoc w/ Target compd out - see attached form

16.0 Laboratory Control Samples (LCS)

16.1 Were any LCS samples run in order to verify analytes which failed criteria for spike recovery? ___ ✓ ___

16.2 Did the lab spike LCS sample spiked with the same analytes and the same concentrations as the matrix spike? ✓ ___ ___

16.3 Were the mean and standard deviation of all analytes within the QC acceptance ranges as shown in Table 6, 8270D-43? ✓ ___ ___

ACTION: If the recovery of any analyte falls out of the designated range, the analytical results for that compound is suspect and should be qualified "J" in the unspiked samples.

17.0 Field Duplicates

17.1 Were any field duplicates submitted for semivolatile analysis? ✓ ___ ___

INTERNAL STANDARD AREA AND RT SUMMARY
SW8270D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Sequence: 3E14803

SDG: 1305255
Project: Vieques East SWMU 20
Instrument: MS-BNA3
Calibration: 3122001

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Calibration Check (3E14803-CCV1)			Lab File ID: SEQ-CCV1.D			Analyzed: 05/25/13 11:31			
Phenanthrene-d10	265917	10.183	321039	10.545	83	50 - 200	-0.3620	+/-0.50	
Perylene-d12	311805	16.462	337266	17.137	92	50 - 200	-0.6750	+/-0.50	*
Blank (3E23014-BLK2)			Lab File ID: E23014D1.D			Analyzed: 05/25/13 12:26			
Phenanthrene-d10	307697	10.178	321039	10.545	96	50 - 200	-0.3670	+/-0.50	
Perylene-d12	365315	16.462	337266	17.137	108	50 - 200	-0.6750	+/-0.50	*
LCS (3E23014-BS2)			Lab File ID: E23014L1.D			Analyzed: 05/25/13 12:53			
Phenanthrene-d10	418958	10.178	321039	10.545	131	50 - 200	-0.3670	+/-0.50	
Perylene-d12	503246	16.458	337266	17.137	149	50 - 200	-0.6790	+/-0.50	*
VEP4-GW09-0513 (1305255-01)			Lab File ID: 0525501.D			Analyzed: 05/25/13 13:21			
Phenanthrene-d10	316882	10.175	321039	10.545	99	50 - 200	-0.3670	+/-0.50	
Perylene-d12	370166	16.462	337266	17.137	110	50 - 200	-0.6750	+/-0.50	*
VEP4-GW13-0513 (1305255-02)			Lab File ID: 0525502.D			Analyzed: 05/25/13 13:49			
Phenanthrene-d10	330580	10.178	321039	10.545	103	50 - 200	-0.3670	+/-0.50	
Perylene-d12	395195	16.458	337266	17.137	117	50 - 200	-0.6790	+/-0.50	*
VEP4-GW13P-0513 (1305255-03)			Lab File ID: 0525503.D			Analyzed: 05/25/13 14:16			
Phenanthrene-d10	413895	10.178	321039	10.545	130	50 - 200	-0.3670	+/-0.50	
Perylene-d12	502168	16.458	337266	17.137	149	50 - 200	-0.6790	+/-0.50	*
Matrix Spike (3E23014-MS2)			Lab File ID: 0525501M.D			Analyzed: 05/25/13 16:14			
Phenanthrene-d10	206110	10.178	321039	10.545	64	50 - 200	-0.3670	+/-0.50	
Perylene-d12	247149	16.453	337266	17.137	73	50 - 200	-0.6800	+/-0.50	*
Matrix Spike Dup (3E23014-MSD2)			Lab File ID: 0525501S.D			Analyzed: 05/25/13 17:01			
Phenanthrene-d10	214018	10.178	321039	10.545	67	50 - 200	-0.3670	+/-0.50	
Perylene-d12	252378	16.457	337266	17.137	75	50 - 200	-0.6800	+/-0.50	*

target compd not associated w/ this ISTD - no qual

071

YES NO N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

VEP4-GW13-0513
VEP4-GW13P-0513 > NO ®

DataQual
Environmental Services, LLC

CH2M HILL-VBO
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

December 9, 2013
SDG# 1305268, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1305268. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24 and 8270D-Rev 4, August 2008-SOP #HW-22,), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA	SVOA
VEP4-GW11-0513	1305268-02	water	X	X
VEP4-EB01-052213-GW	1305268-03	water	X	X
VEP4-GW12-0513	1305268-04	water	X	X
VEP4-TB01-052313	1305268-05	water	X	
VEP4-EB01-052313-GW	1305268-06	water	X	X

The following quality control samples were provided with this SDG: sample VEP4-EB01-052213-GW and VEP4-EB01-052313-GW - equipment blank and sample VEP4-TB01-052313- trip blank.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Field Duplicates NA

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001

- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

Due to high %D in the continuing calibration, qualifications were added to the data.

SVOA

No qualifications were required to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to chain of custody records, sampling was performed on 5/23/13 and samples were received at the laboratory 5/24/13. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

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Initial/Continuing Calibration

VOA

Calibration standards exhibited %Ds that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results were qualified as indicated.

Standard ID	Compound(s)	%D	Samples	Q Flag	Qual Code
CC 6/5/13	vinyl chloride	25.5	VEP4-EB01-052213, VEP4-TB01-052313, VEP4-EB01-052313-GW	J/UJ	CCH

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff
President

003

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
VEP4-EB01-052213, VEP4-TB01-052313, VEP4-EB01-052313-GW	vinyl chloride	+/-	J/UJ	CCH

SVOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

004

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U not detected above the reported sample quantitation limit
J estimated value
UJ reported quantitation limit is qualified as estimated
N analyte has been tentatively identified
JN analyte has been tentatively identified, estimated value
R result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.

U* The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.

RL** The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.

J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.
Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL reporting limit
PQL practical quantitation limit
IDL instrument detection limit
MDL method detection limit
CRDL contract required detection limit
CRQL contract required quantitation limit
\+ positive result
\- non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

ANALYSIS DATA SHEET

VEP4-GW11-0513

Laboratory: Empirical Laboratories, LLC SDG: 1305268
Client: CH2M Hill, Inc. Project: Vieques East SWMU 20
Matrix: Water Laboratory ID: 1305268-02 File ID: 0526802.D
Sampled: 05/21/13 09:15 Prepared: 06/01/13 00:00 Analyzed: 06/01/13 13:32
Solids: Preparation: 5030B Dilution: 1
Batch: 3F01002 Sequence: 3F15404 Calibration: 3127004 Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	50.00	27.74	92.5	75 - 120	
Dibromofluoromethane	30.00	30.08	100	85 - 115	
1,2-Dichloroethane-d4	30.00	29.11	97.0	70 - 120	
Toluene-d8	30.00	31.25	104	85 - 120	

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ANALYSIS DATA SHEET

VEP4-EB01-052213-GW

Laboratory: Empirical Laboratories, LLC | SDG: 1305268
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1305268-03 | File ID: 0526803.D
Sampled: 05/22/13 13:40 | Prepared: 06/05/13 10:24 | Analyzed: 06/05/13 10:24
Solids: | Preparation: 5030B | Dilution: 1
Batch: 3F05001 | Sequence: 3F15712 | Calibration: 3127004 | Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

OK 05CCH

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	26.68	88.9	75 - 120	
Dibromofluoromethane	30.00	30.30	101	85 - 115	
1,2-Dichloroethane-d4	30.00	29.72	99.1	70 - 120	
Toluene-d8	30.00	31.74	106	85 - 120	

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009

ANALYSIS DATA SHEET

VEP4-GW12-0513

Laboratory: Empirical Laboratories, LLC | SDG: 1305268
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1305268-04 | File ID: 0526804.D
Sampled: 05/23/13 11:50 | Prepared: 06/01/13 00:00 | Analyzed: 06/01/13 14:00
Solids: | Preparation: 5030B | Dilution: 1
Batch: 3F01002 | Sequence: 3F15404 | Calibration: 3127004 | Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene	**1.80**	0.100	0.200	0.500	
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	26.85	89.5	75 - 120	
Dibromofluoromethane	30.00	29.37	97.9	85 - 115	
1,2-Dichloroethane-d4	30.00	29.41	98.0	70 - 120	
Toluene-d8	30.00	29.97	99.9	85 - 120	

LM 112413

010

ANALYSIS DATA SHEET

VEP4-TB01-052313

Laboratory: Empirical Laboratories, LLC | SDG: 1305268
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1305268-05 | File ID: 0526805.D
Sampled: 05/23/13 12:45 | Prepared: 06/05/13 11:30 | Analyzed: 06/05/13 11:30
Solids: | Preparation: 5030B | Dilution: 1
Batch: 3F05001 | Sequence: 3F15712 | Calibration: 3127004 | Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

OK 05CCH

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	26.38	87.9	75 - 120	
Dibromofluoromethane	30.00	30.70	102	85 - 115	
1,2-Dichloroethane-d4	30.00	30.36	101	70 - 120	
Toluene-d8	30.00	31.10	104	85 - 120	

LM 112413

011

ANALYSIS DATA SHEET

VEP4-EB01-052313-GW

Laboratory: Empirical Laboratories, LLC | SDG: 1305268
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1305268-06 | File ID: 0526806.D
Sampled: 05/23/13 12:50 | Prepared: 06/05/13 11:55 | Analyzed: 06/05/13 11:55
Solids: | Preparation: 5030B | Dilution: 1
Batch: 3F05001 | Sequence: 3F15712 | Calibration: 3127004 | Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

OK 05CCH

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	25.97	86.6	75 - 120	
Dibromofluoromethane	30.00	30.70	102	85 - 115	
1,2-Dichloroethane-d4	30.00	29.49	98.3	70 - 120	
Toluene-d8	30.00	30.97	103	85 - 120	

LM 112413

012

ANALYSIS DATA SHEET

VEP4-GW11-0513

Laboratory:	Empirical Laboratories, LLC		SDG:	1305268	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1305268-02	File ID:	0526802.D
Sampled:	05/23/13 09:15	Prepared:	05/28/13 11:20	Analyzed:	06/03/13 14:32
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3E28005	Sequence:	3F15501	Calibration:	3122001

Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.250	0.500	1.00	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	50.00	35.85	71.7	50 - 110	
Terphenyl-d14	50.00	40.57	81.1	50 - 135	
2,4,6-Tribromophenol	100.0	83.94	83.9	40 - 125	

MM 11/24/13

017

ANALYSIS DATA SHEET

VEP4-EB01-052213-GW

Laboratory:	Empirical Laboratories, LLC		SDG:	1305268	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1305268-03	File ID:	0526803.D
Sampled:	05/22/13 13:40	Prepared:	05/28/13 11:20	Analyzed:	06/03/13 14:59
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3E28005	Sequence:	3F15501	Calibration:	3122001

Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.250	0.500	1.00	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	50.00	41.10	82.2	50 - 110	
Terphenyl-d14	50.00	42.38	84.8	50 - 135	
2,4,6-Tribromophenol	100.0	97.52	97.5	40 - 125	

MM 11/24/13

01

ANALYSIS DATA SHEET

VEP4-GW12-0513

Laboratory:	Empirical Laboratories, LLC		SDG:	1305268	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1305268-04	File ID:	0526804.D
Sampled:	05/23/13 11:50	Prepared:	05/28/13 11:20	Analyzed:	06/03/13 15:26
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3E28005	Sequence:	3F15501	Calibration:	3122001

Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.263	0.526	1.05	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	52.63	44.39	84.3	50 - 110	
Terphenyl-d14	52.63	45.50	86.4	50 - 135	
2,4,6-Tribromophenol	105.3	51.23	48.7	40 - 125	

MM 11/24/13

015

ANALYSIS DATA SHEET

VEP4-EB01-052313-GW

Laboratory:	Empirical Laboratories, LLC		SDG:	1305268	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1305268-06	File ID:	0526806.D
Sampled:	05/23/13 12:50	Prepared:	05/28/13 11:20	Analyzed:	06/03/13 15:53
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3E28005	Sequence:	3F15501	Calibration:	3122001

Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.250	0.500	1.00	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	50.00	37.63	75.3	50 - 110	
Terphenyl-d14	50.00	42.40	84.8	50 - 135	
2,4,6-Tribromophenol	100.0	86.15	86.2	40 - 125	

MM 11/24/13

01

Sample Delivery Group Case Narrative

Receipt Information
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Changes to the Revision
This is an original submittal of the final report package.

Analytical Information
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:
The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

017

SW8260B:
The following continuing calibration verifications exceeded criteria:
3F15712-CCV1 with a positive bias for Vinyl Chloride

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

SW8270D BNA:
Note – While the Perylene-d12 internal standard shifted outside +/-0.5min from the initial calibration in 3E14803-CCV1, 3F15501-CCV1, 3E23014-BLK2, -BS2, 3E28005-BLK2, -BS2, 1305268-01, -02, -03, -04, and -06 it is identified by the mass spectrum. This minimal shift would have no impact on the reported results.

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

018

EMPIRICAL LABORATORIES, LLC - CHAIN OF CUSTODY RECORD
SHIP TO: 621 Mainstream Drive, Suite 270 • Nashville, TN 37228 • 615-345-1115 • (fax) 615-846-5426

1305268 — 18759

Send Results to: Name Michael Carbone; Company CHA Hill; Address 15010 Conference Cntr Dr; City Chantilly; State, Zip VA 20151; Phone 703 376 5501; Fax 703 376 2811; E-mail mcarbone@chahill.com

Send Invoice to: Name; Company; Address; City; State, Zip; Phone; Fax; E-mail

Project No./Name:

Sampler's (Signature): Michael Carbone

Analysis Requirements: VOC (Low-Dilution); VOC (Std)

Lab Use Only: VOA Headspace Y N NA; Field Filtered Y N NA; Correct Containers Y N NA; Discrepancies Y N NA; Cust. Seals Intact Y N NA; Containers Intact Y N NA

Airbill #: 7998 3448 0030

CAR #:

Lab Use Only Lab #	Date/Time Sampled	Sample Description	Sample Matrix	VOC (Low-Dilution)	VOC (Std)	Comments	No. of Bottles	Lab Use Only Containers/Pres.
01	5/23/13 10:50	VEPA-GV15-052313	GW	X	X	next-day	5	
02	5/23/13 09:15	VEPA-GV11-0513	GW	X	X	7-day	5	
03	5/23/13 12:30	VEPA-EG01-052313-GW	AQ	X	X	std	5	
04	5/23/13 11:50	VEPA-GW4-0513	GW	X	X	7-day	5	
05	5/23/13 14:45	VEPA-TB01-052313	AQ	X	X	std	2	
06	5/23/13 14:30	VEPA-EG01-052313-GW	AQ	X	X	std	5	

REMARKS:

Details: Page 1 of 1; Cooler No. 1 of 1; Date Shipped 5/23/13; Shipped By MTZ; Turnaround N/A

Sample Kit Prep'd by: (Signature) Date/Time; Received By: (Signature) MTZ

Relinquished by: (Signature) Date/Time 5/24/13 1330; Received By: (Signature)

Relinquished by: (Signature) Date/Time; Received By: (Signature)

Received for Laboratory by: (Signature) Date/Time 5/24/13 0830; Temperature 0.5 IAST

Distribution: Original and yellow copies accompany sample shipment to laboratory; Pink retained by samplers.

1305268 Summ Package

EMPIRICAL LABORATORIES
COOLER RECEIPT FORM

Cooler Received/Opened On: 05/24/13 @ 0830 Workorder# 1305268

1. Tracking # 0030 (last 4 digits, FedEx)
   Courier: FEDEX
2. Temperature of rep. sample or temp blank when opened: 0.5 °C + correction factor (-0.1) = 0.4 °C
3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES (NO) NA
4. Were custody seals on outside of cooler? YES (NO) NA
   If yes, how many and where: 2 - Front + Back
5. Were the seals intact, signed, and dated correctly? YES NO NA
6. Were custody papers inside cooler? YES NO NA
   I certify that I opened the cooler and answered questions 1-6 (initial) BC
7. Were custody seals on containers: YES (NO) and intact YES NO (NA)
   Were these signed and dated correctly? YES NO (NA)
8. Packing material used: Bubblewrap (Plastic bag) Peanuts Vermiculite Foam Insert Paper Other None
9. Cooling process: (Ice) Ice-pack Ice (direct contact) Dry Ice Other None
10. Did all containers arrive in good condition (unbroken)? YES NO NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES NO NA
12. Did all container labels and tags agree with custody papers? YES NO NA
13. a. Were VOA vials received? YES NO NA
    b. Was there any observable headspace present in any VOA vial? YES NO NA
14. Was there a Trip Blank in this cooler? (YES) NO NA If multiple coolers, sequence #
    I certify that I unloaded the cooler and answered questions 7-14 (initial) BC
15. a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES NO (NA)
    b. Did the bottle labels indicate that the correct preservatives were used YES NO NA
16. Was residual chlorine present? YES NO (NA)
    I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial) BC
17. Were custody papers properly filled out (ink, signed, etc)? YES NO NA
18. Did you sign the custody papers in the appropriate place? YES NO NA
19. Were correct containers used for the analysis requested? YES NO NA
20. Was sufficient amount of sample sent in each container? YES NO NA
    I certify that I entered this project into LIMS and answered questions 17-20 (initial) BC
    I certify that I attached a label with the unique LIMS number to each container (initial) BC
    I certify that I have performed a second check of the LIMS information against the COC to confirm accuracy (initial) BC
21. Were there Non-Conformance issues at login? YES (NO) Was a NCR generated? YES (NO) #

Additional Details:

C:\Documents and Settings\bwright\Desktop\New CRF.doc1.doc

Page 1 of 1

023

YES NO N/A

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 1305268 LAB: Empirical

SITE NAME: Vieques SWMU 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. **VOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓ ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓ ___ ___

1.3 Sample Conditions/Problems

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

A 5/23/13 a 6/1-5
A 5/24 t 0 4°C

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ ✓ ___

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water ✓ ___ ___

b. Soil ___ ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water ✓ ___ ___

b. Soil ___ ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. ✓ ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? ___ ___ ✓

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. ___ ✓ ___

If yes, were samples reanalyzed? ___ ___ ✓

Were method blanks reanalyzed? ___ ___ ✓

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] ✓ ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ ✓

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] ✓ ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent)

MS MSD/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] ___ ___ ✓

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] ___ ___ ✓

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month (page 8000C, section 9.5.1)

a. Water [ ] ___ ✓

b. Waste [ ] ___ ✓

c. Soil/Solid [ ] ___ ✓

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [ ] ___ ___ ✓

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ ✓

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? ✓

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? ✓

6.3 Has a method blank been analyzed for each GC/MS system used ? ✓

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data – chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? ✓

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ✓

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ✓

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and ≤ blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone
** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE) If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ☑ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ☑ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ☑ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ☑ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ☑ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ☑ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ☑ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ☑ ___

9.7 Have the appropriate number of significant figures (two) been reported? ☑ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ☑ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ☑ ___ ___

b. Matrix spikes and matrix spike duplicates ☐ ___ ☑

c. Blanks ☑ ___ ___

d. Laboratory Control Samples ☑ ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ☑ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ☐ ___ ☑

c. Blanks ☑ ___ ___

d. Laboratory Control Samples ☑ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? ☑ ___ ___

YES NO N/A

Résolution? ☑ ___ ___

Peak shape? ☑ ___ ___

Full-scale graph (attenuation)? ☑ ___ ___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? ☑ ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reportec compound within 0.06 RRT units of the standard RRT in the continuing calibration? ☑ ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ☑ ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ☑ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

No TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ ✓

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ ✓

b. Blanks [ ] ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ ✓

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ ✓

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2 (M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] ___ ✓

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ ✓

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? M ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? M ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39) qualify positive results for that analyte "J". When % RSD > 90%, Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? M ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. [ ] ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? ☑ ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) ☐ ☑ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? ☑ ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ☑ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? ☑ ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Asseasment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). ☑ ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ANALYSIS SEQUENCE SUMMARY
SW8260B

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Sequence: 3F15712
Calibration: 3127004

SDG: 1305268
Project: Vieques East SWMU 20
Instrument: MS-VOA5

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
MS Tune	3F15712-TUN1	0605TUN1.D	06/05/13 07:07
Calibration Check	3F15712-CCV1	0605CCV1.D	06/05/13 07:36
LCS	3F05001-BS1	0605LCS1.D	06/05/13 08:05
Blank	3F05001-BLK1	0605BLK1.D	06/05/13 09:56
VEP4-EB01-052213-GW	1305268-03	0526803.D	06/05/13 10:24
VEP4-TB01-052313	1305268-05	0526805.D	06/05/13 11:30
VEP4-EB01-052313-GW	1305268-06	0526806.D	06/05/13 11:58

CONTINUING CALIBRATION CHECK
SW8260B

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Instrument ID: MS-VOA5
Lab File ID: 0605CCV1.D
Sequence: 3F15712
Lab Sample ID: 3F15712-CCV1

SDG: 1305268
Project: Vieques East SWMU 20
Calibration: 3127004
Calibration Date: 08/03/13 16:26
Injection Date: 06/05/13
Injection Time: 07:36

COMPOUND	TYPE	CONC (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
		STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT (#)
1,1-Dichloroethene	A	100.0	83.90	0.2690732	0.2257491		-16.1	20
cis+1,2-Dichloroethene	A	100.0	98.66	0.3014068	0.2973725		-1.3	20
trans-1,2-Dichloroethene	A	100.0	94.26	0.2786249	0.2626374		-5.7	20
Tetrachloroethene	A	100.0	103.3	0.6283694	0.6490766		3.3	20
Trichloroethene	A	100.0	95.14	0.2900884	0.2759903		-4.9	20
Vinyl chloride	L	100.0	125.5	0.2186541	0.2431291		25.5	20 *
Bromofluorobenzene	A	30.00	29.57	0.9050802	0.8920043		-1.4	20
Dibromofluoromethane	A	30.00	32.51	0.3161834	0.3426726		8.4	20
1,2-Dichloroethane-d4	A	30.00	29.92	6.210881E-02	6.185333E-02		-0.3	20
Toluene-d8	A	30.00	29.28	2.228607	2.175089		-2.4	20

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? ✓ ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:
1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.
2. Do not qualify non-detects when the associated IS are counts area > + 100%.
3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".
4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ___ ✓ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

YES NO N/A

E - The concentration of this analyte exceeds the calibration range of the instrument.

A - Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 1305268 LAB: Empirical

SITE NAME: Virgilia SW0120

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the data assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative or cover letter present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

YES NO N/A

II. **SEMIVOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? [✓] ___ ___

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ [✓] ___

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, all non-detects data are qualified as unusable (R), and detects are flagged "J".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (10°C), flag all positive results "J" and all non-detects "UJ". t = 0.4°C

a 5/23/13 e 5/28
a 5/24 a 6/3

2.0 Holding Times

2.1 Have any semivolatile technical holding times, determined from date of collection to date of extraction, been exceeded? ___ [✓] ___

Continuous extraction of water samples for semivolatile analysis must be started within 7 days of the date of collection. Soil/sediment samples must be extracted within 14 days of collection. Extracts must be analyzed within

YES NO N/A

40 days of the date of extraction.

Table of Holding Time Violations

Sample ID	Sample Matrix	Date Sampled	Date Lab Received	(See Traffic Report) Date Extracted	Date Analyzed

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

YES NO N/A

3.0 Surrogate Recovery (Form II/Equivalent)

3.1 Have the semi volatile surrogate recoveries been listed on CLP Surrogate Recovery forms (Form II) for each of the following matrices:

a. Low Water [✓] ___ ___

b. Low/Med Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery Summary forms for each matrix:

a. Low Water [✓] ___ ___

b. Low/Med Soil [ ] ___ ___

ACTION: If CLP deliverables are unavailable, document the effect(s) in data assessments. In some cases the lab may have to be contacted to obtain the data necessary to complete the validation.

3.3 Were outliers marked correctly with an asterisk? [ ] ___ [✓]

ACTION: Circle all outliers in red.

3.4 Were two or more base neutral OR acid surrogate recoveries out of specification for any sample or method blank (Reviewer should use lab in house recovery limits. Use surrogate recovery limits from USEPA National Functional Guidlines January 2005 page 130, if in house limits are not available. See Method 8000B-43 or 8000C-24). [ ] [✓] ___

Note: Examine lab in house limits for reasonableness.

If yes, were samples re-analyzed? [ ] ___ [✓]

YES NO N/A

Were method blanks re-analyzed? [ ] ___ [✓]

ACTION: If all surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet method specifications, for the affected fraction only (i.e. either base-neutral or acid compounds):

1. Flag all positive results as estimated ("J").

2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.

3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Positive results for the fraction with < 10% surrogate recovery are qualified with "J".

2. Non-detects for that fraction should be qualified as unusable (R) .

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ [✓] ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document

YES NO N/A

effect in data assessments.

4.0 Matrix Spikes (Form III/Equivalent)

No MS/MSD

4.1 Have the semivolatile Matrix Spike and Matrix Spike Duplicate/or duplicate unspiked Sample recoveries been listed on the Recovery Form (Form III)? | | ___ ✓

NOTE: Method 3500B/page 4 states the spiking compounds:

Base/neutrals	Acids
1,2,4-Trichlorobenzene	Pentachlorophenol
Acenaphthene	Phenol
2,4-Dinitrotoluene	2-Chlorophenol
Pyrene	4-Chloro-3-methylphenol
N-Nitroso-di-n-propylamine	4-Nitrophenol
1,4-Dichlorobenzene	

Note: Some projects may require the spiking of specific compounds of interest.

Note: See Method 8270D-sec 8.4.2 for deciding on whether to prepare and analyze duplicate samples or a martix spike/matrix spike duplicate. If samples are expected to contain Large analytes, then laboratory may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratory should use a matrix spike and matrix spike duplicate pair.

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water | | ___ ✓

b. Low Solid | | ___ ✓

c. Med Solid | | ___ ✓

YES NO N/A

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. It may be necessary to contact the lab to obtain the required data.

NOTE: If the data has not been reported on CLP equivalent form, then the laboratory must provide the information necessary to evaluate the spike recoveries in the MS and MSD. The required data which should have been provided by the lab include the analytes and concentrations used for spiking, background concentrations of the spiked analytes (i.e., concentrations in unspiked sample), methods and equations used to calculate the QC acceptance criteria for the spiked analytes, percent recovery data for all spiked analytes.

The data reviewer must verify that all reported equations and percent recoveries are correct before proceeding to the next section.

4.3 Were matrix spikes performed at concentration equal to 100ug/L for acid compounds, and 200ug/l for base compounds (Method 3500B-4), or those specified in project plan. | | ___ ✓

4.4 How many semivolatile spike recoveries are outside Laboratory in house MS/MSD recovery limits (use recovery limits values in Method 8270D-43444 Table 6 if in house values not available).

Water	Solids
___ out of ___	___ out of ___

YES NO N/A

4.5 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water	Solids
___ out of ___	___ out of ___

ACTION: Circle all outliers with red pencil.

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria to determine the need for some qualification of the data.

4.6 Was a Laboratory Control Sample (LCS) analyzed with each analytical batch? ✓ ___ ___

NOTE: When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

5.0 Blanks (Form IV/Equivalent)

5.1 Is the Method Blank Summary (Form IV) present? ✓ ___ ___

5.2 Frequency of Analysis:

Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? ✓ ___ ___

5.3 Has a method blank been analyzed either after

YES NO N/A

the calibration standard or at any other time during the analytical shift for each GC/MS system used ? ✓ ___ ___

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, use professional judgement to determine if the associated sample data should be qualified.

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for the semivolatiles? ✓ ___ ___

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ✓ ___

6.2 Do any field/rinse/ blanks have positive results for target analytes and/or TICs (if required, see section 10 below)? ___ ✓ ___

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field Blanks must be qualified for outlying surrogates, poor spectra, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify sample results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R)

YES NO N/A

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

NOTE: If the laboratory did not report TIC analyses, check the project plans to verify whether or not it was required.

6.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

6.4 Was a instrument blank analyzed after each sample/dilution which contained a target compound

YES NO N/A

that exceeded the initial calibration range. ___ ___ ✓

6.5 Does the instrument blank have positive results for target analytes and/or TICs? ___ ✓ ___

Note: Use professional judgement to determine if carryover occurred and qualify analytes accordingly.

7.0 GC/MS Apparatus and Materials

7.1 Did the lab use the proper gas chromatographic column for analysis of semivolatiles by Method 8270D? Check raw data, instrument logs or contact the lab to determine what type of column was used. The method requires the use of 30 m x 0.25 mm ID (or 0.32 mm ID), silicone-coated, fused silica, capillary column. ✓ ___ ___

ACTION: If the specified column, or equivalent, was not used, document the effects in the data assessment. Use professional judgement to determine the acceptability of the data.

8.0 GC/MS Instrument Performance Check (Form V/Equivalent)

8.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)? ✓ ___ ___

NOTE: The performance solution should also contain 4,4-DDT, pentachlorophenol, and benzidine to verify injection port inertness and column performance. The degradation of DDT to DDE and DDD must be less than 20% total and the response of pentachlorophenol and benzidine should be within normal ranges for these compounds (based upon lab experience) and show no peak degradation or tailing before samples are analyzed. (see section 5.5

YES NO N/A

page 8270D-12).

8.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? ✓ ___ ___

8.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

8.4 Have the ion abundances been normalized to m/z 198? ✓ ___ ___

8.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

YES NO N/A

ACTION: If ion abundance criteria are not met, take action specified in section 3.2

8.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.) ___ ☑ ___

8.7 Have the appropriate number of significant figures (two) been reported? ☑ ___ ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.

8.8 Are the spectra of the mass calibration compound acceptable? ☑ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

9.0 Target Analytes

9.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ☑ ___ ___

b. Matrix spikes and matrix spike duplicates ☐ ___ ☑

c. Blanks ☑ ___ ___

9.2 Has any special cleanup, such as GPC, been performed on all soil/sediment sample extracts (see section 7.2, page 8270D-14)? ☐ ___ ☑

YES NO N/A

ACTION: If data suggests that extract cleanup was not performed, use professional judgement. Make note in the data assessment narrative.

9.3 Are the Reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ☑ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ☐ ___ ☑

c. Blanks ☑ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

9.4 Are the response factors shown in the Quant Report? ☑ ___ ___

9.5 Is chromatographic performance acceptable with respect to:

Baseline stability? ☑ ___ ___

Resolution? ☑ ___ ___

Peak shape? ☑ ___ ___

Full-scale graph (attenuation)? ☑ ___ ___

Other:_____ ☐ ___ ___

ACTION: Use professional judgement to determine the acceptability of the data.

9.6 Are the lab-generated standard mass spectra of identified semivolatile compounds present for

YES NO N/A

each sample? ☑ ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the data assessment narrative. If spectra are missing, reject all positive data.

9.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? ☑ ___ ___

9.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ☑ ___ ___

9.9 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ☑ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 9.7, 9.8, and 9.9.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

YES NO N/A

10.0 Tentatively Identified Compounds (TIC)

10.1 If Tentatively Identified Compounds were required for this project, are all Form Is, Part B present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier? NO TICs

NOTE: Review sampling reports to determine if the lab was required to identify non target analytes (refer to section 7.6.2,page 8270D-21).

10.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following: ☐ ___ ☑

a. Samples and/or fractions as appropriate ☐ ___ ☑

b. Blanks ☐ ___ ☑

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by CAS #.

10.3 Are any target compounds from one fraction listed as TIC compounds in another (e.g., an acid compound listed as a base neutral TIC)? ___ ☐ ☑

ACTION: i. Flag with "R" any target compound listed as a TIC.

ii. Make sure all rejected compounds are properly reported in the other fraction.

10.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the

YES NO N/A

sample mass spectrum? ✓ ___ ___

10.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? ✓ ___ ___

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate and remove "JN". Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R."

11.0 Compound Quantitation and Reported Detection Limits

11.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found? ___ ✓ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

11.2 Are the method detection limits adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ ✓

YES NO N/A

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I (if present) and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red " X" across the entire page of all Form I's that should not be used, including any in the summary package.

12.0 Standards Data (GC/MS)

12.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration? ✓ ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

13.0 GC/MS Initial Calibration (Form VI/Equivalent)

13.1 Is the Initial Calibration Form (Form VI/ Equivalent) present and complete for the semivolatile fraction? ✓ ___ ___

ACTION: If any calibration forms or standard row data are missing, take action specified in 3.2 above.

13.2 Are all base neutral or acid RRFs > 0.050? ✓ ___ ___

YES NO N/A

Check the **average RRFs** of the four System Performance Check Compounds (SPCCs): N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. These compounds must have **average RRFs** greater than or equal to 0.05 before running samples and should not show any peak tailing.

ACTION: Circle all outliers in red.

ACTION: For any target analyte with **average RRF <0.05**

1. "R" all non-detects;

2. "J" all positive results.

13.3 Are response factors for base neutral or acid target analytes stable over the concentration range of the calibration (% Relative standard deviation [%RSD] < 20.0%)? ✓ ___ ___

NOTE: The % RSD for each individual Calibration Check Compound (CCC, Method 8270D-40 see Table 4) must be less than 30% before analysis can begin. If grater 30%, the lab must clean and recalibrate the instrument.

CALIBRATION CHECK COMPOUNDS

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol

YES NO N/A

Benzo(a)pyrene

ACTION: If the %RSD for any CCC >30% and no corrective action taken, then "J" qualify all positive hits and "UJ" qualify all non-detects.

ACTION: Circle all outliers in red.

ACTION: If the % RSD is ≥ 20.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non- detect results for that analyte "R," unusable. Alternatively, the lab should calculate first or second order regression fit of the calibration curve and select the fit which introduces the least amount of error.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

13.4 Did the laboratory calculate the calibration curve by the least squares regression fit? ___ ✓ ___

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) ___ ✓ ___

ACTION: Circle Errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

13.5 Do the target compounds for this SDG include Pesticides? [ ] ___ ✓ ___

YES NO N/A

13.6 If the pesticide compounds include DDT, was the percent breakdown of DDT to DDD and DDE greater than 20%? ___ [ ] ✓

ACTION: If DDT percent breakdown exceeds 20%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE results are positive, qualify the quantitation limit for DDT as unusable, "R".

ii. Qualify all positive results for DDD and DDE as presumptively present at an approximate concentration "JN".

14.0 GC/MS Calibration Verification (Form VII/Equivalent)

14.1 Are the Calibration Verification Forms (Form VII) present and complete for all compounds of interest? ✓ ___ ___

14.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

_____

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed within twelve hours of every sample analysis,

YES NO N/A

call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

14.3 Do any of the SPCCs have an RRF <0.05? ___ ✓ ___

If YES, make a note in data assessment if the lab did not take corrective action specified in section 7.4.4, page 8270D-18. [ ] ✓ ___

14.4 Do any of the CCCs have a %D between the initial and continuing RRF which exceeds 20.0%?

ACTION: If yes, make a note in data assessment.

14.5 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds 20.0%? ___ ✓ ___

ACTION: Circle all outliers in red.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is above 90%, qualify all non-detects for that analyte as "R", unusable.

14.6 Do any semivolatile compounds have a RRF < 0.05? ___ ✓ ___

ACTION: Circle all outliers in red.

ACTION: If RRF < 0.05, qualify as unusable ("R") associated non-detects and "J" associated positive values.

14.7 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or percent difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more). ___ ✓ ___

YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect(s) in the data assessments.

15.0 Internal Standards (Form VIII)

15.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to + 100%) for each continuing calibration? ✓ ___ ___

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area	LowerLimit	Upper Limit

(Attach additional sheets if necessary.)

Note: Check Table 5, 8270D-41 for associated analytes.

ACTION: i. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

ii. Non-detects associated with IS > 100% should not be qualified.

YES NO N/A

iii. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

15.2 Are the retention times of all internal standards within 30 seconds of the associated calibration standard? [ ] ✓ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds. see attached form

16.0 Laboratory Control Samples (LCS)

16.1 Were any LCS samples run in order to verify analytes which failed criteria for spike recovery? [ ] ✓ ___

16.2 Did the lab spike LCS sample spiked with the same analytes and the same concentrations as the matrix spike? [ ] ___ ✓

16.3 Were the mean and standard deviation of all analytes within the QC acceptance ranges as shown in Table 6, 8270D-43? ✓ ___ ___

ACTION: If the recovery of any analyte falls out of the designated range, the analytical results for that compound is suspect and should be qualified "J" in the unspiked samples.

17.0 Field Duplicates

17.1 Were any field duplicates submitted for semivolatile analysis? [ ] ✓ ___

INTERNAL STANDARD AREA AND RT SUMMARY
SW8270D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Sequence: 3F15501

SDG: 1305268
Project: Vieques East SWMU 20
Instrument: MS-BNA4
Calibration: 3172001

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Calibration Check (3F15501-CCV1)			Lab File ID: SEQ-CCV1.D			Analyzed: 06/03/13 12:44			
Phenanthrene-d10	358821	10.054	321039	10.545	112	50 - 200	-0.4910	+/-0.50	
Perylene-d12	416067	16.208	337266	17.137	123	50 - 200	-0.9290	+/-0.50	*
Blank (3E28005-BLK2)			Lab File ID: E28005B1.D			Analyzed: 06/03/13 13:11			
Phenanthrene-d10	384012	10.05	321039	10.545	120	50 - 200	-0.4950	+/-0.50	
Perylene-d12	448839	16.203	337266	17.137	133	50 - 200	-0.9340	+/-0.50	*
LCS (3E28005-BS2)			Lab File ID: E28005L1.D			Analyzed: 06/03/13 13:38			
Phenanthrene-d10	376269	10.049	321039	10.545	117	50 - 200	-0.4960	+/-0.50	
Perylene-d12	440397	16.203	337266	17.137	131	50 - 200	-0.9340	+/-0.50	*
VEP4-GW11-0513 (1305268-02)			Lab File ID: 0526802.D			Analyzed: 06/03/13 14:32			
Phenanthrene-d10	382058	10.049	321039	10.545	119	50 - 200	-0.4960	+/-0.50	
Perylene-d12	442285	16.203	337266	17.137	131	50 - 200	-0.9340	+/-0.50	*
VEP4-EB01-052213-GW (1305268-03)			Lab File ID: 0526803.D			Analyzed: 06/03/13 14:59			
Phenanthrene-d10	267585	10.049	321039	10.545	83	50 - 200	-0.4960	+/-0.50	
Perylene-d12	313817	16.203	337266	17.137	93	50 - 200	-0.9340	+/-0.50	*
VEP4-GW12-0513 (1305268-04)			Lab File ID: 0526804.D			Analyzed: 06/03/13 15:26			
Phenanthrene-d10	350085	10.049	321039	10.545	109	50 - 200	-0.4960	+/-0.50	
Perylene-d12	406181	16.203	337266	17.137	120	50 - 200	-0.9340	+/-0.50	*
VEP4-EB01-052313-GW (1305268-06)			Lab File ID: 0526806.D			Analyzed: 06/03/13 15:53			
Phenanthrene-d10	328301	10.05	321039	10.545	102	50 - 200	-0.4960	+/-0.50	
Perylene-d12	381632	16.204	337266	17.137	113	50 - 200	-0.9330	+/-0.50	*

Target compd not associated w/ IS's perylene-d12 — no qual

(7)

1305268 Summ Package

93

USEPA Region II
SW846 Method 8270D (Rev.4, January 1998)

Date: August, 2008
SOP HW-22 Rev.4

YES NO N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

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07

DataQual
Environmental Services, LLC

CH2M HILL-VBO
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

December 9, 2013
SDG# 1305279, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1305279. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24 and 8270D-Rev 4, August 2008-SOP #HW-22,), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA	SVOA
VEP4-GW14-0513	1305279-01	water	X	X
VEP4-EB01-052413-GW	1305279-02	water	X	X
VEP4-TB01-052413	1305279-03	water	X	

The following quality control samples were provided with this SDG: sample VEP4-EB01-052413-GW - equipment blank and sample VEP4-TB01-052413- trip blank.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Field Duplicates NA
- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

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001

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

Due to high %D in the continuing calibration, qualifications were added to the data.

SVOA

No qualifications were required to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to chain of custody records, sampling was performed on 5/24/13 and samples were received at the laboratory 5/25/13. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

Initial/Continuing Calibration

VOA

Calibration standards exhibited %Ds that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results were qualified as indicated.

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1305279

002

Standard ID	Compound(s)	%D	Samples	Q Flag	Qual Code
CC 6/4/13 CC 6/5/13	vinyl chloride	29.7 30.7	all samples	J/UJ	CCH

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
all samples	vinyl chloride	+/-	J/UJ	CCH

SVOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U not detected above the reported sample quantitation limit
J estimated value
UJ reported quantitation limit is qualified as estimated
N analyte has been tentatively identified
JN analyte has been tentatively identified, estimated value
R result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.

U* The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.

RL** The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.

J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.
Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL reporting limit
PQL practical quantitation limit
IDL instrument detection limit
MDL method detection limit
CRDL contract required detection limit
CRQL contract required quantitation limit
+ positive result
- non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1305279

007

ANALYSIS DATA SHEET

VEP4-GW14-0513

Laboratory: Empirical Laboratories, LLC — SDG: 1305279
Client: CH2M Hill, Inc. — Project: Vieques East SWMU 20
Matrix: Water — Laboratory ID: 1305279-01 — File ID: 0527901.D
Sampled: 05/24/13 09:20 — Prepared: 06/04/13 21:43 — Analyzed: 06/04/13 21:43
Solids: — Preparation: 5030B — Dilution: 1
Batch: 3F04013 — Sequence: 3F15601 — Calibration: 3127004 — Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene	0.300	0.100	0.200	0.500	J
75-01-4	Vinyl chloride		0.140	0.200	0.500	UX ~~U~~ CCH

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.37	91.2	75 - 120	
Dibromofluoromethane	30.00	30.44	101	85 - 115	
1,2-Dichloroethane-d4	30.00	28.69	95.6	70 - 120	
Toluene-d8	30.00	30.43	101	85 - 120	

WM 11/2013

ANALYSIS DATA SHEET

VEP4-EB01-052413-GW

Laboratory: Empirical Laboratories, LLC — SDG: 1305279
Client: CH2M Hill, Inc. — Project: Vieques East SWMU 20
Matrix: Water — Laboratory ID: 1305279-02 — File ID: 0527902.D
Sampled: 05/24/13 10:10 — Prepared: 06/06/13 00:01 — Analyzed: 06/06/13 00:01
Solids: — Preparation: 5030B — Dilution: 1
Batch: 3F05018 — Sequence: 3E15714 — Calibration: 3127004 — Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	UX ~~U~~ CCH

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	26.38	87.9	75 - 120	
Dibromofluoromethane	30.00	30.33	101	85 - 115	
1,2-Dichloroethane-d4	30.00	31.02	103	70 - 120	
Toluene-d8	30.00	31.76	106	85 - 120	

WM 11/2013

ANALYSIS DATA SHEET

VEP4-TB01-052413

Laboratory: Empirical Laboratories, LLC — SDG: 1305279
Client: CH2M Hill, Inc. — Project: Vieques East SWMU 20
Matrix: Water — Laboratory ID: 1305279-03 — File ID: 0527903.D
Sampled: 05/24/13 10:25 — Prepared: 06/06/13 00:29 — Analyzed: 06/06/13 00:29
Solids: — Preparation: 5030B — Dilution: 1
Batch: 3F05018 — Sequence: 3E15714 — Calibration: 3127004 — Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	UX ~~U~~ CCH

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	26.98	89.9	75 - 120	
Dibromofluoromethane	30.00	30.04	100	85 - 115	
1,2-Dichloroethane-d4	30.00	30.20	101	70 - 120	
Toluene-d8	30.00	31.76	106	85 - 120	

WM 11/2013

ANALYSIS DATA SHEET

VEP4-GW14-0513

Laboratory:	Empirical Laboratories, LLC			SDG:	1305279		
Client:	CH2M Hill, Inc.			Project:	Vieques East SWMU 20		
Matrix:	Water	Laboratory ID:	1305279-01	File ID:	0527901.D		
Sampled:	05/24/13 09:20	Prepared:	05/30/13 10:10	Analyzed:	05/30/13 20:56		
Solids:		Preparation:	EXT_3510	Dilution:	1		
Batch:	3E29032	Sequence:	3E15107	Calibration:	3122001	Instrument:	MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.240	0.481	0.962	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	48.08	42.69	88.8	50 - 110	
Terphenyl-d14	48.08	39.68	82.5	50 - 135	
2,4,6-Tribromophenol	96.15	94.48	98.3	40 - 125	

MM 11/2/13

ANALYSIS DATA SHEET

VEP4-EB01-052413-GW

Laboratory:	Empirical Laboratories, LLC			SDG:	1305279		
Client:	CH2M Hill, Inc.			Project:	Vieques East SWMU 20		
Matrix:	Water	Laboratory ID:	1305279-02	File ID:	0527902.D		
Sampled:	05/24/13 10:10	Prepared:	05/30/13 10:10	Analyzed:	05/30/13 21:23		
Solids:		Preparation:	EXT_3510	Dilution:	1		
Batch:	3E29032	Sequence:	3E15107	Calibration:	3122001	Instrument:	MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.243	0.485	0.971	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	48.54	35.71	73.6	50 - 110	
Terphenyl-d14	48.54	42.45	87.4	50 - 135	
2,4,6-Tribromophenol	97.09	44.41	45.7	40 - 125	

MM 11/2/13

ELECTRONIC CHAIN OF CUSTODY RECORD

C.O.C. 20130524-GW-EMP-01

PLEASE PRINT

1305279

EMPIRICAL
621 Mainstream Dr.
Suite 270
Nashville, TN 37228
phone: 615-345-1115

Report to: Company Name: CH2MHILL
Address: 15010 Conference Dr.; 200
Chantilly, VA 20151
Attn: Mike Zamboni
Phone: 703.376.5301
Fax: 703.376.5801

Invoice to: Company Name: See Contact

Sampler (Print): not required
Sampler (Signature): not required
Purchase Order Number: 943380

Date Shipped: 5/24/13
Carrier: FedEx
Waybill No.: 799842801560

Sample Identification	Date Collected	Time Collected	No. of containers	Matrix	Comments
VEP4-GW14-0513	5/24/13	09:20	5	GW	7 day TAT
VEP4-EB01-052413-GW	5/24/13	10:10	5	✓	equipment blank
VEP4-TB01-052413	5/24/13	10:25	2	✓	trip blank

Sample Disposal: not applicable

Relinquished by sampler: [signature] Date: 5/24/13 Time: 1515

Received by lab: [signature] 5/25/13 0825

Note: The first sampled date of the ARF will be used as the COC number unless indicated otherwise.

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

EMPIRICAL LABORATORIES
COOLER RECEIPT FORM

Cooler Received/Opened On: 05/25/13 @ 0825 Workorder# 1305279

1. Tracking # 1550 (last 4 digits, FedEx)
   Courier: FED-EX
2. Temperature of rep. sample or temp blank when opened: 0.3 °C + correction factor (-0.1) = 0.2 °C
3. If item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES (NO) NA
4. Were custody seals on outside of cooler? (YES) NO NA
   If yes, how many and where: 2 - FRONT + BACK
5. Were the seals intact, signed, and dated correctly? (YES) NO NA
6. Were custody papers inside cooler? (YES) NO NA

I certify that I opened the cooler and answered questions 1-6 (initial)

7. Were custody seals on containers: YES (NO) and Intact YES NO (NA)
   Were these signed and dated correctly? YES NO (NA)
8. Packing material used? (Bubblewrap) (Plastic bag) Peanuts Vermiculite Foam insert Paper Other None
9. Cooling process: (Ice) Ice-pack Ice (direct contact) Dry ice Other None
10. Did all containers arrive in good condition (unbroken)? (YES) NO NA
11. Were all container labels complete (#, date, signed, pres., etc)? (YES) NO NA
12. Did all container labels and tags agree with custody papers? (YES) NO NA
13. a. Were VOA vials received? (YES) NO NA
    b. Was there any observable headspace present in any VOA vial? YES (NO) NA
14. Was there a Trip Blank in this cooler? (YES) NO NA If multiple coolers, sequence # —

I certify that I unloaded the cooler and answered questions 7-14 (initial)

15. a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES NO (NA)
    b. Did the bottle labels indicate that the correct preservatives were used (YES) NO NA
16. Was residual chlorine present? YES NO (NA)

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial)

17. Were custody papers properly filled out (ink, signed, etc)? (YES) NO NA
18. Did you sign the custody papers in the appropriate place? (YES) NO NA
19. Were correct containers used for the analysis requested? (YES) NO NA
20. Was sufficient amount of sample sent in each container? (YES) NO NA

I certify that I entered this project into LIMS and answered questions 17-20 (initial)

I certify that I attached a label with the unique LIMS number to each container (initial)

I certify that I have performed a second check of the LIMS information against the COC to confirm accuracy (initial)

21. Were there Non-Conformance issues at login? YES (NO) Was a NCR generated? YES (NO) #

Additional Details:

Sample Delivery Group Case Narrative

Receipt Information
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Changes to the Revision
This is an original submittal of the final report package.

Analytical Information
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:
The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

015

SW8260B:
The following were analyzed after the 12-hour tune criteria:
3F04013-BSD1 was analyzed 12 hours 1 minute after the associated tune standard

The following continuing calibration verifications exceeded criteria:
3F15601-CCV1 with a positive bias for Vinyl Chloride
3F15714-CCV1 with a positive bias for Vinyl Chloride

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

SW8270D BNA:
No anomalies or deviations are noted.

016

YES NO N/A

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 1305279 LAB: Empirical

SITE NAME: Vieques Summer 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓ __ __

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓ __ __

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ __ __

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. VOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓ __ __

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓ __ __

1.3 Sample Conditions/Problems

017

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? __ ✓ __

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? __ ✓ __

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

018

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water [✓] ___ ___

b. Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water [✓] ___ ___

b. Soil [ ] ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. [✓] ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ [✓]

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] [✓] ___

If yes, were samples reanalyzed? [ ] ___ [✓]

Were method blanks reanalyzed? [ ] ___ [✓]

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] [✓] ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ [✓]

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] [✓] ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent) NO MS/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] ___ ✓

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] ___ ✓

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month (page 8000C, section 9.5.1)

a. Water [ ] ___ ✓

b. Waste [ ] ___ ✓

c. Soil/Solid [ ] ___ ✓

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [ ] ___ ✓

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ ___ ✓

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? [✓] ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? [ ] ___ ___ ✓

6.3 Has a method blank been analyzed for each GC/MS system used ? [✓] ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? [ ] ___ ___ ✓

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. [ ] ___ ___ ✓

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contamination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone
** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.
1658hp run out of 12 hr clock - not reg since BC

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R". out by 1 min

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

ANALYSIS SEQUENCE SUMMARY
SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	1305279
Client:	CH2M Hill, Inc.	Project:	Vieques East SWMU 20
Sequence:	3F15601	Instrument:	MS-VOA5
Calibration:	3127904		

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
MS Tune	3F15601-TUN1	0604TUNE.D	06/04/13 18:29
Calibration Check	3F15601-CCV1	0604CCVE.D	06/04/13 18:57
LCS	3F04013-BS1	0604LCSE.D	06/04/13 19:25
Blank	3F04013-BLK1	0604BLKE.D	06/04/13 21:16
VEP4-GW14-0513	1305279-01	0527901.D	06/04/13 21:43
LCS Dup	3F04013-BSD1	0604LCDE.D	06/05/13 06:30

exceeded 12 hour clock by 1 min — no qual as LCS dup

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YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates [ ] ___ ✓

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) [ ] ___ ✓

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? [✓] ___ ___

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YES NO N/A

Resolution? [✓] ___ ___

Peak shape? [✓] ___ ___

Full-scale graph (attenuation)? [✓] ___ ___

Other: _____

ACTION: Use professional judgment to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of tentatively identified volatile compounds present for each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 20% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgment to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to not detected ("U") at the calculated detection limit. In order to be

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YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

no TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ ✓

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ ✓

b. Blanks [ ] ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ ✓

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ ✓

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unuseable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] ___ ___ ✓

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ ___ ✓

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? [ ] ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39) qualify positive results for that analyte "J", When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? [✓] ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. [✓] ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) [ ] ___ ✓ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

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YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? ✓ ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unuseable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceed the (SW-846, page 8260B-19, section 7.4.5.2). ✓ ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

- 27 VOA -

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ANALYSIS SEQUENCE SUMMARY
SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	1305279
Client:	CH2M Hill, Inc.	Project:	Vieques East SWMU 20
Sequence:	3F15601	Instrument:	MS-VOA5
Calibration:	3127004		

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
MS Tune	3F15601-TUN1	0604TUNE.D	06/04/13 18:29
Calibration Check	3F15601-CCV1	0604CCVE.D	06/04/13 18:57
LCS	3F04013-BS1	0604LCSE.D	06/04/13 19:25
Blank	3F04013-BLK1	0604BLKE.D	06/04/13 21:16
VEP4-GW14-0513	1305279-01	0527901.D	06/04/13 21:43
LCS Dup	3F04013-BSD1	0604LCDE.D	06/05/13 06:30

043

CONTINUING CALIBRATION CHECK
SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	1305279
Client:	CH2M Hill, Inc.	Project:	Vieques East SWMU 20
Instrument ID:	MS-VOA5	Calibration:	3127004
Lab File ID:	0604CCVE.D	Calibration Date:	05/03/13 16:26
Sequence:	3F15601	Injection Date:	06/04/13
Lab Sample ID:	3F15601-CCV1	Injection Time:	18:57

COMPOUND	TYPE	CONC. (ug/L) STD	CONC. (ug/L) CCV	RESPONSE FACTOR ICAL	RESPONSE FACTOR CCV	RESPONSE FACTOR MIN (4)	% DIFF / DRIFT CCV	% DIFF / DRIFT LIMIT (#)
1,1-Dichloroethene	A	100.0	90.44	0.2690732	0.2433498		-9.6	20
cis+1,2-Dichloroethene	A	100.0	98.75	0.3014086	0.2976437		-1.2	20
trans-1,2-Dichloroethene	A	100.0	97.21	0.2786249	0.270857		-2.8	20
Tetrachloroethene	A	100.0	102.4	0.6283694	0.6436708		2.4	20
Trichloroethene	A	100.0	98.11	0.2900884	0.2846036		-1.9	20
Vinyl chloride	L	100.0	129.7	0.2186543	0.2503419		29.7	20 *
Bromofluorobenzene	A	30.00	29.58	0.9050802	0.8924613		-1.4	20
Dibromofluoromethane	A	30.00	31.94	0.3161834	0.3365807		6.5	20
1,2-Dichloroethane-d4	A	30.00	29.22	6.210881E-02	6.049011E-02		-2.6	20
Toluene-d8	A	30.00	29.66	2.228607	2.20334		-1.1	20

JTUS

041

ANALYSIS SEQUENCE SUMMARY
SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	1305279
Client:	CH2M Hill, Inc.	Project:	Vieques East SWMU 20
Sequence:	3F15714	Instrument:	MS-VOA5
Calibration:	3127004		

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
MS Tune	3F15714-TUN1	0605TUNE.D	06/05/13 20:19
Calibration Check	3F15714-CCV1	0605CCVE.D	06/05/13 20:47
LCS	3F05018-BS1	0605LCSE.D	06/05/13 21:14
Blank	3F05018-BLK1	0605BLKE.D	06/05/13 23:06
VEP4-EB01-052413-GW	1305279-02	0527902.D	06/06/13 00:01
VEP4-TB01-052413	1305279-03	0527903.D	06/06/13 00:29

042

CONTINUING CALIBRATION CHECK
SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	1305279
Client:	CH2M Hill, Inc.	Project:	Vergnes East SWMU 20
Instrument ID:	MS-VOA5	Calibration:	5127004
Lab File ID:	0605CCV5.D	Calibration Date:	05/07/13 16:26
Sequence:	5F15714	Injection Date:	06/05/13
Lab Sample ID:	5F15714-CCV1	Injection Time:	20:47

COMPOUND	TYPE	CONC. (ug/L) STD	CONC. (ug/L) CCV	RESPONSE FACTOR ICAL	RESPONSE FACTOR CCV	MIN(#)	% DIFF / DRIFT CCV	% DIFF / DRIFT LIMIT (#)
1,1-Dichloroethane	A	100.0	88.52	0.2690732	0.2381917		-11.5	20
cis-1,2-Dichloroethene	A	100.0	102.2	0.3014068	0.3079455		2.2	20
trans-1,2-Dichloroethene	A	100.0	97.68	0.2786249	0.272148		-2.3	20
Tetrachloroethene	A	100.0	106.9	0.6285694	0.6718743		6.9	20
Trichloroethene	A	100.0	98.74	0.2900884	0.2864437		-1.3	20
Vinyl chloride	L	100.0	130.7	0.2186541	0.2523264		30.7	20 *
Bromofluorobenzene	A	30.00	29.11	0.9050802	0.8783436		-3.0	20
Dibromofluoromethane	A	30.00	32.28	0.3161834	0.3402595		7.6	20
1,2-Dichloroethane-d4	A	30.00	29.09	6.210881E-02	0.060235		-3.0	20
Toluene-d8	A	30.00	29.45	2.228607	2.18754		-1.8	20

043

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? IV ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? IV ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:
1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.
2. Do not qualify non-detects when the associated IS are counts area > + 100%.
3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".
4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? IV ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ___ ✓ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

YES NO N/A

E - The concentration of this analyte exceeds the calibration range of the instrument.

A - Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 1305274 LAB: Empirical

SITE NAME: Vieques SWMU 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format? ☑ ☐ ☐

ACTION: If not, note the effect on review of the data in the data assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative or cover letter present? ☑ ☐ ☐

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ☑ ☐ ☐

YES NO N/A

II. SEMIVOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? ☑ ☐ ☐

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ☐ ☑ ☐

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, all non-detects data are qualified as unusable (R), and detects are flagged "J".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (10°C), flag all positive results "J" and all non-detects "UJ". t = 0.2C

2.0 Holding Times

A 5/24/13 e 5/30
R 5/25 a 5/30

2.1 Have any semivolatile technical holding times, determined from date of collection to date of extraction, been exceeded? ☐ ☑ ☐

Continuous extraction of water samples for semivolatile analysis must be started within 7 days of the date of collection. Soil/sediment samples must be extracted within 14 days of collection. Extracts must be analyzed within

YES NO N/A

40 days of the date of extraction.

Table of Holding Time Violations

Sample ID	Sample Matrix	Date Sampled	Date Lab Received (See Traffic Report)	Date Extracted	Date Analyzed

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

YES NO N/A

3.0 Surrogate Recovery (Form II/Equivalent)

3.1 Have the semi volatile surrogate recoveries been listed on CLP Surrogate Recovery forms (Form II) for each of the following matrices:

a. Low Water ☑ ☐ ☐

b. Low/Med Soil ☐ ☐ ☐

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery Summary forms for each matrix:

a. Low Water ☑ ☐ ☐

b. Low/Med Soil ☐ ☐ ☐

ACTION: If CLP deliverables are unavailable, document the effect(s) in data assessments. In some cases the lab may have to be contacted to obtain the data necessary to complete the validation.

3.3 Were outliers marked correctly with an asterisk? ☐ ☐ ☑

ACTION: Circle all outliers in red.

3.4 Were two or more base neutral OR acid surrogate recoveries out of specification for any sample or method blank (Reviewer should use lab in house recovery limits. Use surrogate recovery limits from USEPA National Functional Guidlines January 2005 page 130, if in house limits are not available. See Method 8000B-43 or 8000C-24). ☐ ☑ ☐

Note: Examine lab in house limits for reasonableness.

If yes, were samples re-analyzed? ☐ ☐ ☑

YES NO N/A

Were method blanks re-analyzed? [ ] ___ ✓

ACTION: If all surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet method specifications, for the affected fraction only (i.e. either base-neutral or acid compounds):

1. Flag all positive results as estimated ("J").

2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.

3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Positive results for the fraction with < 10% surrogate recovery are qualified with "J".

2. Non-detects for that fraction should be qualified as unusable (R) .

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ ✓ [ ] ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document

YES NO N/A

effect in data assessments.

4.0 Matrix Spikes (Form III/Equivalent)

No MS/MSD

4.1 Have the semivolatile Matrix Spike and Matrix Spike Duplicate/or duplicate unspiked Sample recoveries been listed on the Recovery Form (Form III)? [ ] ___ ✓

NOTE: Method 3500B/page 4 states the spiking compounds:

Base/neutrals	Acids
1,2,4-Trichlorobenzene	Pentachlorophenol
Acenaphthene	Phenol
2,4-Dinitrotoluene	2-Chlorophenol
Pyrene	4-Chloro-3-methylphenol
N-Nitroso-di-n-propylamine	4-Nitrophenol
1,4-Dichlorobenzene	

Note: Some projects may require the spiking of specific compounds of interest.

Note: See Method 8270D-sec 8.4.2 for deciding on whether to prepare and analyze duplicate samples or a martix spike/matrix spike duplicate. If samples are expected to contain target analytes, then laboratory may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratory should use a matrix spike and matrix spike duplicate pair.

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water [ ] ___ ✓

b. Low Solid [ ] ___ ✓

c. Med Solid [ ] ___ ✓

YES NO N/A

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. It may be necessary to contact the lab to obtain the required data.

NOTE: If the data has not been reported on CLP equivalent form, then the laboratory must provide the information necessary to evaluate the spike recoveries in the MS and MSD. The required data which should have been provided by the lab include the analytes and concentrations used for spiking, background concentrations of the spiked analytes (i.e., concentrations in unspiked sample), methods and equations used to calculate the QC acceptance criteria for the spiked analytes, percent recovery data for all spiked analytes.

The data reviewer must verify that all reported equations and percent recoveries are correct before proceeding to the next section.

4.3 Were matrix spikes performed at concentration equal to 100ug/L for acid compounds, and 200ug/l for base compounds (Method 3500B-4), or those specified in project plan. [ ] ___ ✓

4.4 How many semivolatile spike recoveries are outside Laboratory in house MS/MSD recovery limits (use recovery limits values in Method 8270D-43&44 Table 6 if in house values not available).

Water ____ out of ____

Solids ____ out of ____

YES NO N/A

4.5 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water ____ out of ____

Solids ____ out of ____

ACTION: Circle all outliers with red pencil.

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria to determine the need for some qualification of the data.

4.6 Was a Laboratory Control Sample (LCS) analyzed with each analytical batch? [ ] ✓ ___ ___

NOTE: When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

5.0 Blanks (Form IV/Equivalent)

5.1 Is the Method Blank Summary (Form IV) present? ✓ [ ] ___ ___

5.2 Frequency of Analysis:

Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? ✓ [ ] ___ ___

5.3 Has a method blank been analyzed either after

YES NO N/A

the calibration standard or at any other time during the analytical shift for each GC/MS system used ? ✓ ___ ___

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, use professional judgement to determine if the associated sample data should be qualified.

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for the semivolatiles? ✓ ___ ___

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ✓ ___

6.2 Do any field/rinse/ blanks have positive results for target analytes and/or TICs (if required, see section 10 below)? ___ ✓ ___

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field Blanks must be qualified for outlying surrogates, poor spectra, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify sample results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

YES NO N/A

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and > blank contamination	No qualification required

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

NOTE: If the laboratory did not report TIC analyses, check the project plans to verify whether or not it was required.

6.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

6.4 Was a instrument blank analyzed after each sample/dilution which contained a target compound

YES NO N/A

that exceeded the initial calibration range. ___ ___ ✓

6.5 Does the instrument blank have positive results for target analytes and/or TICs? ___ ✓ ___

Note: Use professional judgement to determine if carryover occurred and qualify analytes accordingly.

7.0 GC/MS Apparatus and Materials

7.1 Did the lab use the proper gas chromatographic column for analysis of semivolatiles by Method 8270D? Check raw data, instrument logs or contact the lab to determine what type of column was used. The method requires the use of 30 m x 0.25 mm ID (or 0.32 mm ID), silicone-coated, fused silica, capillary column. ✓ ___ ___

ACTION: If the specified column, or equivalent, was not used, document the effects in the data assessment. Use professional judgement to determine the acceptability of the data.

8.0 GC/MS Instrument Performance Check (Form V/Equivalent)

8.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)? ✓ ___ ___

NOTE: The performance solution should also contain 4,4-DDT, pentachlorophenol, and benzidine to verify injection port inertness and column performance. The degradation of DDT to DDE and DDD must be less than 20% total and the response of pentachlorophenol and benzidine should be within normal ranges for these compounds (based upon lab experience) and show no peak degradation or tailing before samples are analyzed. (see section 5.5

YES NO N/A

page 8270D-12).

8.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? ✓ ___ ___

8.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

8.4 Have the ion abundances been normalized to m/z 198? ✓ ___ ___

8.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

YES NO N/A

ACTION: If ion abundance criteria are not met, take action specified in section 3.2

8.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.) ___ ✓ ___

8.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.

8.8 Are the spectra of the mass calibration compound acceptable? ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

9.0 Target Analytes

9.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates ___ ___ ✓

c. Blanks ✓ ___ ___

9.2 Has any special cleanup, such as GPC, been performed on all soil/sediment sample extracts (see section 7.2, page 8270D-14)? ___ ___ ✓

YES NO N/A

ACTION: If data suggests that extract cleanup was not performed, use professional judgement. Make note in the data assessment narrative.

9.3 Are the Reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ___ ___ ✓

c. Blanks ✓ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

9.4 Are the response factors shown in the Quant Report? ✓ ___ ___

9.5 Is chromatographic performance acceptable with respect to:

Baseline stability? ✓ ___ ___

Resolution? ✓ ___ ___

Peak shape? ✓ ___ ___

Full-scale graph (attenuation)? ✓ ___ ___

Other:_____ ___ ___ ___

ACTION: Use professional judgement to determine the acceptability of the data.

9.6 Are the lab-generated standard mass spectra of identified semivolatile compounds present for

YES NO N/A

each sample? ✓ ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the data assessment narrative. If spectra are missing, reject all positive data.

9.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? ✓ ___ ___

9.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ✓ ___ ___

9.9 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ✓ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 9.7, 9.8, and 9.9.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

YES NO N/A

10.0 Tentatively Identified Compounds (TIC)

10.1 If Tentatively Identified Compounds were required for this project, are all Form Is, Part B present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier?

No TIC

NOTE: Review sampling reports to determine if the lab was required to identify non target analytes (refer to section 7.6.2,page 8270D-21).

10.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following: [ ] ___ ✓

a. Samples and/or fractions as appropriate [ ] ___ ✓

b. Blanks [ ] ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by CAS #.

10.3 Are any target compounds from one fraction listed as TIC compounds in another (e.g., an acid compound listed as a base neutral TIC)? ___ [ ] ✓

ACTION: i. Flag with "R" any target compound listed as a TIC.

ii. Make sure all rejected compounds are properly reported in the other fraction.

10.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the

YES NO N/A

sample mass spectrum? [ ] ___ ✓

10.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate and remove "JN". Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R."

11.0 Compound Quantitation and Reported Detection Limits

11.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found? ___ [✓] ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

11.2 Are the method detection limits adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ ✓

YES NO N/A

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I (if present) and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red " X" across the entire page of all Form I's that should not be used, including any in the summary package.

12.0 Standards Data (GC/MS)

12.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

13.0 GC/MS Initial Calibration (Form VI/Equivalent)

13.1 Is the Initial Calibration Form (Form VI/ Equivalent) present and complete for the semivolatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard row data are missing, take action specified in 3.2 above.

13.2 Are all base neutral or acid RRFs > 0.050? [✓] ___ ___

YES NO N/A

Check the **average RRFs** of the four System Performance Check Compounds (SPCCs): N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. These compounds must have **average RRFs** greater than or equal to 0.05 before running samples and should not show any peak tailing.

ACTION: Circle all outliers in red.

ACTION: For any target analyte with **average RRF <0.05**

1. "R" all non-detects;

2. "J" all positive results.

13.3 Are response factors for base neutral or acid target analytes stable over the concentration range of the calibration (% Relative standard deviation [%RSD] < 20.0%)? [✓] ___ ___

NOTE: The % RSD for each individual Calibration Check Compound (CCC, Method 8270D-40 see Table 4) must be less than 30% before analysis can begin. If grater 30%, the lab must clean and recalibrate the instrument.

CALIBRATION CHECK COMPOUNDS

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol

YES NO N/A

Benzo(a)pyrene

ACTION: If the %RSD for any CCC >30% and no corrective action taken, then "J" qualify all positive hits and "UJ" qualify all non-detects.

ACTION: Circle all outliers in red.

ACTION: If the % RSD is ≥ 20.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non- detect results for that analyte "R," unusable. Alternatively, the lab should calculate first or second order regression fit of the calibration curve and select the fit which introduces the least amount of error.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

13.4 Did the laboratory calculate the calibration curve by the least squares regression fit? ___ ✓ ___

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) ___ ✓ ___

ACTION: Circle Errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

13.5 Do the target compounds for this SDG include Pesticides? ___ ✓ ___

YES NO N/A

13.6 If the pesticide compounds include DDT, was the percent breakdown of DDT to DDD and DDE greater than 20%? ___ ___ ✓

ACTION: If DDT percent breakdown exceeds 20%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE results are positive, qualify the quantitation limit for DDT as unusable, "R".

ii. Qualify all positive results for DDD and DDE as presumptively present at an approximate concentration "JN".

14.0 GC/MS Calibration Verification (Form VII/Equivalent)

14.1 Are the Calibration Verification Forms (Form VII) present and complete for all compounds of interest? ✓ ___ ___

14.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

_____

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed within twelve hours of every sample analysis.

YES NO N/A

call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

14.3 Do any of the SPCCs have an RRF <0.05? ___ ✓ ___

If YES, make a note in data assessment if the lab did not take corrective action specified in section 7.4.4, page 8270D-18. ✓ ___ ___

14.4 Do any of the CCCs have a %D between the initial and continuing RRF which exceeds 20.0%?

ACTION: If yes, make a note in data assessment.

14.5 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds 20.0%? ___ ✓ ___

ACTION: Circle all outliers in red.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is above 90%, qualify all non-detects for that analyte as "R", unusable. ✓

14.6 Do any semivolatile compounds have a RRF < 0.05? ___ ✓ ___

ACTION: Circle all outliers in red.

ACTION: If RRF < 0.05, qualify as unusable ("R") associated non-detects and "J" associated positive values.

14.7 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or percent difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more). ___ ✓ ___

YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect(s) in the data assessments.

15.0 Internal Standards (Form VIII)

15.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to + 100%) for each continuing calibration? ✓ ___ ___

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area	LowerLimit	Upper Limit

(Attach additional sheets if necessary.)

Note: Check Table 5, 8270D-41 for associated analytes.

ACTION: i. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

ii. Non-detects associated with IS > 100% should not be qualified.

YES NO N/A

iii. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

15.2 Are the retention times of all internal standards within 30 seconds of the associated calibration standard? ✓

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

16.0 Laboratory Control Samples (LCS)

16.1 Were any LCS samples run in order to verify analytes which failed criteria for spike recovery? ✓

16.2 Did the lab spike LCS sample spiked with the same analytes and the same concentrations as the matrix spike? ✓

16.3 Were the mean and standard deviation of all analytes within the QC acceptance ranges as shown in Table 6, 8270D-43? ✓

ACTION: If the recovery of any analyte falls out of the designated range, the analytical results for that compound is suspect and should be qualified "J" in the unspiked samples.

17.0 Field Duplicates

17.1 Were any field duplicates submitted for semivolatile analysis? ✓

YES NO N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

DataQual
Environmental Services, LLC

CH2M HILL-VBO
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

December 11, 2013
SDG# 1305300, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1305300. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24 and 8270D-Rev 4, August 2008-SOP #HW-22,), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA	SVOA
VEP4-SS16-0001	1305300-01	soil	X	X
VEP4-SB16-0406	1305300-02	soil	X	X
VEP4-TB01-053013	1305300-03	water	X	
VEP4-EB01-053013-SO	1305300-04	water	X	X

The following quality control samples were provided with this SDG: sample VEP4-EB01-053013-SO- equipment blank and sample VEP4-TB01-053013- trip blank.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Field Duplicates NA
- Identification/Quantitation *
- Reporting Limits *

- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

No qualifications were required to the data.

SVOA

No qualifications were required to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to chain of custody records, sampling was performed on 5/30/13 and samples were received at the laboratory 5/31/13. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

SVOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.
U*	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.
RL**	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action -	The sample result is greater than the RL and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R -	Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.
J -	Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.
J/UJ -	Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.
Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action -	The sample result is greater than the RL and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.
R -	Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.
J -	Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL	reporting limit
PQL	practical quantitation limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1305300

007

ANALYSIS DATA SHEET

VEP4-SS16-0001

Laboratory: Empirical Laboratories, LLC — SDG: 1305300
Client: CH2M Hill, Inc. — Project: Vieques East SWMU 20
Matrix: Solid — Laboratory ID: 1305300-01 — File ID: 0530001A.D
Sampled: 05/30/13 07:20 — Prepared: 05/31/13 00:00 — Analyzed: 05/31/13 16:39
Solids: 95.07 — Preparation: 5035A — Dilution: 1
Batch: 3E31011 — Sequence: 3F15202 — Calibration: 3127001 — Instrument: MS-VOA6

CAS NO	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		1.29	2.57	5.15	U
156-59-2	cis-1,2-Dichloroethene		1.29	2.57	5.15	U
156-60-5	trans-1,2-Dichloroethene		1.29	2.57	5.15	U
127-18-4	Tetrachloroethene		1.29	2.57	5.15	U
79-01-6	Trichloroethene		1.29	2.57	5.15	U
75-01-4	Vinyl chloride		1.29	2.57	5.15	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.88	26.43	85.6	85 - 120	
Dibromofluoromethane	30.88	28.87	93.5	80 - 125	
1,2-Dichloroethane-d4	30.88	29.96	97.0	75 - 140	
Toluene-d8	30.88	33.09	107	85 - 115	

008

ANALYSIS DATA SHEET

VEP4-SB16-0406

Laboratory: Empirical Laboratories, LLC — SDG: 1305300
Client: CH2M Hill, Inc. — Project: Vieques East SWMU 20
Matrix: Solid — Laboratory ID: 1305300-02 — File ID: 0530002A.D
Sampled: 05/30/13 07:50 — Prepared: 05/31/13 00:00 — Analyzed: 05/31/13 17:29
Solids: 95.31 — Preparation: 5035A — Dilution: 1
Batch: 3E31011 — Sequence: 3F15202 — Calibration: 3127001 — Instrument: MS-VOA6

CAS NO	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		1.12	2.23	4.47	U
156-59-2	cis-1,2-Dichloroethene		1.12	2.23	4.47	U
156-60-5	trans-1,2-Dichloroethene		1.12	2.23	4.47	U
127-18-4	Tetrachloroethene		1.12	2.23	4.47	U
79-01-6	Trichloroethene		1.12	2.23	4.47	U
75-01-4	Vinyl chloride		1.12	2.23	4.47	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
Bromofluorobenzene	26.81	26.09	97.3	85 - 120	
Dibromofluoromethane	26.81	24.48	91.3	80 - 125	
1,2-Dichloroethane-d4	26.81	25.95	96.8	75 - 140	
Toluene-d8	26.81	27.51	103	85 - 115	

009

ANALYSIS DATA SHEET

VEP4-TB01-053013

Laboratory: Empirical Laboratories, LLC — SDG: 1305300
Client: CH2M Hill, Inc. — Project: Vieques East SWMU 20
Matrix: Water — Laboratory ID: 1305300-03 — File ID: 0530003.D
Sampled: 05/30/13 07:00 — Prepared: 06/06/13 15:06 — Analyzed: 06/06/13 15:06
Solids: — Preparation: 5030B — Dilution: 1
Batch: 3F06010 — Sequence: 3F15803 — Calibration: 3127004 — Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	26.90	89.7	75 - 120	
Dibromofluoromethane	30.00	30.65	102	85 - 115	
1,2-Dichloroethane-d4	30.00	30.19	101	70 - 120	
Toluene-d8	30.00	31.72	106	85 - 120	

010

ANALYSIS DATA SHEET

VEP4-EB01-053013-SO

Laboratory: Empirical Laboratories, LLC | SDG: 1305300
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1305300-04 | File ID: 0530004.D
Sampled: 05/30/13 12:20 | Prepared: 06/06/13 15:34 | Analyzed: 06/06/13 15:34
Solids: | Preparation: 5030B | Dilution: 1
Batch: 3F06010 | Sequence: 3F15803 | Calibration: 3127004 | Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.50	91.7	75 - 120	
Dibromofluoromethane	30.00	29.99	100	85 - 115	
1,2-Dichloroethane-d4	30.00	29.09	97.0	70 - 120	
Toluene-d8	30.00	31.70	106	85 - 120	

011

ANALYSIS DATA SHEET

VEP4-SS16-0001

Laboratory: Empirical Laboratories, LLC | SDG: 1305300
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Solid | Laboratory ID: 1305300-01 | File ID: 0530001.D
Sampled: 05/30/13 07:20 | Prepared: 06/05/13 15:55 | Analyzed: 06/18/13 18:08
Solids: 95.07 | Preparation: EXT_3546 | Dilution: 1
Batch: 3F04008 | Sequence: 3F17032 | Calibration: 3122001 | Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		17.5	34.8	69.8	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	3488	3010	86.3	45 - 105	
Terphenyl-d14	3488	3297	94.5	30 - 125	
2,4,6-Tribromophenol	6975	6045	86.7	35 - 125	X

011

ANALYSIS DATA SHEET

VEP4-SB16-0406

Laboratory: Empirical Laboratories, LLC | SDG: 1305300
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Solid | Laboratory ID: 1305300-02 | File ID: 0530002.D
Sampled: 05/30/13 07:50 | Prepared: 06/05/13 15:55 | Analyzed: 06/18/13 18:30
Solids: 95.31 | Preparation: EXT_3546 | Dilution: 1
Batch: 3F04008 | Sequence: 3F17032 | Calibration: 3122001 | Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		17.5	34.9	69.8	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	3490	3054	87.5	45 - 105	
Terphenyl-d14	3490	3305	94.7	30 - 125	
2,4,6-Tribromophenol	6981	7059	101	35 - 125	X

013

ANALYSIS DATA SHEET

VEP4-EB01-053013-SO

Laboratory: Empirical Laboratories, LLC | SDG: 1305300
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1305300-04 | File ID: 0530004.D
Sampled: 05/30/13 12:20 | Prepared: 06/03/13 10:35 | Analyzed: 06/14/13 20:28
Solids: | Preparation: EXT_3510 | Dilution: 1
Batch: 3F03014 | Sequence: 3F16810 | Calibration: 3122001 | Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.238	0.476	0.952	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	47.62	34.56	72.6	50 - 110	
Terphenyl-d14	47.62	36.72	77.1	50 - 131	
2,4,6-Tribromophenol	95.24	79.52	83.5	40 - 125	X

014

Sample Delivery Group Case Narrative

Receipt Information

The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

As per the client, the sample listed on the COC as VEP4-SS20-0001 should have the client ID of VEP4-SS16-0001 and the sample listed on the COC as VEP4-SS20-0406 should have the client ID of VEP4-SB16-0406.

Changes to the Revision

This is an original submittal of the final report package.

Analytical Information

All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:

The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

015

SW8260B:
No anomalies or deviations are noted.

SW8270D BNA:
The following continuing calibration verifications exceeded criteria:
3F16810-CCV1 with a positive bias for 2,4,6-Tribromophenol
3F17032-CCV1 with a positive bias for 2,4,6-Tribromophenol

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

Total Organic Carbon by Lloyd Kahn:
No anomalies or deviations are noted.

016

ELECTRONIC CHAIN OF CUSTODY RECORD

1305300

EMPIRICAL
621 Mainstream Dr.
Suite 270
Nashville, TN 37228
phone: 615-345-1115

C.O.C. 20130530-SOL-EMP-01

Report to: Company Name: CH2MHILL
Address: 15010 Conference Dr., 200
Chantilly, VA 20151
Attn: Mike Zamboni
Phone: 703.376.5301
Fax: 703.376.5801

Invoice to: Company Name: See Contact

Sampler (Print): not required
Sampler (Signature): not required
Purchase Order Number: 943380

Date Shipped: 5/30/13
Carrier: FedEx
Waybill No.: 795880761244

Sample Identification	Date Collected	Time Collected	Time Zone	No. of Containers	Matrix	Lab ID	Comments
VEP4-SS20-0001	5/30/13	07:20	AST	5	Soil	-01	48 hours TAT for 8260C
VEP4-SS20-0406	5/30/13	07:50	AST	5	Soil	-02	48 hours TAT for 8260C
VEP4-TB01-053013	5/30/13	07:00	AST	2	Aq	-03	
VEP4-EB01-053013-SO	5/30/13	12:20	AST	5	Aq	-04	

Received by: not applicable

Note: The first sampled date of the ARF will be used as the COC number unless indicated otherwise.

White: Return to client with report. Yellow: Laboratory Copy. Pink: Sampler

EMPIRICAL LABORATORIES
COOLER RECEIPT FORM

Cooler Received/Opened On: 05/31/13 @ 0845 Workorder# 1305300

1. Tracking # 1244 (last 4 digits, FedEx)
   Courier: FEDEX
2. Temperature of rep. sample or temp blank when opened: 3.6 °C + correction factor (-0.1) = 3.5 °C
3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA
4. Were custody seals on outside of cooler? YES NO NA
   If yes, how many and where: 2-FRONT + BACK
5. Were the seals intact, signed, and dated correctly? YES NO NA
6. Were custody papers inside cooler? YES NO NA

I certify that I opened the cooler and answered questions 1-6 (initial)

7. Were custody seals on containers: YES NO and Intact YES NO NA
   Were these signed and dated correctly? YES NO NA
8. Packing material used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry Ice Other None
10. Did all containers arrive in good condition (unbroken)? YES NO NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES NO NA
12. Did all container labels and tags agree with custody papers? YES NO NA
13. a. Were VOA vials received? YES NO NA
    b. Was there any observable headspace present in any VOA vial? YES NO NA
14. Was there a Trip Blank in this cooler? YES NO NA If multiple coolers, sequence # —

I certify that I unloaded the cooler and answered questions 7-14 (initial)

15. a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES NO NA
    b. Did the bottle labels indicate that the correct preservatives were used YES NO NA
16. Was residual chlorine present? YES NO NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial)

17. Were custody papers properly filled out (ink, signed, etc)? YES NO NA
18. Did you sign the custody papers in the appropriate place? YES NO NA
19. Were correct containers used for the analysis requested? YES NO NA
20. Was sufficient amount of sample sent in each container? YES NO NA

I certify that I entered this project into LIMS and answered questions 17-20 (initial)

I certify that I attached a label with the unique LIMS number to each container (initial)

I certify that I have performed a second check of the LIMS information against the COC to confirm accuracy (initial)

21. Were there Non-Conformance issues at login? YES NO Was a NCR generated? YES NO

Additional Details:

C:\Documents and Settings\bwright\Desktop\New CRF.doc1.doc

Page 1 of 1

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YES NO N/A

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 130530 LAB: Empirical

SITE NAME: Vieques Swmu 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓ __ __

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓ __ __

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ __ __

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. **VOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓ __ __

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓ __ __

1.3 Sample Conditions/Problems

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? __ ✓ __

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? __ ✓ __

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water ✓ __ __

b. Soil ✓ __ __

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water ✓ __ __

b. Soil ✓ __ __

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. ✓ __ __

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? __ __ ✓

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. __ ✓ __

If yes, were samples reanalyzed? __ __ ✓

Were method blanks reanalyzed? __ __ ✓

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] ✓ ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [✓] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ ✓

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] ✓ ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent) MS/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] ___ ✓

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] ___ ✓

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month [page 8000C, section 9.5.1])

a. Water [ ] ___ ✓

b. Waste [ ] ___ ✓

c. Soil/Solid [ ] ___ ✓

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [ ] ___ ✓

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ ✓

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? ✓

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? ✓

6.3 Has a method blank been analyzed for each GC/MS system used ? ✓

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? ✓

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ✓

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ✓

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates ___ ___ ✓

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ___ ___ ✓

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? ✓ ___ ___

YES NO N/A

Resolution? ✓ ___ ___

Peak shape? ✓ ___ ___

Full-scale graph (attenuation)? ✓ ___ ___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? ✓ ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? ✓ ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ✓ ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ✓ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

No TIC

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present: and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ ✓

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ ✓

b. Blanks [ ] ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ ✓

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ ✓

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] ___ ___ ✓

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [✓] ___ ___

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39)qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? [✓] ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. [✓] ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

INITIAL CALIBRATION DATA (Continued)

SW8260B

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Calibration: 3127004
Matrix: Water

SDG: 1305300
Project: Niagara East SWMU 20
Instrument: MS-VOA5
Calibration Dates: 5/3/13 16:26 5/3/13 20:08

Compound	Mean RF	RF RSD	Mean RT	RT RSD	Linear r	Quad COD	LIMIT	Q
Methylene chloride	0.3137099	14.33759	4.43	8.271958E-03			15	
Methyl Acetate	0.2309449	9.602668	5.182222	9.5161424			15	
Methylcyclohexane	0.3286699	8.393523	8.477777	5.302813E-02			15	
Napthalene	1.041132	14.67109	13.33778	3.281637E-02			15	
Methyl Methacrylate	0.3134284	4.356691	8.29	1.379167E-02			15	
n-Butyl-2-pentanone	0.3291286	10.6254	8.833333	8.135454E-02			15	
Methyl t-Butyl Ether	0.8149128	4.424439	3.003333	8.931735E-02			15	
n-Propylbenzene	1.18908	8.168074	12.24333	4.206973E-02			15	
Propionitrile	3.619405E-02	4.329957	3.565556	9.1588352			15	
Styrene	1.379519	4.69869	11.40778	3.734325E-02			15	
1,1,2,2-Tetrachloroethane	0.9053947	8.84231	11.73556	4.390148E-02			15	
1,1,1,2-Tetrachloroethane	0.9491931	8.225376	10.82333	4.625408E-02			SPCC(0.3)	
tert-Butyl alcohol	0.8207926	9.003445	3.974444	0.1525786			15	
Tetrachloroethene	0.8703894	4.280347	10.12444	5.366577E-02			15	
Toluene	1.444804	5.389715	9.386667	0.0525901			15	
1,2,3-Trichlorobenzene	0.5081278	10.62808	15.64	0.0377589			CCC(20)	
1,2,4-Trichlorobenzene	0.597197	12.43414	15.28556	7.429344E-02			15	
1,1,2-Trichloroethane	0.5312596	8.586911	9.534889	1.0014508-05			15	
1,1,1-Trichloroethane	0.7832628	4.930255	8.95	1.095187E-02			15	
Trichloroethene	2.546078E-02	14.32504	6.393333	5.502273E-02			15	
Trichloroethene	0.2500884	6.26007	8.101111	7.619435E-02			15	
Trichlorofluoromethane	0.6196741	1.49308	3.112222	0.1412121			15	
1,2,3-Trichloropropane	0.5925219	6.931957	11.88	3.604404E-02			15	
1,3,5-Trimethylbenzene	2.029606	4.731844	12.73111	7.299126			15	
1,2,4-Trimethylbenzene	2.018245	4.930621	12.79556	6.686617E-02			15	
1,1,2-Trichloro-1,2,2-trifluoroethane	0.2592723	2.447034	3.928889	0.0848532			15	
Vinyl chloride	0.2186341	20.99907	2.148572	0.5190052	0.9978253		CCC(20)	*
m,p-Xylene	1.941508	8.507979	11.04778	0.036907			15	
o-Xylene	2.133316	5.412975	11.63667	4.907098E-02			15	
Vinyl acetate	0.8253597	5.071693	2.474444	9.630107E-02			15	
Xylenes (total)	2.065454	8.99122	11.43667	4.907098E-02			15	
Dibromofluoromethane	0.3163834	1.69123	0.557778	0.872585E-02			15	

039

1305300 Summ Package

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USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibrstion criteria.

14.4 Was the % RSD determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) ___ ✓ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

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USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? ✓ ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). ___ ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

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USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? ✓ ___ ___

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YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:
1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.
2. Do not qualify non-detects when the associated IS are counts area > + 100%.
3. If the IS area is below the lower limit (< -50%), quality all associated non-detects (U-values) "J".
4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ___ ✓ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

YES NO N/A

E – The concentration of this analyte exceeds the calibration range of the instrument.

A – Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 1305300 LAB: Empirical

SITE NAME: Vieques Sound 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the data assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative or cover letter present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

YES NO N/A

II. **SEMIVOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? ✓ ___ ___

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, all non-detects data are qualified as unusable (R), and detects are flagged "J".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (10°C), flag all positive results "J" and all non-detects "UJ". 3.5°C

5/30/13 6/13 - 6/15
5/31 6/14 - 6/18

2.0 Holding Times

2.1 Have any semivolatile technical holding times, determined from date of collection to date of extraction, been exceeded? ___ ✓ ___

Continuous extraction of water samples for semivolatile analysis must be started within 7 days of the date of collection. Soil/sediment samples must be extracted within 14 days of collection. Extracts must be analyzed within

YES NO N/A

40 days of the date of extraction.

Table of Holding Time Violations

(See Traffic Report)

Sample ID	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted	Date Analyzed

NA

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

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YES NO N/A

3.0 Surrogate Recovery (Form II/Equivalent)

3.1 Have the semi volatile surrogate recoveries been listed on CLP Surrogate Recovery forms (Form II) for each of the following matrices:

a. Low Water ✓ ___ ___

b. Low/Med Soil ✓ ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery Summary forms for each matrix:

a. Low Water ✓ ___ ___

b. Low/Med Soil ✓ ___ ___

ACTION: If CLP deliverables are unavailable, document the effect(s) in data assessments. In some cases the lab may have to be contacted to obtain the data necessary to complete the validation.

3.3 Were outliers marked correctly with an asterisk? ✓ ___ NA

ACTION: Circle all outliers in red.

Surr high for Base Pal — no qual

3.4 Were two or more base neutral OR acid surrogate recoveries out of specification for any sample or method blank (Reviewer should use lab in house recovery limits. Use surrogate recovery limits from USEPA National Functional Guidlines January 2005 page 130, if in house limits are not available. See Method 8000B-43 or 8000C-24). ___ ✓ ___

Note: Examine lab in house limits for reasonableness.

If yes, were samples re-analyzed? ___ ✓ ___

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SURROGATE STANDARD RECOVERY AND RT SUMMARY
SW8270D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Sequence: 3F17032
SDG: 1305300
Project: Vieques East SWMU 20
Instrument: MS-BNA4
Calibration: 3122001

Surrogate Compound	Spike Level	% Recovery	Recovery Limits	RT	CCV RT	RT Diff	RT Diff Limit	Q
Calibration Check (3F17032-CCV1) ug/mL				Lab File ID: SEQ-CCV1.D		Analyzed: 06/18/13 12:52		
2-Fluorobiphenyl	10.00	104	80 - 120	7.202	7.202	0.0000	+/-0.500	
Terphenyl-d14	10.00	114	80 - 120	11.772	11.772	0.0000	+/-0.500	
2,4,6-Tribromophenol	20.00	128	80 - 120	8.955	8.955	0.0000	+/-0.500	*
Blank (3F04008-BLK2) ug/Kg wet				Lab File ID: F04008B1.D		Analyzed: 06/18/13 13:00		
2-Fluorobiphenyl	3333	73.4	45 - 105	7.202	7.202	0.0000	+/-0.500	
Terphenyl-d14	3333	79.4	30 - 125	11.772	11.772	0.0000	+/-0.500	
2,4,6-Tribromophenol	6667	83.1	35 - 125	8.95	8.955	-0.0050	+/-0.500	
LCS (3F04008-BS2) ug/Kg wet				Lab File ID: F04008L1.D		Analyzed: 06/18/13 13:28		
2-Fluorobiphenyl	3333	72.3	45 - 105	7.202	7.202	0.0000	+/-0.500	
Terphenyl-d14	3333	77.9	30 - 125	11.772	11.772	0.0000	+/-0.500	
2,4,6-Tribromophenol	6667	85.4	35 - 125	8.95	8.955	-0.0050	+/-0.500	
VEP4-SS16-0001 (1305300-01) ug/Kg dry				Lab File ID: 0530001.D		Analyzed: 06/18/13 18:08		
2-Fluorobiphenyl	3488	86.3	45 - 105	7.207	7.202	0.0050	+/-0.500	
Terphenyl-d14	3488	94.5	30 - 125	11.782	11.772	0.0100	+/-0.500	
2,4,6-Tribromophenol	6975	86.7	35 - 125	8.96	8.955	0.0050	+/-0.500	
VEP4-SB16-0406 (1305300-02) ug/Kg dry				Lab File ID: 0530002.D		Analyzed: 06/18/13 18:36		
2-Fluorobiphenyl	3490	87.5	45 - 105	7.207	7.202	0.0050	+/-0.500	
Terphenyl-d14	3490	94.7	30 - 125	11.777	11.772	0.0050	+/-0.500	
2,4,6-Tribromophenol	6981	101	35 - 125	8.96	8.955	0.0050	+/-0.500	

No qual

049

SURROGATE STANDARD RECOVERY AND RT SUMMARY
SW8270D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Sequence: 3F16810
SDG: 1305300
Project: Vieques East SWMU 20
Instrument: MS-BNA4
Calibration: 3122001

Surrogate Compound	Spike Level	% Recovery	Recovery Limits	RT	CCV RT	RT Diff	RT Diff Limit	Q
Calibration Check (3F16810-CCV1) ug/mL				Lab File ID: SEQ-CCV1.D		Analyzed: 06/14/13 17:53		
2-Fluorobiphenyl	10.00	105	80 - 120	7.251	7.251	0.0000	+/-0.500	
Terphenyl-d14	10.00	112	80 - 120	11.826	11.826	0.0000	+/-0.500	
2,4,6-Tribromophenol	20.00	122	80 - 120	9.004	9.004	0.0000	+/-0.500	*
Blank (3F03014-BLK2) ug/L				Lab File ID: F03014B1.D		Analyzed: 06/14/13 18:21		
2-Fluorobiphenyl	50.00	71.9	50 - 110	7.251	7.251	0.0000	+/-0.500	
Terphenyl-d14	50.00	80.2	50 - 135	11.831	11.826	0.0050	+/-0.500	
2,4,6-Tribromophenol	100.0	91.1	40 - 125	9.004	9.004	0.0000	+/-0.500	
LCS (3F03014-BS2) ug/L				Lab File ID: F03014L1.D		Analyzed: 06/14/13 18:48		
2-Fluorobiphenyl	50.00	83.2	50 - 110	7.251	7.251	0.0000	+/-0.500	
Terphenyl-d14	50.00	89.4	50 - 135	11.831	11.826	0.0050	+/-0.500	
2,4,6-Tribromophenol	100.0	97.8	40 - 125	9.004	9.004	0.0000	+/-0.500	
LCS Dup (3F03014-BSD2) ug/L				Lab File ID: F03014L2.D		Analyzed: 06/14/13 19:16		
2-Fluorobiphenyl	50.00	87.9	50 - 110	7.251	7.251	0.0000	+/-0.500	
Terphenyl-d14	50.00	93.4	50 - 135	11.831	11.826	0.0050	+/-0.500	
2,4,6-Tribromophenol	100.0	109	40 - 125	9.004	9.004	0.0000	+/-0.500	
VEP4-EB01-053013-SO (1305300-04) ug/L				Lab File ID: 0530004.D		Analyzed: 06/14/13 20:38		
2-Fluorobiphenyl	47.62	72.6	50 - 110	7.251	7.251	0.0000	+/-0.500	
Terphenyl-d14	47.62	77.1	50 - 135	11.831	11.826	0.0050	+/-0.500	
2,4,6-Tribromophenol	95.24	83.5	40 - 125	9.004	9.004	0.0000	+/-0.500	

No qual

050

YES NO N/A

Were method blanks re-analyzed? [ ] ___ ✓

ACTION: If all surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet method specifications, for the affected fraction only (i.e. either base-neutral or acid compounds):

1. Flag all positive results as estimated ("J").

2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.

3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Positive results for the fraction with < 10% surrogate recovery are qualified with "J".

2. Non-detects for that fraction should be qualified as unusable (R) .

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ [✓] ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document

YES NO N/A

effect in data assessments.

4.0 Matrix Spikes (Form III/Equivalent) NO MS/MSD

4.1 Have the semivolatile Matrix Spike and Matrix Spike Duplicate/or duplicate unspiked Sample recoveries been listed on the Recovery Form (Form III)? [ ] ___ ✓

NOTE: Method 3500B/page 4 states the spiking compounds:

Base/neutrals	Acids
1,2,4-Trichlorobenzene	Pentachlorophenol
Acenaphthene	Phenol
2,4-Dinitrotoluene	2-Chlorophenol
Pyrene	4-Chloro-3-methylphenol
N-Nitroso-di-n-propylamine	4-Nitrophenol
1,4-Dichlorobenzene	

Note: Some projects may require the spiking of specific compounds of interest.

Note: See Method 8270D-sec 8.4.2 for deciding on whether to prepare and analyze duplicate samples or a martix spike/matrix spike duplicate. If samples are expected to contain target analytes, then laboratory may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratory should use a matrix spike and matrix spike duplicate pair.

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water [ ] ___ ✓

b. Low Solid [ ] ___ ✓

c. Med Solid [ ] ___ ✓

YES NO N/A

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. It may be necessary to contact the lab to obtain the required data.

NOTE: If the data has not been reported on CLP equivalent form, then the laboratory must provide the information necessary to evaluate the spike recoveries in the MS and MSD. The required data which should have been provided by the lab include the analytes and concentrations used for spiking, background concentrations of the spiked analytes (i.e., concentrations in unspiked sample), methods and equations used to calculate the QC acceptance criteria for the spiked analytes, percent recovery data for all spiked analytes.

The data reviewer must verify that all reported equations and percent recoveries are correct before proceeding to the next section.

4.3 Were matrix spikes performed at concentration equal to 100ug/L for acid compounds, and 200ug/l for base compounds (Method 3500B-4), or those specified in project plan. [ ] ___ ✓

4.4 How many semivolatile spike recoveries are outside Laboratory in house MS/MSD recovery limits (use recovery limits values in Method 8270D-43&44 Table 6 if in house values not available).

Water ____ out of ____

Solids ____ out of ____

YES NO N/A

4.5 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water ____ out of ____

Solids ____ out of ____

ACTION: Circle all outliers with red pencil.

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria to determine the need for some qualification of the data.

4.6 Was a Laboratory Control Sample (LCS) analyzed with each analytical batch? [✓] ___ ___

NOTE: When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

5.0 Blanks (Form IV/Equivalent)

5.1 Is the Method Blank Summary (Form IV) present? [✓] ___ ___

5.2 Frequency of Analysis:

Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? [✓] ___ ___

5.3 Has a method blank been analyzed either after

YES NO N/A

the calibration standard or at any other time during the analytical shift for each GC/MS system used ? ✓ ___ ___

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, use professional judgement to determine if the associated sample data should be qualified.

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for the semivolatiles? ✓ ___ ___

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ✓ ___

6.2 Do any field/rinse/ blanks have positive results for target analytes and/or TICs (if required, see section 10 below)? ___ ✓ ___

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field Blanks must be qualified for outlying surrogates, poor spectra, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify sample results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

YES NO N/A

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

NOTE: If the laboratory did not report TIC analyses, check the project plans to verify whether or not it was required.

6.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

6.4 Was a instrument blank analyzed after each sample/dilution which contained a target compound

YES NO N/A

that exceeded the initial calibration range. ___ ___ ✓

6.5 Does the instrument blank have positive results for target analytes and/or TICs? ___ ✓ ___

Note: Use professional judgement to determine if carryover occurred and qualify analytes accordingly.

7.0 GC/MS Apparatus and Materials

7.1 Did the lab use the proper gas chromatographic column for analysis of semivolatiles by Method 8270D? Check raw data, instrument logs or contact the lab to determine what type of column was used. The method requires the use of 30 m x 0.25 mm ID (or 0.32 mm ID), silicone-coated, fused silica, capillary column. ✓ ___ ___

ACTION: If the specified column, or equivalent, was not used, document the effects in the data assessment. Use professional judgement to determine the acceptability of the data.

8.0 GC/MS Instrument Performance Check (Form V/Equivalent)

8.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)? ✓ ___ ___

NOTE: The performance solution should also contain 4,4-DDT, pentachlorophenol, and benzidine to verify injection port inertness and column performance. The degradation of DDT to DDE and DDD must be less than 20% total and the response of pentachlorophenol and benzidine should be within normal ranges for these compounds (based upon lab experience) and show no peak degradation or tailing before samples are analyzed. (see section 5.5

YES NO N/A

page 8270D-12).

8.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? ☑ ___ ___

8.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument? ☑ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

8.4 Have the ion abundances been normalized to m/z 198? ☑ ___ ___

8.5 Have the ion abundance criteria been met for each instrument used? ☑ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

YES NO N/A

ACTION: If ion abundance criteria are not met, take action specified in section 3.2

8.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.) ___ ☑ ___

8.7 Have the appropriate number of significant figures (two) been reported? ☑ ___ ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.

8.8 Are the spectra of the mass calibration compound acceptable? ☑ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

9.0 Target Analytes

9.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ☑ ___ ___

b. Matrix spikes and matrix spike duplicates ☐ ___ ☑

c. Blanks ☑ ___ ___

9.2 Has any special cleanup, such as GPC, been performed on all soil/sediment sample extracts (see section 7.2, page 8270D-14)? ☐ ☑ ___

YES NO N/A

ACTION: If data suggests that extract cleanup was not performed, use professional judgement. Make note in the data assessment narrative.

9.3 Are the Reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ☑ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ☐ ___ ☑

c. Blanks ☑ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

9.4 Are the response factors shown in the Quant Report? ☑ ___ ___

9.5 Is chromatographic performance acceptable with respect to:

Baseline stability? ☑ ___ ___

Resolution? ☑ ___ ___

Peak shape? ☑ ___ ___

Full-scale graph (attenuation)? ☑ ___ ___

Other:_____ ☐ ___ ___

ACTION: Use professional judgement to determine the acceptability of the data.

9.6 Are the lab-generated standard mass spectra of identified semivolatile compounds present for

YES NO N/A

each sample? ☑ ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the data assessment narrative. If spectra are missing, reject all positive data.

9.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? ☑ ___ ___

9.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ☑ ___ ___

9.9 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ☑ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 9.7, 9.8, and 9.9.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

YES NO N/A

10.0 Tentatively Identified Compounds (TIC)

10.1 If Tentatively Identified Compounds were required for this project, are all Form Is, Part B present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier? No TICs

NOTE: Review sampling reports to determine if the lab was required to identify non target analytes (refer to section 7.6.2,page 8270D-21).

10.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following: [ ] ___ ✓

a. Samples and/or fractions as appropriate [ ] ___ ✓

b. Blanks [ ] ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by CAS #.

10.3 Are any target compounds from one fraction listed as TIC compounds in another (e.g., an acid compound listed as a base neutral TIC)? ___ [ ] ✓

ACTION: i. Flag with "R" any target compound listed as a TIC.

ii. Make sure all rejected compounds are properly reported in the other fraction.

10.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the

YES NO N/A

sample mass spectrum? [ ] ___ ✓

10.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate and remove "JN". Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R."

11.0 Compound Quantitation and Reported Detection Limits

11.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found? ___ ✓ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

11.2 Are the method detection limits adjusted to reflect sample dilutions and, for soils, sample moisture? ✓ ___ ___

YES NO N/A

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I (if present) and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red " X" across the entire page of all Form I's that should not be used, including any in the summary package.

12.0 Standards Data (GC/MS)

12.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration? ✓ ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

13.0 GC/MS Initial Calibration (Form VI/Equivalent)

13.1 Is the Initial Calibration Form (Form VI/ Equivalent) present and complete for the semivolatile fraction? ✓ ___ ___

ACTION: If any calibration forms or standard row data are missing, take action specified in 3.2 above.

13.2 Are all base neutral or acid RRFs > 0.050? ✓ ___ ___

YES NO N/A

Check the **average RRFs** of the four System Performance Check Compounds (SPCCs): N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. These compounds must have **average RRFs** greater than or equal to 0.05 before running samples and should not show any peak tailing.

ACTION: Circle all outliers in red.

ACTION: For any target analyte with **average RRF <0.05**

1. "R" all non-detects;

2. "J" all positive results.

13.3 Are response factors for base neutral or acid target analytes stable over the concentration range of the calibration (% Relative standard deviation [%RSD] < 20.0%)? [ ] ✓ ___

NOTE: The % RSD for each individual Calibration Check Compound (CCC, Method 8270D-40 see Table 4) must be less than 30% before analysis can begin. If grater 30%, the lab must clean and recalibrate the instrument.

CALIBRATION CHECK COMPOUNDS

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol

CONTINUING CALIBRATION CHECK
SW8270D

Laboratory:	Empirical Laboratories, LLC	SDG:	1305300
Client:	CH2M Hill, Inc.	Project:	Vieques East SWMU 20
Instrument ID:	MS-BNA4	Calibration:	3122001
Lab File ID:	SEQ-CCV1.D	Calibration Date:	05/01/13 00:00
Sequence:	3F16810	Injection Date:	06/14/13
Lab Sample ID:	3F16810-CCV1	Injection Time:	17:53

COMPOUND	TYPE	CONC. (ug/mL)		RESPONSE FACTOR			% DIFF / DRIFT	
		STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT (#)
1,4-Dioxane	A	10.00	9.630	0.1401567	0.1349635		-3.7	20
2-Fluorobiphenyl	A	10.00	10.52	0.6701778	0.7050974		5.2	20
Terphenyl-d14	A	10.00	11.23	0.8784264	0.986909		12.3	20
2,4,6-Tribromophenol	A	20.00	24.32	0.1373566	0.1669958		21.6	20 *

no qual

067

CONTINUING CALIBRATION CHECK
SW8270D

Laboratory:	Empirical Laboratories, LLC	SDG:	1305300
Client:	CH2M Hill, Inc.	Project:	Vieques East SWMU 20
Instrument ID:	MS-BNA4	Calibration:	3122001
Lab File ID:	SEQ-CCV1.D	Calibration Date:	05/01/13 00:00
Sequence:	3F17032	Injection Date:	06/18/13
Lab Sample ID:	3F17032-CCV1	Injection Time:	12:32

COMPOUND	TYPE	CONC. (ug/mL)		RESPONSE FACTOR			% DIFF / DRIFT	
		STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT (#)
1,4-Dioxane	A	10.00	9.055	0.1401567	0.1269065		-9.5	20
2-Fluorobiphenyl	A	10.00	10.42	0.6701778	0.698201		4.2	20
Terphenyl-d14	A	10.00	11.36	0.8784264	0.9978971		13.6	20
2,4,6-Tribromophenol	A	20.00	25.60	0.1373566	0.1757951		28.0	20 *

no qual

065

YES NO N/A

Benzo(a)pyrene

ACTION: If the %RSD for any CCC >30% and no corrective action taken, then "J" qualify all positive hits and "UJ" qualify all non-detects.

ACTION: Circle all outliers in red.

ACTION: If the % RSD is ≥ 20.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non- detect results for that analyte "R," unusable. Alternatively, the lab should calculate first or second order regression fit of the calibration curve and select the fit which introduces the least amount of error.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

13.4 Did the laboratory calculate the calibration curve by the least squares regression fit? ___ ✓ ___

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) ___ ✓ ___

ACTION: Circle Errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

13.5 Do the target compounds for this SDG include Pesticides? ___ ✓ ___

063

YES NO N/A

13.6 If the pesticide compounds include DDT, was the percent breakdown of DDT to DDD and DDE greater than 20%? ___ ___ ✓

ACTION: If DDT percent breakdown exceeds 20%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE results are positive, qualify the quantitation limit for DDT as unusable, "R".

ii. Qualify all positive results for DDD and DDE as presumptively present at an approximate concentration "JN".

14.0 GC/MS Calibration Verification (Form VII/Equivalent)

14.1 Are the Calibration Verification Forms (Form VII) present and complete for all compounds of interest? ✓ ___ ___

14.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

_____

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed within twelve hours of every sample analysis,

070

YES NO N/A

call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

14.3 Do any of the SPCCs have an RRF <0.05? ___ ✓ ___

If YES, make a note in data assessment if the lab did not take corrective action specified in section 7.4.4, page 8270D-18. ✓ ___ ___

14.4 Do any of the CCCs have a %D between the initial and continuing RRF which exceeds 20.0%?

ACTION: If yes, make a note in data assessment.

14.5 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds 20.0%? ___ ✓ ___

ACTION: Circle all outliers in red.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is above 90%, qualify all non-detects for that analyte as "R", unusable.

14.6 Do any semivolatile compounds have a RRF < 0.05? ___ ✓ ___

ACTION: Circle all outliers in red.

ACTION: If RRF < 0.05, qualify as unusable ("R") associated non-detects and "J" associated positive values.

14.7 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or percent difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more). ___ ✓ ___

YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect(s) in the data assessments.

15.0 Internal Standards (Form VIII)

15.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to + 100%) for each continuing calibration? ✓ ___ ___

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area	LowerLimit	Upper Limit

(Attach additional sheets if necessary.)

Note: Check Table 5, 8270D-41 for associated analytes.

ACTION: i. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

ii. Non-detects associated with IS > 100% should not be qualified.

YES NO N/A

iii. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

15.2 Are the retention times of all internal standards within 30 seconds of the associated calibration standard? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

16.0 Laboratory Control Samples (LCS)

16.1 Were any LCS samples run in order to verify analytes which failed criteria for spike recovery? NA ✓ ___

16.2 Did the lab spike LCS sample spiked with the same analytes and the same concentrations as the matrix spike? ___ ___ ✓

NW MS

16.3 Were the mean and standard deviation of all analytes within the QC acceptance ranges as shown in Table 6, 8270D-43? ✓ ___ ___

ACTION: If the recovery of any analyte falls out of the designated range, the analytical results for that compound is suspect and should be qualified "J" in the unspiked samples.

17.0 Field Duplicates

17.1 Were any field duplicates submitted for semivolatile analysis? ___ ✓ ___

YES NO N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

DataQual
Environmental Services, LLC

CH2M HILL-VBO
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

December 9, 2013
SDG# 1306048, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1306048. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24 and 8270D-Rev 4, August 2008-SOP #HW-22,), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA	SVOA
VEP4-SB17-0406	1306048-01	soil	X	X
VEP4-SS17-0001	1306048-02	soil	X	X
VEP4-SS17P-0001	1306048-03	soil	X	X
VEP4-GW15-0613	1306048-04	water	X	X
VEP4-EB01-060513-SO	1306048-05	water	X	X
VEP4-EB01-060513-GW	1306048-06	water	X	X
VEP4-TB01-060513	1306048-07	water	X	
VEP4-GW15-0613 MS	1306048-04MS	water	X	X
VEP4-GW15-0613 MSD	1306048-04MSD	water	X	X
VEP4-SS17-0001 MS	1306048-02MS	soil	X	X
VEP4-SS17-0001 MSD	1306048-02MSD	soil	X	X

The following quality control samples were provided with this SDG: sample VEP4-EB01-060513-SO and VEP4-EB01-060513-GW - equipment blank; sample VEP4-TB01-060513- trip blank; sample VEP4-SS17P-0001- field duplicate of sample VEP4-SS17-0001.

The samples were evaluated based on the following criteria:

- Data Completeness
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations
- Blanks *

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- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries *
- Matrix Duplicate RPDs *
- Field Duplicates *
- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

Due to high %D in the continuing calibration, qualifications were added to the data.

SVOA

No qualifications were required to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were required as the raw data was not printed dark enough to read in the original package. The laboratory was contacted and updated pages were submitted.

Technical Holding Times

According to chain of custody records, sampling was performed on 6/5/13 and samples were received at the laboratory 6/6/13. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

Initial/Continuing Calibration

VOA

Calibration standards exhibited %Ds that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results were qualified as indicated.

Standard ID	Compound(s)	%D	Samples	Q Flag	Qual Code
CC 6/11/13	tetrachloroethene	21.3	VEP4-TB01-060513, VEP4-EB01-060513-SO, VEP4-EB01-060513-GW, VEP4-GW15-0613	J/UJ	CCH

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
VEP4-TB01-060513, VEP4-EB01-060513-SO, VEP4-EB01-060513-GW,VEP4-GW15-0613	tetrachloroethene	+/-	J/UJ	CCH

SVOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U not detected above the reported sample quantitation limit
J estimated value
UJ reported quantitation limit is qualified as estimated
N analyte has been tentatively identified
JN analyte has been tentatively identified, estimated value
R result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.

U* The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.

RL** The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.

J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.
Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL reporting limit
PQL practical quantitation limit
IDL instrument detection limit
MDL method detection limit
CRDL contract required detection limit
CRQL contract required quantitation limit
+ positive result
- non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

ANALYSIS DATA SHEET

VEP4-SB17-0406

Laboratory: Empirical Laboratories, LLC SDG: 1306048
Client: CH2M HILL Inc. Project: Vieques East SWMU 20
Matrix: Solid Laboratory ID: 1306048-01 File ID: 0604801A.D
Sampled: 06/05/13 07:25 Prepared: 06/14/13 00:00 Analyzed: 06/14/13 11:20
Solids: 93.88 Preparation: 5035A Dilution: 1
Batch: 3F14010 Sequence: 3F18801 Calibration: 3164002 Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		2.04	4.08	8.17	U
156-59-2	cis-1,2-Dichloroethene		2.04	4.08	8.17	U
156-60-5	trans-1,2-Dichloroethene		2.04	4.08	8.17	U
127-18-4	Tetrachloroethene		2.04	4.08	8.17	U
79-01-6	Trichloroethene		2.04	4.08	8.17	U
75-01-4	Vinyl chloride		2.04	4.08	8.17	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
Bromofluorobenzene	49.01	51.23	105	85 - 120	
Dibromofluoromethane	49.01	57.81	118	80 - 125	
1,2-Dichloroethane-d4	49.01	54.71	112	75 - 140	
Toluene-d8	49.01	47.93	97.8	85 - 115	

ANALYSIS DATA SHEET

VEP4-SS17-0001

Laboratory: Empirical Laboratories, LLC | SDG: 1306048
Client: CH2M Hill, Inc | Project: Vieques East SWMU 20
Matrix: Solid | Laboratory ID: 1306048-02 | File ID: 0604802A.D
Sampled: 06/05/13 07:05 | Prepared: 06/14/13 00:00 | Analyzed: 06/14/13 12:48
Solids: 87.07 | Preparation: 5035A | Dilution: 1
Batch: 3F14010 | Sequence: 3F16801 | Calibration: 3164002 | Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		1.64	3.29	6.57	U
156-59-2	cis-1,2-Dichloroethene		1.64	3.29	6.57	U
156-60-5	trans-1,2-Dichloroethene		1.64	3.29	6.57	U
127-18-4	Tetrachloroethene		1.64	3.29	6.57	U
79-01-6	Trichloroethene		1.64	3.29	6.57	U
75-01-4	Vinyl chloride		1.64	3.29	6.57	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
Bromofluorobenzene	39.42	38.67	98.1	85 - 120	
Dibromofluoromethane	39.42	45.06	114	80 - 125	
1,2-Dichloroethane-d4	39.42	44.06	112	75 - 140	
Toluene-d8	39.42	40.16	102	85 - 115	

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ANALYSIS DATA SHEET

VEP4-SS17P-0001

Laboratory: Empirical Laboratories, LLC | SDG: 1306048
Client: CH2M Hill, Inc | Project: Vieques East SWMU 20
Matrix: Solid | Laboratory ID: 1306048-03 | File ID: 0604803A.D
Sampled: 06/05/13 07:10 | Prepared: 06/14/13 00:00 | Analyzed: 06/14/13 13:17
Solids: 93.20 | Preparation: 5035A | Dilution: 1
Batch: 3F14010 | Sequence: 3F16801 | Calibration: 3164002 | Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		1.13	2.27	4.54	U
156-59-2	cis-1,2-Dichloroethene		1.13	2.27	4.54	U
156-60-5	trans-1,2-Dichloroethene		1.13	2.27	4.54	U
127-18-4	Tetrachloroethene		1.13	2.27	4.54	U
79-01-6	Trichloroethene		1.13	2.27	4.54	U
75-01-4	Vinyl chloride		1.13	2.27	4.54	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
Bromofluorobenzene	27.23	26.51	97.3	85 - 120	
Dibromofluoromethane	27.23	31.38	115	80 - 125	
1,2-Dichloroethane-d4	27.23	30.92	114	75 - 140	
Toluene-d8	27.23	28.17	104	85 - 115	

MM 112413

ANALYSIS DATA SHEET

VEP4-GW15-0613

Laboratory: Empirical Laboratories, LLC | SDG: 1306048
Client: CH2M Hill, Inc | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1306048-04 | File ID: 0604804.D
Sampled: 06/05/13 09:40 | Prepared: 06/11/13 19:15 | Analyzed: 06/11/13 19:15
Solids: | Preparation: 5030B | Dilution: 1
Batch: 3F11019 | Sequence: 3F16308 | Calibration: 3157003 | Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene	2.30	0.100	0.200	0.500	
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.84	92.8	75 - 120	
Dibromofluoromethane	30.00	30.92	103	85 - 115	
1,2-Dichloroethane-d4	30.00	30.29	101	70 - 120	
Toluene-d8	30.00	28.59	95.3	85 - 120	

MM 112413

ANALYSIS DATA SHEET

VEP4-EB01-060513-SO

Laboratory: Empirical Laboratories, LLC | SDG: 1306048
Client: CH2M Hill, Inc | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1306048-05 | File ID: 0604805.D
Sampled: 06/05/13 13:00 | Prepared: 06/11/13 18:19 | Analyzed: 06/11/13 18:19
Solids: | Preparation: 5030B | Dilution: 1
Batch: 3F11019 | Sequence: 3F16308 | Calibration: 3157003 | Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.14	90.5	75 - 120	
Dibromofluoromethane	30.00	29.94	99.8	85 - 115	
1,2-Dichloroethane-d4	30.00	29.82	99.4	70 - 120	
Toluene-d8	30.00	29.21	97.4	85 - 120	

MM 112413

ANALYSIS DATA SHEET

VEP4-EB01-060513-GW

Laboratory:	Empirical Laboratories, LLC		SDG:	1306048	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1306048-06	File ID:	0604806.D
Sampled:	06/05/13 13:05	Prepared:	06/11/13 18:47	Analyzed:	06/11/13 18:47
Solids:		Preparation:	5030B	Dilution:	1
Batch:	3F11019	Sequence:	3F16308	Calibration:	3157003

Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.64	92.1	75 - 120	
Dibromofluoromethane	30.00	30.05	100	85 - 115	
1,2-Dichloroethane-d4	30.00	30.52	102	70 - 120	
Toluene-d8	30.00	29.77	99.2	85 - 120	

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ANALYSIS DATA SHEET

VEP4-TB01-060513

Laboratory:	Empirical Laboratories, LLC		SDG:	1306048	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1306048-07	File ID:	0604807.D
Sampled:	06/05/13 07:00	Prepared:	06/11/13 17:51	Analyzed:	06/11/13 17:51
Solids:		Preparation:	5030B	Dilution:	1
Batch:	3F11019	Sequence:	3F16308	Calibration:	3157003

Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.95	93.2	75 - 120	
Dibromofluoromethane	30.00	29.75	99.2	85 - 115	
1,2-Dichloroethane-d4	30.00	30.42	101	70 - 120	
Toluene-d8	30.00	30.99	103	85 - 120	

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ANALYSIS DATA SHEET

VEP4-SB17-0406

Laboratory:	Empirical Laboratories, LLC		SDG:	1306048	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Solid	Laboratory ID:	1306048-03	File ID:	0604801.D
Sampled:	06/05/13 07:25	Prepared:	06/19/13 14:28	Analyzed:	07/07/13 00:20
Solids:	93.88	Preparation:	EXT_3546	Dilution:	1
Batch:	3F19004	Sequence:	3G19002	Calibration:	3122001

Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		16.7	33.4	66.9	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	3341	2667	79.8	45 - 105	
Terphenyl-d14	3341	2922	87.5	30 - 125	
2,4,6-Tribromophenol	6682	4372	65.4	35 - 125	

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ANALYSIS DATA SHEET

VEP4-SS17-0001

Laboratory:	Empirical Laboratories, LLC		SDG:	1306048	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Solid	Laboratory ID:	1306048-02	File ID:	0604802D.D
Sampled:	06/05/13 07:05	Prepared:	06/18/13 17:55	Analyzed:	07/06/13 14:51
Solids:	87.07	Preparation:	EXT_3546	Dilution:	10
Batch:	3F18006	Sequence:	3G19001	Calibration:	3122001

Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		190	379	758	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	3790	2571	67.8	45 - 105	
Terphenyl-d14	3790	3145	83.0	30 - 125	
2,4,6-Tribromophenol	7581	5310	70.0	35 - 125	

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ANALYSIS DATA SHEET

VEP4-SS17P-0001

Laboratory:	Empirical Laboratories, LLC		SDG:	1306048	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Solid	Laboratory ID:	1306048-03	File ID:	0604803D.D
Sampled:	06/05/13 07:10	Prepared:	06/18/13 17:55	Analyzed:	07/06/13 15:19
Solids:	93.20	Preparation:	EXT_3546	Dilution:	10
Batch:	3F18006	Sequence:	3G19001	Calibration:	3172001
				Instrument:	MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		177	353	706	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	3530	2731	77.4	45 - 105	
Terphenyl-d14	3530	3105	88.0	30 - 125	
2,4,6-Tribromophenol	7059	5562	78.8	35 - 125	

ANALYSIS DATA SHEET

VEP4-GW15-0613

Laboratory:	Empirical Laboratories, LLC		SDG:	1306048	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1306048-04	File ID:	0604804.D
Sampled:	06/05/13 09:40	Prepared:	06/10/13 08:14	Analyzed:	07/03/13 14:41
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3F09001	Sequence:	3G18605	Calibration:	3172001
				Instrument:	MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.236	0.472	0.943	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	47.17	35.47	75.2	50 - 110	
Terphenyl-d14	47.17	39.17	83.0	50 - 132	
2,4,6-Tribromophenol	94.34	87.47	92.7	40 - 135	

ANALYSIS DATA SHEET

VEP4-EB01-060513-SO

Laboratory:	Empirical Laboratories, LLC		SDG:	1306048	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1306048-05	File ID:	0604805.D
Sampled:	06/05/13 13:00	Prepared:	06/10/13 08:14	Analyzed:	07/03/13 15:09
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3F09001	Sequence:	3G18605	Calibration:	3172001
				Instrument:	MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.236	0.472	0.943	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	47.17	34.64	73.4	50 - 110	
Terphenyl-d14	47.17	40.62	86.1	50 - 135	
2,4,6-Tribromophenol	94.34	87.64	92.9	40 - 125	

ANALYSIS DATA SHEET

VEP4-EB01-060513-GW

Laboratory:	Empirical Laboratories, LLC		SDG:	1306048	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1306048-06	File ID:	0604806.D
Sampled:	06/05/13 13:05	Prepared:	06/10/13 08:14	Analyzed:	07/03/13 15:36
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3F09001	Sequence:	3G18605	Calibration:	3172001
				Instrument:	MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.236	0.472	0.943	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	47.17	35.11	74.4	50 - 110	
Terphenyl-d14	47.17	38.50	81.2	50 - 135	
2,4,6-Tribromophenol	94.34	85.33	90.4	40 - 125	

EMPIRICAL LABORATORIES, LLC - CHAIN OF CUSTODY RECORD

SHIP TO: 621 Mainstream Drive, Suite 270 • Nashville, TN 37228 • 615-345-1115 • (fax) 615-846-5426

1306048 19037

Send Results to:
Name Mike Zaubert
Company CH2M HILL
Address
City
State, Zip
Phone
Fax
E-mail

Send Invoice to:
Name
Company
Address
City
State, Zip
Phone
Fax
E-mail

Project No./Name: VE - SWMU 20

Sampler's (Signature)

Lab Use Only:
VOA Headspace Y N
Field Filtered Y N
Correct Containers Y N
Discrepancies Y N
Cust. Seals Intact Y N NA
Containers Intact Y N NA

Airbill #
CAR #:

Analysis Requirements: Solid VOC, Solid SVOC, TOC, Alk, TDS, Cl, NO3, NO2, SO4, SO4, MBC, VFA

Lab Use Only Lab #	Date/Time Sampled	Sample Description	Sample Matrix	Solid VOC	Solid SVOC	TOC	Alk	TDS	Cl, NO3, NO2, SO4	SO4	MBC	VFA	Comments	No. of Bottles	Lab Use Only Containers/Pres.
	4/5/13 0725	VEP4-SB17-0406	SB	X	X										
	" 0725	VEP4-SB17-0406-MS	SB	X	X								Same containers		
	" 0725	VEP4-SB17-0406-SD	SB	X	X										
	" 0720	VEP4-SB17-0001	SB	X	X	X									
	" 0710	VEP4-SS17E-0001	SS	X	X	X									
	" 0940	VEP4-GW15-0406	GW	X	X	X	X	X	X	X	X	X			
	" 0940	VEP4-GW15-0406-MS	GW	X	X	X									
	" 0940	VEP4-GW15-0406-SD	GW	X	X	X									
	" 1300	VEP4-EB01-0613-SD	AQ	X	X										
	" 1305	VEP4-EB01-0613-GW	AQ	X	X										
	" 0720	VEP4-TB01-0613	AQ	X											

REMARKS:

Sample Kit Prep'd by: (Signature) Date/Time
Relinquished by: (Signature) Date/Time
Relinquished by: (Signature) Date/Time
Received by: (Signature) Date/Time
Received by: (Signature) Date/Time
Received for Laboratory by: (Signature) Date/Time 4/6/13 0840
Temperature 0.5 IAT

Details:
Page ___ of ___
Cooler No. ___ of ___
Date Shipped
Shipped By
Turnaround

Distribution: Original and yellow copies accompany sample shipment to laboratory. Pink retained by samplers.

MEMORANDUM **CH2MHILL**

Corrections to COCs

TO: Sonya Gordon, Empirical

COPIES: File
Data Validation Package
Laboratory Package SDG: Not yet assigned

FROM: Juliana Dean
Project Chemist

DATE: June 6, 2013

This memo is to document corrections made to entries on the Chains of Custody (COC) for Vieques East, SWMU20, CTO-0013.

The corrections include changes to the sample IDs on the COC:

Sample ID on COC	Correct Sample ID	Date Collected	Time Collected	SDG
VEP4-GW15-0406	VEP4-GW15-0613	6/5/13	9:40	Not yet assigned
VEP4-GW15-0406-MS	VEP4-GW15-0613-MS	6/5/13	9:40	Not yet assigned
VEP4-GW15-0406-SD	VEP4-GW15-0613-SD	6/5/13	9:40	Not yet assigned

022

EMPIRICAL LABORATORIES
COOLER RECEIPT FORM

Cooler Received/Opened On: 06/06/13 @ 0840 Workorder# 1306048

1. Tracking # 4825 (last 4 digits, FedEx)
   Courier: FEDEX
2. Temperature of rep. sample or temp blank when opened: 0.5 °C + correction factor (-0.1) = 0.4 °C
3. If item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA
4. Were custody seals on outside of cooler? YES NO NA
   If yes, how many and where: 2, 1 on front, 1 on back
5. Were the seals intact, signed, and dated correctly? YES NO NA
6. Were custody papers inside cooler? YES NO NA

I certify that I opened the cooler and answered questions 1-6 (initial) JG

7. Were custody seals on containers: YES NO and intact YES NO NA
   Were these signed and dated correctly? YES NO NA
8. Packing material used: Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry Ice Other None
10. Did all containers arrive in good condition (unbroken)? YES NO NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES NO NA
12. Did all container labels and tags agree with custody papers? YES NO NA
13. a. Were VOA vials received? YES NO NA
    b. Was there any observable headspace present in any VOA vial? YES NO NA
14. Was there a Trip Blank in this cooler? YES NO NA If multiple coolers, sequence # 1

I certify that I unloaded the cooler and answered questions 7-14 (initial)

15. a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES NO NA
    b. Did the bottle labels indicate that the correct preservatives were used YES NO NA
16. Was residual chlorine present? YES NO NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial)

17. Were custody papers properly filled out (ink, signed, etc)? YES NO NA
18. Did you sign the custody papers in the appropriate place? YES NO NA
19. Were correct containers used for the analysis requested? YES NO NA
20. Was sufficient amount of sample sent in each container? YES NO NA

I certify that I entered this project into LIMS and answered questions 17-20 (initial)

I certify that I attached a label with the unique LIMS number to each container (initial)

I certify that I have performed a second check of the LIMS information against the COC to confirm accuracy (initial)

21. Were there Non-Conformance issues at login? YES NO Was a NCR generated? YES NO #

Additional Details:

Page 1 of 1 023

EMPIRICAL LABORATORIES
COOLER RECEIPT FORM

Cooler Received/Opened On: 06/06/13 @ 0840 Workorder# 1306048

1. Tracking # 4636 (last 4 digits, FedEx)
   Courier: FEDEX
2. Temperature of rep. sample or temp blank when opened: 0.1 °C + correction factor (-0.1) = 0.0 °C
3. If item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA
4. Were custody seals on outside of cooler? YES NO NA
   If yes, how many and where: 2, 1 on front + 1 on back
5. Were the seals intact, signed, and dated correctly? YES NO NA
6. Were custody papers inside cooler? YES NO NA

I certify that I opened the cooler and answered questions 1-6 (initial) JG

7. Were custody seals on containers: YES NO and intact YES NO NA
   Were these signed and dated correctly? YES NO NA
8. Packing material used: Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry Ice Other None
10. Did all containers arrive in good condition (unbroken)? YES NO NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES NO NA
12. Did all container labels and tags agree with custody papers? YES NO NA
13. a. Were VOA vials received? YES NO NA
    b. Was there any observable headspace present in any VOA vial? YES NO NA
14. Was there a Trip Blank in this cooler? YES NO NA If multiple coolers, sequence # 2

I certify that I unloaded the cooler and answered questions 7-14 (initial)

15. a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES NO NA
    b. Did the bottle labels indicate that the correct preservatives were used YES NO NA
16. Was residual chlorine present? YES NO NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial)

17. Were custody papers properly filled out (ink, signed, etc)? YES NO NA
18. Did you sign the custody papers in the appropriate place? YES NO NA
19. Were correct containers used for the analysis requested? YES NO NA
20. Was sufficient amount of sample sent in each container? YES NO NA

I certify that I entered this project into LIMS and answered questions 17-20 (initial)

I certify that I attached a label with the unique LIMS number to each container (initial)

I certify that I have performed a second check of the LIMS information against the COC to confirm accuracy (initial)

21. Were there Non-Conformance issues at login? YES NO Was a NCR generated? YES NO #

Additional Details:

Page 1 of 1 024

Sample Delivery Group Case Narrative

Receipt Information
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. Samples were subcontracted to Test America for Volatile Fatty Acids.

As per the client, the sample listed on the COC as VEP4-GW15-0406 should have the client ID of VEP4-GW15-0613.

Changes to the Revision
Revision 01: The package was revised to replace the raw data that was not dark enough to be read in the original package.

Analytical Information
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:
The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

025

SW8260B:
The following were analyzed after the 12-hour tune criteria:
3F14010-MSD1 was analyzed 12 hours 13 minutes after the associated tune standard

The following continuing calibration verifications exceeded criteria:
3F16308-CCV1 with a positive bias for Tetrachloroethene

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

SW8270D BNA:
Note – Samples 1306048-02 and -03 were analyzed at a 10x due to apparent sample matrix in the sample extracts. No lower analyses were able to be performed.

The following internal standards exceeded criteria:
Phenanthrene-d10 with a negative bias in 3F19004-MSD1
Perylene-d12 with a negative bias in 3F19004-MSD1

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

RSK175 MEE:
The following matrix spikes exceeded criteria:
3F12022-MS1/MSD1 (1306048-04) with a negative bias for Methane

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

Wet Chemistry:
The following compounds are qualified with an M to indicate that the LOQ was raised to the concentration of the reporting limit standard within criteria:
Chloride (2.5mg/L) in 1306048-04

The following matrix spikes exceeded criteria:
3F06013-MS1/MSD1 (1306048-04) with a negative bias for Nitrite as N
3F10008-MS1/MSD1 (1306048-04) for Alkalinity, Total (as CACO3); note – the parent sample concentration for Alkalinity is greater than 4 times the amount spiked

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

026

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 1306048 LAB: Empirical

SITE NAME: Niagara Summit 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. VOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓ ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓ ___ ___

1.3 Sample Conditions/Problems

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- 6 VOA -

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

A 6/5/13 A 6/11-14
N 6/16 t 0.4°C

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ ✓ ___

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

028

- 7 VOA -

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water [✓] ___ ___

b. Soil [✓] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water [✓] ___ ___

b. Soil [✓] ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. [✓] ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ [✓]

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] [✓] ___

If yes, were samples reanalyzed? [ ] ___ [✓]

Were method blanks reanalyzed? [ ] ___ [✓]

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] [✓] ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [✓] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ [✓]

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] ___ ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent)

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? ☑ ___ ___

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? ☑ ___ ___

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month (page 8000C, section 9.5.))

a. Water ☑ ___ ___

b. Waste ☑ ___ ___

c. Soil/Solid ☐ ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. ☑ ___ ___

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. ☐ ___ ___

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? ☑ ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? ☑ ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? ☑ ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? ☑ ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ☐ ___ ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone
** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates [✓] ___ ___

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) [✓] ___ ___

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? [✓] ___ ___

YES NO N/A

Resolution? [✓] ___ ___

Peak shape? [✓] ___ ___

Full-scale graph (attenuation)? [✓] ___ ___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reportec compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ [✓]

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ [✓]

b. Blanks [ ] ___ [✓]

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ [✓]

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ [✓]

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ [✓]

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] [✓] ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? ✓ ___ ___

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? ✓ ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? ✓ ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39) qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. ___ ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) ___ ✓ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? ✓ ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

All attached form

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). ✓ ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ANALYSIS SEQUENCE SUMMARY
SW8260B

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Sequence: 3F16801
Calibration: 3164002

SDG: 1306048
Project: Vieques East SWMU 20
Instrument: MS-VOA3

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
MS Tune	3F16801-TUN1	0614TUN1.D	06/14/13 07:53
Calibration Check	3F16801-CCV1	0614CCV1.D	06/14/13 08:24
LCS	3F14010-BS1	0614LCS1.D	06/14/13 08:54
Blank	3F14010-BLK1	0614BLK1.D	06/14/13 10:51
VEP4-SB17-0406	1306048-01	0604801A.D	06/14/13 11:20
VEP4-SS17-0001	1306048-02	0604802A.D	06/14/13 12:48
VEP4-SS17P-0001	1306048-03	0604803A.D	06/14/13 13:17
VEP4-SB17-0406	3F14010-MS1	0604801M.D	06/14/13 19:37
VEP4-SB17-0406 MSD	3F14010-MSD1	0604801S.D	06/14/13 20:06

Out of 12 hour clock
— No qualifications are added to MSD sample per no final applied

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ANALYSIS SEQUENCE SUMMARY
SW8260B

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Sequence: 3F16308
Calibration: 3157003

SDG: 1306048
Project: Vieques East SWMU 20
Instrument: MS-VOA4

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
MS Tune	3F16308-TUN1	0611TUN1.D	06/11/13 12:59
Calibration Check	3F16308-CCV1	0611CCV2.D	06/11/13 14:08
LCS	3F11019-BS1	0611LCS1.D	06/11/13 14:36
Blank	3F11019-BLK1	0611BLK1.D	06/11/13 16:28
VEP4-TB01-060513	1306048-07	0604807.D	06/11/13 17:51
VEP4-EB01-060513-SO	1306048-05	0604805.D	06/11/13 18:19
VEP4-EB01-060513-GW	1306048-06	0604806.D	06/11/13 18:47
VEP4-GW15-0613	1306048-04	0604804.D	06/11/13 19:15
VEP4-GW15-0613	3F11019-MS1	0604804M.D	06/11/13 23:54
VEP4-GW15-0613	3F11019-MSD1	0604804S.D	06/12/13 00:22

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CONTINUING CALIBRATION CHECK
SW8260B

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Instrument ID: MS-VOA4
Lab File ID: 0611CCV2.D
Sequence: 3F16308
Lab Sample ID: 3F16308-CCV1

SDG: 1306048
Project: Vieques East SWMU 20
Calibration: 3157003
Calibration Date: 06/05/13 01:15
Injection Date: 06/11/13
Injection Time: 14:08

COMPOUND	TYPE	CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
		STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT (#)
1,1-Dichloroethene	A	100.0	90.71	0.2706059	0.2454663		-9.3	20
cis-1,2-Dichloroethene	A	100.0	95.19	0.3175907	0.3023295		-4.8	20
trans-1,2-Dichloroethene	A	100.0	96.25	0.2955831	0.2844937		-3.8	20
Tetrachloroethene	A	100.0	121.3	0.6698359	0.8124939		21.3	20 *
Trichloroethene	A	100.0	96.78	0.2922197	0.2828238		-3.2	20
Vinyl chloride	A	100.0	98.97	0.2716692	0.2688716		-1.0	20
Bromofluorobenzene	A	50.00	50.72	0.9483193	0.9711938		2.4	20
Dibromofluoromethane	A	50.00	29.71	0.278935	0.2762641		-1.0	20
1,2-Dichloroethane-d4	A	50.00	28.66	6.055941E-02	5.785398E-02		-4.5	20
Toluene-d8	A	50.00	51.77	2.345693	2.484277		5.9	20

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USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? L1 ✓ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds in section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? L1 ___ ___

- 28 VOA -

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YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION: 1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.

2. Do not qualify non-detects when the associated IS are counts area > + 100%.

3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".

4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ✓

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ✓

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

VEP4-SS17-0001
VEP4-SS17P-0001 > N/A

YES NO N/A

E - The concentration of this analyte exceeds the calibration range of the instrument.

A - Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 1306048 LAB: Empirical

SITE NAME: Vieques Summer 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format? ✓

ACTION: If not, note the effect on review of the data in the data assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative or cover letter present? ✓

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓

YES NO N/A

II. SEMIVOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? ✓

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ✓

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, all non-detects data are qualified as unusable (R), and detects are flagged "J".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (10°C), flag all positive results "J" and all non-detects "UJ".

2.0 Holding Times

2.1 Have any semivolatile technical holding times, determined from date of collection to date of extraction, been exceeded? ✓

Continuous extraction of water samples for semivolatile analysis must be started within 7 days of the date of collection. Soil/sediment samples must be extracted within 14 days of collection. Extracts must be analyzed within

YES NO N/A

40 days of the date of extraction.

Table of Holding Time Violations

(See Traffic Report)

Sample ID	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted	Date Analyzed

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

YES NO N/A

3.0 Surrogate Recovery (Form II/Equivalent)

3.1 Have the semi volatile surrogate recoveries been listed on CLP Surrogate Recovery forms (Form II) for each of the following matrices:

a. Low Water [✓] ___ ___

b. Low/Med Soil [✓] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery Summary forms for each matrix:

a. Low Water [✓] ___ ___

b. Low/Med Soil [✓] ___ ___

ACTION: If CLP deliverables are unavailable, document the effect(s) in data assessments. In some cases the lab may have to be contacted to obtain the data necessary to complete the validation.

3.3 Were outliers marked correctly with an asterisk? [ ] ___ [✓]

ACTION: Circle all outliers in red.

3.4 Were two or more base neutral OR acid surrogate recoveries out of specification for any sample or method blank (Reviewer should use lab in house recovery limits. Use surrogate recovery limits from USEPA National Functional Guidlines January 2005 page 130, if in house limits are not available. See Method 8000B-43 or 8000C-24). [ ] [✓] ___

Note: Examine lab in house limits for reasonableness.

If yes, were samples re-analyzed? [ ] ___ [✓]

YES NO N/A

Were method blanks re-analyzed? [ ] ___ [✓]

ACTION: If all surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet method specifications, for the affected fraction only (i.e. either base-neutral or acid compounds):

1. Flag all positive results as estimated ("J").

2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.

3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Positive results for the fraction with < 10% surrogate recovery are qualified with "J".

2. Non-detects for that fraction should be qualified as unusable (R) .

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II? [✓] [ ] ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document

YES NO N/A

effect in data assessments.

4.0 Matrix Spikes (Form III/Equivalent)

4.1 Have the semivolatile Matrix Spike and Matrix Spike Duplicate/or duplicate unspiked Sample recoveries been listed on the Recovery Form (Form III)? [✓] ___ ___

NOTE: Method 3500B/page 4 states the spiking compounds:

Base/neutrals	Acids
1,2,4-Trichlorobenzene	Pentachlorophenol
Acenaphthene	Phenol
2,4-Dinitrotoluene	2-Chlorophenol
Pyrene	4-Chloro-3-methylphenol
N-Nitroso-di-n-propylamine	4-Nitrophenol
1,4-Dichlorobenzene	

Note: Some projects may require the spiking of specific compounds of interest.

Note: See Method 8270D-sec 8.4.2 for deciding on whether to prepare and analyze duplicate samples or a martix spike/matrix spike duplicate. If samples are expected to contain target analytes, then laboratory may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratory should use a matrix spike and matrix spike duplicate pair.

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water [✓] ___ ___

b. Low Solid [✓] ___ ___

c. Med Solid [ ] ___ ___

YES NO N/A

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. It may be necessary to contact the lab to obtain the required data.

NOTE: If the data has not been reported on CLP equivalent form, then the laboratory must provide the information necessary to evaluate the spike recoveries in the MS and MSD. The required data which should have been provided by the lab include the analytes and concentrations used for spiking, background concentrations of the spiked analytes (i.e., concentrations in unspiked sample), methods and equations used to calculate the QC acceptance criteria for the spiked analytes, percent recovery data for all spiked analytes.

The data reviewer must verify that all reported equations and percent recoveries are correct before proceeding to the next section.

4.3 Were matrix spikes performed at concentration equal to 100ug/L for acid compounds, and 200ug/l for base compounds (Method 3500B-4), or those specified in project plan. ✓ ___ ___

4.4 How many semivolatile spike recoveries are outside Laboratory in house MS/MSD recovery limits (use recovery limits values in Method 8270D-43&44 Table 6 if in house values not available).

Water: 0 out of 1

Solids: 0 out of 1

YES NO N/A

4.5 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water: 0 out of 1

Solids: 0 out of 1

ACTION: Circle all outliers with red pencil.

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria to determine the need for some qualification of the data.

4.6 Was a Laboratory Control Sample (LCS) analyzed with each analytical batch? ✓ ___ ___

NOTE: When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

5.0 Blanks (Form IV/Equivalent)

5.1 Is the Method Blank Summary (Form IV) present? ✓ ___ ___

5.2 Frequency of Analysis:

Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? ✓ ___ ___

5.3 Has a method blank been analyzed either after

YES NO N/A

the calibration standard or at any other time during the analytical shift for each GC/MS system used ? ✓ ___ ___

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, use professional judgement to determine if the associated sample data should be qualified.

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for the semivolatiles? ✓ ___ ___

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ✓ ___

6.2 Do any field/rinse/ blanks have positive results for target analytes and/or TICs (if required, see section 10 below)? ___ ✓ ___

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field Blanks must be qualified for outlying surrogates, poor spectra, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify sample results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

YES NO N/A

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

NOTE: If the laboratory did not report TIC analyses, check the project plans to verify whether or not it was required.

6.3 Are there field/rinse/equipment blanks associated with every sample? ✓

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

6.4 Was a instrument blank analyzed after each sample/dilution which contained a target compound

YES NO N/A

that exceeded the initial calibration range. ✓

6.5 Does the instrument blank have positive results for target analytes and/or TICs? ✓

Note: Use professional judgement to determine if carryover occurred and qualify analytes accordingly.

7.0 GC/MS Apparatus and Materials

7.1 Did the lab use the proper gas chromatographic column for analysis of semivolatiles by Method 8270D? Check raw data, instrument logs or contact the lab to determine what type of column was used. The method requires the use of 30 m x 0.25 mm ID (or 0.32 mm ID), silicone-coated, fused silica, capillary column. ✓

ACTION: If the specified column, or equivalent, was not used, document the effects in the data assessment. Use professional judgement to determine the acceptability of the data.

8.0 GC/MS Instrument Performance Check (Form V/Equivalent)

8.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)? ✓

NOTE: The performance solution should also contain 4,4-DDT, pentachlorophenol, and benzidine to verify injection port inertness and column performance. The degradation of DDT to DDE and DDD must be less than 20% total and the response of pentachlorophenol and benzidine should be within normal ranges for these compounds (based upon lab experience) and show no peak degradation or tailing before samples are analyzed. (see section 5.5

YES NO N/A

page 8270D-12).

8.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? ✓

8.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument? ✓

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

8.4 Have the ion abundances been normalized to m/z 198? ✓

8.5 Have the ion abundance criteria been met for each instrument used? ✓

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

YES NO N/A

ACTION: If ion abundance criteria are not met, take action specified in section 3.2

8.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.) ✓

8.7 Have the appropriate number of significant figures (two) been reported? ✓

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.

8.8 Are the spectra of the mass calibration compound acceptable? ✓

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

9.0 Target Analytes

9.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ✓

b. Matrix spikes and matrix spike duplicates ✓

c. Blanks ✓

9.2 Has any special cleanup, such as GPC, been performed on all soil/sediment sample extracts (see section 7.2, page 8270D-14)? ✓

YES NO N/A

ACTION: If data suggests that extract cleanup was not performed, use professional judgement. Make note in the data assessment narrative.

9.3 Are the Reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) [✓] ___ ___

c. Blanks [✓] ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

9.4 Are the response factors shown in the Quant Report? [✓] ___ ___

9.5 Is chromatographic performance acceptable with respect to:

Baseline stability? [✓] ___ ___

Resolution? [✓] ___ ___

Peak shape? [✓] ___ ___

Full-scale graph (attenuation)? [✓] ___ ___

Other:_____ [ ] ___ ___

ACTION: Use professional judgement to determine the acceptability of the data.

9.6 Are the lab-generated standard mass spectra of identified semivolatile compounds present for

YES NO N/A

each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the data assessment narrative. If spectra are missing, reject all positive data.

9.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

9.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

9.9 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 9.7, 9.8, and 9.9.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

YES NO N/A

10.0 Tentatively Identified Compounds (TIC)

10.1 If Tentatively Identified Compounds were required for this project, are all Form Is, Part B present: and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier?

NOTE: Review sampling reports to determine if the lab was required to identify non target analytes (refer to section 7.6.2, page 8270D-21).

No TICs

10.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following: [ ] ___ [✓]

a. Samples and/or fractions as appropriate [ ] ___ [✓]

b. Blanks [ ] ___ [✓]

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by CAS #.

10.3 Are any target compounds from one fraction listed as TIC compounds in another (e.g., an acid compound listed as a base neutral TIC)? ___ [ ] [✓]

ACTION: i. Flag with "R" any target compound listed as a TIC.

ii. Make sure all rejected compounds are properly reported in the other fraction.

10.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the

YES NO N/A

sample mass spectrum? [ ] ___ [✓]

10.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ [✓]

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate and remove "JN". Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R."

11.0 Compound Quantitation and Reported Detection Limits

11.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found? ___ [✓] ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

11.2 Are the method detection limits adjusted to reflect sample dilutions and, for soils, sample moisture? [✓] ___ ___

YES NO N/A

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I (if present) and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red " X" across the entire page of all Form I's that should not be used, including any in the summary package.

12.0 Standards Data (GC/MS)

12.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration? ☑ ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

13.0 GC/MS Initial Calibration (Form VI/Equivalent)

13.1 Is the Initial Calibration Form (Form VI/ Equivalent) present and complete for the semivolatile fraction? ☑ ___ ___

ACTION: If any calibration forms or standard row data are missing, take action specified in 3.2 above.

13.2 Are all base neutral or acid RRFs > 0.050? ☑ ___ ___

YES NO N/A

Check the **average RRFs** of the four System Performance Check Compounds (SPCCs): N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. These compounds must have **average RRFs** greater than or equal to 0.05 before running samples and should not show any peak tailing.

ACTION: Circle all outliers in red.

ACTION: For any target analyte with **average RRF <0.05**

1. "R" all non-detects;
2. "J" all positive results.

13.3 Are response factors for base neutral or acid target analytes stable over the concentration range of the calibration (% Relative standard deviation [%RSD] < 20.0%)? ☑ ___ ___

NOTE: The % RSD for each individual Calibration Check Compound (CCC, Method 8270D-40 see Table 4) must be less than 30% before analysis can begin. If grater 30%, the lab must clean and recalibrate the instrument.

CALIBRATION CHECK COMPOUNDS

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol

YES NO N/A

Benzo(a)pyrene

ACTION: If the %RSD for any CCC >30% and no corrective action taken, then "J" qualify all positive hits and "UJ" qualify all non-detects.

ACTION: Circle all outliers in red.

ACTION: If the % RSD is ≥ 20.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non- detect results for that analyte "R," unusable. Alternatively, the lab should calculate first or second order regression fit of the calibration curve and select the fit which introduces the least amount of error.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

13.4 Did the laboratory calculate the calibration curve by the least squares regression fit? ___ ☑ ___

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) ___ ☑ ___

ACTION: Circle Errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

13.5 Do the target compounds for this SDG include Pesticides? ☐ ☑ ___

YES NO N/A

13.6 If the pesticide compounds include DDT, was the percent breakdown of DDT to DDD and DDE greater than 20%? ___ ☐ ☑

ACTION: If DDT percent breakdown exceeds 20%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE results are positive, qualify the quantitation limit for DDT as unusable, "R".

ii. Qualify all positive results for DDD and DDE as presumptively present at an approximate concentration "JN".

14.0 GC/MS Calibration Verification (Form VII/Equivalent)

14.1 Are the Calibration Verification Forms (Form VII) present and complete for all compounds of interest? ☑ ___ ___

14.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ☑ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

ACTION: If any forms are missing or no calibration verification standard has been analyzed within twelve hours of every sample analysis.

YES NO N/A

call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

14.3 Do any of the SPCCs have an RRF <0.05? ___ ✓ ___

If YES, make a note in data assessment if the lab did not take corrective action specified in section 7.4.4, page 8270D-18. ✓ ___ ___

14.4 Do any of the CCCs have a %D between the initial and continuing RRF which exceeds 20.0%?

ACTION: If yes, make a note in data assessment.

14.5 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds 20.0%? ___ ✓ ___

ACTION: Circle all outliers in red.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is above 90%, qualify all non-detects for that analyte as "R", unusable.

14.6 Do any semivolatile compounds have a RRF < 0.05? ___ ✓ ___

ACTION: Circle all outliers in red.

ACTION: If RRF < 0.05, qualify as unusable ("R") associated non-detects and "J" associated positive values.

14.7 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or percent difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more). ___ ✓ ___

YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect(s) in the data assessments.

15.0 Internal Standards (Form VIII)

15.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to + 100%) for each continuing calibration? ✓ ___ ___

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area	LowerLimit	Upper Limit
ISTD	low for	MSD -	No qual	
All	attached	form		

(Attach additional sheets if necessary.)

Note: Check Table 5, 8270D-41 for associated analytes.

ACTION: i. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

ii. Non-detects associated with IS > 100% should not be qualified.

INTERNAL STANDARD AREA AND RT SUMMARY
SW8270D

Laboratory: Empirical Laboratories, LLC
Client: CH2M Hill, Inc.
Sequence: 3G19002

SDG: 1306048
Project: Vineyard East SWMU 20
Instrument: MS-BNA4
Calibration: 3132001

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Calibration Check (3G19002-CCV1)			Lab File ID: SEQ-CCVE.D			Analyzed: 07/06/13 23:52			
Phenanthrene-d10	208377	9.341	321039	10.543	65	50 - 200	-1.2040	+/-0.50	
Perylene-d12	241604	15.629	337266	17.137	72	50 - 200	-1.5080	+/-0.50	
VEP4-SB17-0406 (1306048-01)			Lab File ID: 0604801.D			Analyzed: 07/07/13 00:20			
Phenanthrene-d10	196929	9.341	321039	9.341	61	50 - 200	0.0000	+/-0.50	
Perylene-d12	227578	15.629	337266	15.629	67	50 - 200	0.0000	+/-0.50	
Matrix Spike (3F19004-MS1)			Lab File ID: 0604801M.D			Analyzed: 07/07/13 00:48			
Phenanthrene-d10	176301	9.345	321039	9.341	55	50 - 200	0.0040	+/-0.50	
Perylene-d12	203936	15.629	337266	15.629	60	50 - 200	0.0000	+/-0.50	
Matrix Spike Dup (3F19004-MSD1)			Lab File ID: 0604801S.D			Analyzed: 07/07/13 01:15			
Phenanthrene-d10	115420	9.341	321039	9.341	36	50 - 200	0.0000	+/-0.50	*
Perylene-d12	140953	15.629	337266	15.629	42	50 - 200	0.0000	+/-0.50	*

No qual
— No qualification added to MSD sample

Note: As indicated by QSM 4.2 table F-4, internal standard retention times are evaluated to the continuing calibration verification rather than the midpoint of the initial calibration curve. Reference DoD QSM F-4 tables for RTW establishment: "Position shall be set using the midpoint standard of the ICAL curve when ICAL is performed. On days when ICAL is not performed, the initial CCV is used." and the following page for technical explanation on the use of daily CCV retention times in lieu of the ICAL midpoint standard: "Laboratories may update the retention times based on the CCV to account for minor performance fluctuations or after routine system maintenance (such as column clipping).

079

YES NO N/A

iii. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

15.2 Are the retention times of all internal standards within 30 seconds of the associated calibration standard? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

16.0 Laboratory Control Samples (LCS)

16.1 Were any LCS samples run in order to verify analytes which failed criteria for spike recovery? ___ ✓ ___

16.2 Did the lab spike LCS sample spiked with the same analytes and the same concentrations as the matrix spike? ✓ ___ ___

16.3 Were the mean and standard deviation of all analytes within the QC acceptance ranges as shown in Table 6, 8270D-43? ✓ ___ ___

ACTION: If the recovery of any analyte falls out of the designated range, the analytical results for that compound is suspect and should be qualified "J" in the unspiked samples.

17.0 Field Duplicates

17.1 Were any field duplicates submitted for semivolatile analysis? ✓ ___ ___

YES NO N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

VEP4-SS17-0001 > MDL
VEP4-SS17P-0001

Samples VEP4-SS17-0001 and VEP4-SS17P-0001 were only analyzed @ 1:10 dilution

DataQual
Environmental Services, LLC

CH2M HILL-VBO
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

December 10, 2013
SDG# 1306083, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1306083. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24 and 8270D-Rev 4, August 2008-SOP #HW-22,), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA	SVOA
VEP4-GW19-0613	1306083-01	water	X	X
VEP4-EB01-060613-GW	1306083-02	water	X	X
VEP4-TB01-060613	1306083-03	water	X	
VEP4-GW18-0613	1306083-04	water	X	X
VEP4-EB01-060713-GW	1306083-05	water	X	X

The following quality control samples were provided with this SDG: sample VEP4-EB01-060613-GW and VEP4-EB01-060713-GW - equipment blank and sample VEP4-TB01-060613- trip blank.

The samples were evaluated based on the following criteria:

- Data Completeness
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Field Duplicates NA

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- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

No qualifications were required to the data.

SVOA

No qualifications were required to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were required as the raw data was not printed dark enough to read in the original package. The laboratory was contacted and updated pages were submitted.

Technical Holding Times

According to chain of custody records, sampling was performed on 6/6-7/13 and samples were received at the laboratory 6/8/13. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

SVOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U not detected above the reported sample quantitation limit
J estimated value
UJ reported quantitation limit is qualified as estimated
N analyte has been tentatively identified
JN analyte has been tentatively identified, estimated value
R result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.

U* The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.

RL** The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.

J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.
Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL reporting limit
PQL practical quantitation limit
IDL instrument detection limit
MDL method detection limit
CRDL contract required detection limit
CRQL contract required quantitation limit
\+ positive result
\- non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Peiticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

ANALYSIS DATA SHEET

VEP4-GW19-0613

Laboratory: Empirical Laboratories, LLC | SDG: 1306083
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1306083-01 | File ID: 0608301.D
Sampled: 06/06/13 10:25 | Prepared: 06/14/13 00:00 | Analyzed: 06/15/13 08:28
Solids: | Preparation: 5030B | Dilution: 1
Batch: 3F14027 | Sequence: 3F16812 | Calibration: 3157003 | Instrument: MS-VOA4

CAS NO	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene	**2.70**	0.100	0.200	0.500	
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.80	92.7	75 - 120	
Dibromofluoromethane	30.00	34.43	115	85 - 115	
1,2-Dichloroethane-d4	30.00	31.96	107	70 - 120	
Toluene-d8	30.00	29.19	97.3	85 - 120	

WM 112413

009

ANALYSIS DATA SHEET

VEP4-EB01-060613-GW

Laboratory: Empirical Laboratories, LLC | SDG: 1306083
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1306083-02 | File ID: 0608302.D
Sampled: 06/06/13 12:30 | Prepared: 06/14/13 00:00 | Analyzed: 06/15/13 07:21
Solids: | Preparation: 5030B | Dilution: 1
Batch: 3F14027 | Sequence: 3F16812 | Calibration: 3157003 | Instrument: MS-VOA4

CAS NO	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.18	101	75 - 120	
Dibromofluoromethane	30.00	31.40	105	85 - 115	
1,2-Dichloroethane-d4	30.00	31.16	104	70 - 120	
Toluene-d8	30.00	30.35	101	85 - 120	

WM 112413

009

ANALYSIS DATA SHEET

VEP4-TB01-060613

Laboratory: Empirical Laboratories, LLC | SDG: 1306083
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1306083-03 | File ID: 0608303.D
Sampled: 06/06/13 07:00 | Prepared: 06/14/13 00:00 | Analyzed: 06/15/13 03:48
Solids: | Preparation: 5030B | Dilution: 1
Batch: 3F14027 | Sequence: 3F16812 | Calibration: 3157003 | Instrument: MS-VOA4

CAS NO	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.71	92.4	75 - 120	
Dibromofluoromethane	30.00	31.88	106	85 - 115	
1,2-Dichloroethane-d4	30.00	31.07	104	70 - 120	
Toluene-d8	30.00	28.44	94.8	85 - 120	

WM 112413

010

ANALYSIS DATA SHEET

VEP4-GW18-0613

Laboratory: Empirical Laboratories, LLC | SDG: 1306083
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1306083-04 | File ID: 0608304.D
Sampled: 06/07/13 09:40 | Prepared: 06/14/13 00:00 | Analyzed: 06/15/13 08:54
Solids: | Preparation: 5030B | Dilution: 1
Batch: 3F14027 | Sequence: 3F16812 | Calibration: 3157003 | Instrument: MS-VOA4

CAS NO	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene	**2.24**	0.100	0.200	0.500	
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.66	92.2	75 - 120	
Dibromofluoromethane	30.00	31.45	105	85 - 115	
1,2-Dichloroethane-d4	30.00	29.97	99.9	70 - 120	
Toluene-d8	30.00	28.37	94.6	85 - 120	

WM 112413

011

ANALYSIS DATA SHEET

VEP4-EB01-060713-GW

Laboratory: Empirical Laboratories, LLC | SDG: 1306083
Client: CH2M Hill, Inc. | Project: Voegtes East SWMU 20
Matrix: Water | Laboratory ID: 1306083-05 | File ID: 0608305.D
Sampled: 06/07/13 11:00 | Prepared: 06/17/13 00:00 | Analyzed: 06/17/13 10:02
Solids: | Preparation: 5030B | Dilution: 1
Batch: 3F17003 | Sequence: 3F16906 | Calibration: 3157003 | Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.16	90.5	75 - 120	
Dibromofluoromethane	30.00	31.69	106	85 - 115	
1,2-Dichloroethane-d4	30.00	29.95	99.8	70 - 120	
Toluene-d8	30.00	28.54	95.1	85 - 120	

MM 112413

ANALYSIS DATA SHEET

VEP4-GW19-0613

Laboratory: Empirical Laboratories, LLC | SDG: 1306083
Client: CH2M Hill, Inc. | Project: Voegtes East SWMU 20
Matrix: Water | Laboratory ID: 1306083-01 | File ID: 0608301.D
Sampled: 06/06/13 10:25 | Prepared: 06/12/13 11:50 | Analyzed: 07/03/13 20:32
Solids: | Preparation: EXT_3510 | Dilution: 1
Batch: 3F12005 | Sequence: 3G18917 | Calibration: 3122001 | Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.231	0.463	0.926	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	46.30	27.35	59.1	50 - 110	
Terphenyl-d14	46.30	31.76	68.6	50 - 135	
2,4,6-Tribromophenol	92.59	71.39	77.1	40 - 125	

MM 112413

ANALYSIS DATA SHEET

VEP4-EB01-060613-GW

Laboratory: Empirical Laboratories, LLC | SDG: 1306083
Client: CH2M Hill, Inc. | Project: Voegtes East SWMU 20
Matrix: Water | Laboratory ID: 1306083-02 | File ID: 0608302.D
Sampled: 06/06/13 12:20 | Prepared: 06/12/13 11:50 | Analyzed: 07/05/13 20:39
Solids: | Preparation: EXT_3510 | Dilution: 1
Batch: 3F12005 | Sequence: 3G18917 | Calibration: 3122001 | Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.231	0.463	0.926	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	46.30	26.75	57.8	50 - 110	
Terphenyl-d14	46.30	37.42	80.8	50 - 135	
2,4,6-Tribromophenol	92.59	75.17	81.2	40 - 125	

MM 112413

ANALYSIS DATA SHEET

VEP4-GW18-0613

Laboratory: Empirical Laboratories, LLC | SDG: 1306083
Client: CH2M Hill, Inc. | Project: Voegtes East SWMU 20
Matrix: Water | Laboratory ID: 1306083-04 | File ID: 0608304.D
Sampled: 06/07/13 09:40 | Prepared: 06/12/13 11:50 | Analyzed: 07/05/13 21:26
Solids: | Preparation: EXT_3510 | Dilution: 1
Batch: 3F12005 | Sequence: 3G18917 | Calibration: 3122001 | Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.245	0.490	0.980	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	49.02	31.25	63.7	50 - 110	
Terphenyl-d14	49.02	43.19	88.0	50 - 135	
2,4,6-Tribromophenol	98.04	86.66	88.4	40 - 125	

MM 112413

ANALYSIS DATA SHEET

VEP4-EB01-060713-GW

Laboratory:	Empirical Laboratories, LLC		SDG:	1306083	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID: 1306083-05		File ID:	0608305.D
Sampled:	06/07/13 11:00	Prepared:	06/12/13 11:30	Analyzed:	07/05/13 21:43
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	IF12005	Sequence: 3GF8917	Calibration:	3132001	Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.233	0.463	0.926	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	46.30	28.63	61.8	50 - 110	
Terphenyl-d14	46.30	33.44	72.2	50 - 135	
2,4,6-Tribromophenol	92.59	82.45	89.0	40 - 125	

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ELECTRONIC CHAIN OF CUSTODY RECORD

C.O.C. 20130607-GW-SMP-01

PLEASE PRINT

Report to: EMPIRICAL, 621 Mainstream Dr., Suite 270, Nashville, TN 37228 — phone: 615-345-1115

Company Name: CH2MHILL — Phone: 703.376.5301

Address: 15010 Conference Dr. ; 200, Chantilly, VA 20151 — Fax: 703.376.5801

Attn: Mike Zamboni

Project Name/Number: Survey 20 MW installation and GW sampling

Purchase Order Number: 943380

Sampler (Print): not required

Sampler (Signature): not required

Invoice to: See Contact

Company Name: See Contact — Phone:

Address: — Fax:

Attn:

Date Shipped: 6/7/13

Carrier: FedEx

Waybill No.: 799944523702

Comments:

Sample Identification	Location	Date Collected	Time Collected	Matrix	Analysis Requested/Method Number
VEP4-GW19-0613		6/6/13	10:25	AST 5	
VEP4-EB01-060613-GW		6/6/13	12:30	AST 5	
VEP4-TB01-060613		6/6/13	7:00	AST 2	
VEP4-GW18-0613		6/7/13	09:40	AST 12	
VEP4-EB01-060713-GW		6/7/13	11:00	AST 5	

Shuttle Temperature:

Sample Disposal: Return to client — Disposal by Lab (fee applies) — not applicable

Relinquished by: Date 6/7/13 Time 1015 — Received by: Date Time

Relinquished by: Date Time — Received by: Date Time

Relinquished by: Date Time — Received by: Date Time

White: Return to client with report — Yellow: Laboratory Copy — Pink: Sampler

Note: The first sampled date of the ARF will be used as the COC number unless indicated otherwise.

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EMPIRICAL LABORATORIES COOLER RECEIPT FORM

Cooler Received/Opened On: 06/08/13 @ 0815 — Workorder# 1306083

1. Tracking # 3702 (last 4 digits, FedEx)
   Courier: ROUTE
2. Temperature of rep. sample or temp blank when opened: 0.2 °C + correction factor (-0.1) = 0.1 °C
3. If item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA
4. Were custody seals on outside of cooler? YES NO NA
   If yes, how many and where: 2, 1 on front + 1 on back
5. Were the seals intact, signed, and dated correctly? YES NO NA
6. Were custody papers inside cooler? YES NO NA

I certify that I opened the cooler and answered questions 1-6 (initial) JG

7. Were custody seals on containers: YES NO and intact YES NO NA
   Were these signed and dated correctly? YES NO NA
8. Packing material used: Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry Ice Other None
10. Did all containers arrive in good condition (unbroken)? YES NO NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES NO NA
12. Did all container labels and tags agree with custody papers? YES NO NA
13. a. Were VOA vials received? YES NO NA
    b. Was there any observable headspace present in any VOA vial? YES NO NA
14. Was there a Trip Blank in this cooler? YES NO NA — If multiple coolers, sequence #
    I certify that I unloaded the cooler and answered questions 7-14 (initial)
15. a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES NO NA
    b. Did the bottle labels indicate that the correct preservatives were used YES NO NA
16. Was residual chlorine present? YES NO NA
    I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial)
17. Were custody papers properly filled out (ink, signed, etc)? YES NO NA
18. Did you sign the custody papers in the appropriate place? YES NO NA
19. Were correct containers used for the analysis requested? YES NO NA
20. Was sufficient amount of sample sent in each container? YES NO NA
    I certify that I entered this project into LIMS and answered questions 17-20 (initial)
    I certify that I attached a label with the unique LIMS number to each container (initial)
    I certify that I have performed a second check of the LIMS information against the COC to confirm accuracy (initial)
21. Were there Non-Conformance issues at login? YES NO Was a NCR generated? YES NO #

Additional Details:

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Sample Delivery Group Case Narrative

Receipt Information

The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. Samples were subcontracted to Test America for Volatile Fatty Acids.

Changes to the Revision

Revision 01: The package was revised to replace the raw data that was not dark enough to be read in the original package.

Analytical Information

All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:

The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

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SW8260B:
No anomalies or deviations are noted.

SW8270D BNA:
No anomalies or deviations are noted.

RSK175 MEE:
No anomalies or deviations are noted.

Wet Chemistry:
Note – Sample 1306083-04 was over linear range for Chloride but was missed for dilution within holding time and was analyzed 33 days after sampling with a method recommended holding time of 28 days. Both are included in the report.

The following compounds are qualified with an M to indicate that the LOQ was raised to the concentration of the reporting limit standard within criteria:
Chloride (1.0mg/L) in 1306083-04

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

020

YES NO N/A

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 1306083 LAB: Empirical

SITE NAME: Vieques Summ 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. **VOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓ ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓ ___ ___

1.3 Sample Conditions/Problems

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"0J".

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ ✓ ___

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water ✓ ___ ___

b. Soil ___ ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water ✓ ___ ___

b. Soil ___ ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. lab [✓] ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ [✓]

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] [✓] ___

If yes, were samples reanalyzed? [ ] ___ [✓]

Were method blanks reanalyzed? [ ] ___ [✓]

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] [✓] ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ [✓]

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] [✓] ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent) No MS/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] ___ [✓]

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] ___ [✓]

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month [page 8000C, section 9.5.])

a. Water [ ] ___ ✓

b. Waste [ ] ___ ✓

c. Soil/Solid [ ] ___ ✓

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [ ] ___ ✓

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ ✓

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? ✓ ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? ✓ ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? ✓ ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? ✓ ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. [ ] ___ ✓

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	≥ CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓

9.5 Have the ion abundance criteria been met for each instrument used? ✓

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ✓

9.7 Have the appropriate number of significant figures (two) been reported? ✓

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ✓

b. Matrix spikes and matrix spike duplicates ✓

c. Blanks ✓

d. Laboratory Control Samples ✓

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ✓

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ✓

c. Blanks ✓

d. Laboratory Control Samples ✓

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? ✓

YES NO N/A

Resolution? [✓] ___ ___

Peak shape? [✓] ___ ___

Full-scale graph (attenuation)? [✓] ___ ___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ ___ [✓]

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ [✓]

b. Blanks [ ] ___ [✓]

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ [✓]

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ [✓]

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ [✓]

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] ___ ___ [✓]

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks ≥ 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ [✓]

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? ✓ ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39)qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. ✓ ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) ___ ✓ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 <u>GC/MS Calibration Verification (CLP Form VII Equivalent)</u>

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? ✓ ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). ___ ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 <u>Internal Standards (CLP Form VIII Equivalent)</u>

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.4)? ✓ ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:
1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.
2. Do not qualify non-detects when the associated IS are counts area > + 100%.
3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".
4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? M

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ✓

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

DataQual **VOA**

Initial Calibration Date: 6/5/2013
RRF and %RSD Calculations:
Compound Name: vinyl chloride
Lab Value: 0.2104

Area of Compound	1419609
Area of Internal STD	1012244
Conc. of Internal STD	30
Conc. of Compound	200
Calculated RRF	0.210

Compound Name: 1,1-dichloroethene
Lab Value: 4.2

RRF of STD 1	0.4208
RRF of STD 2	0.3931
RRF of STD 3	0.4145
RRF of STD 4	0.4066
RRF of STD 5	0.4149
RRF of STD 6	0.3940
RRF of STD 7	0.3740
RRF of STD 8	0.3998
RRF of STD 9	0.3759
Calculated % RSD	4.2

Continuing Calibration File ID: 6/17/2013
RRF and %D Calculations:
Compound Name: cis-1,2-dichloroethene
Lab Value: 0.314

Area of Compound	1013448
Area of Internal STD	967418
Conc. of Internal STD	30
Conc. of Compound	100
Calculated RRF	0.314

Compound Name: trichloroethene
Lab Value: 3.4

Average RRF	0.292
Calibration Check RRF	0.302
Calculated % D	-3.4

YES NO N/A

E - The concentration of this analyte exceeds the calibration range of the instrument.

A - Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 1306083 LAB: Empirical

SITE NAME: Vegas Sunset 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format? M

ACTION: If not, note the effect on review of the data in the data assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative or cover letter present? ✓

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? M

YES NO N/A

II. SEMIVOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? ✓ ___ ___

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, all non-detects data are qualified as unusable (R), and detects are flagged "J".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (10°C), flag all positive results "J" and all non-detects "UJ". ✓ 6/12

✓ 6/6-7/13 ✓ 6/12
✓ 6/8 ✓ 7/15

2.0 Holding Times

2.1 Have any semivolatile technical holding times, determined from date of collection to date of extraction, been exceeded? ___ ✓ ___

Continuous extraction of water samples for semivolatile analysis must be started within 7 days of the date of collection. Soil/sediment samples must be extracted within 14 days of collection. Extracts must be analyzed within

YES NO N/A

40 days of the date of extraction.

Table of Holding Time Violations

Sample ID	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted (See Traffic Report)	Date Analyzed

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

YES NO N/A

3.0 Surrogate Recovery (Form II/Equivalent)

3.1 Have the semi volatile surrogate recoveries been listed on CLP Surrogate Recovery forms (Form II) for each of the following matrices:

a. Low Water ✓ ___ ___

b. Low/Med Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery Summary forms for each matrix:

a. Low Water ✓ ___ ___

b. Low/Med Soil [ ] ___ ___

ACTION: If CLP deliverables are unavailable, document the effect(s) in data assessments. In some cases the lab may have to be contacted to obtain the data necessary to complete the validation.

3.3 Were outliers marked correctly with an asterisk? [ ] ___ ✓

ACTION: Circle all outliers in red.

3.4 Were two or more base neutral OR acid surrogate recoveries out of specification for any sample or method blank (Reviewer should use lab in house recovery limits. Use surrogate recovery limits from USEPA National Functional Guidlines January 2005 page 130, if in house limits are not available. See Method 8000B-43 or 8000C-24). [ ] ✓ ___

Note: Examine lab in house limits for reasonableness.

If yes, were samples re-analyzed? [ ] ___ ✓

YES NO N/A

Were method blanks re-analyzed? [ ] ___ ✓

ACTION: If all surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet method specifications, for the affected fraction only (i.e. either base-neutral or acid compounds):

1. Flag all positive results as estimated ("J").

2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.

3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Positive results for the fraction with < 10% surrogate recovery are qualified with "J".

2. Non-detects for that fraction should be qualified as unusable (R) .

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ ✓ ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document

YES NO N/A

effect in data assessments.

4.0 Matrix Spikes (Form III/Equivalent)

No MS/MSD

4.1 Have the semivolatile Matrix Spike and Matrix Spike Duplicate/or duplicate unspiked Sample recoveries been listed on the Recovery Form (Form III)? [ ] ___ ✓

NOTE: Method 3500B/page 4 states the spiking compounds:

Base/neutrals	Acids
1,2,4-Trichlorobenzene	Pentachlorophenol
Acenaphthene	Phenol
2,4-Dinitrotoluene	2-Chlorophenol
Pyrene	4-Chloro-3-methylphenol
N-Nitroso-di-n-propylamine	4-Nitrophenol
1,4-Dichlorobenzene	

Note: Some projects may require the spiking of specific compounds of interest.

Note: See Method 8270D-sec 8.4.2 for deciding on whether to prepare and analyze cuplicate samples or a martix spike/matrix spike duplicate. If samples are expected to contain target analytes, then laboratory may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratory should use a matrix spike and matrix spike duplicate pair.

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water [ ] ___ ✓

b. Low Solid [ ] ___ ✓

c. Med Solid [ ] ___ ✓

YES NO N/A

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. It may be necessary to contact the lab to obtain the required data.

NOTE: If the data has not been reported on CLP equivalent form, then the laboratory must provide the information necessary to evaluate the spike recoveries in the MS and MSD. The required data which should have been provided by the lab include the analytes and concentrations used for spiking, background concentrations of the spiked analytes (i.e., concentrations in unspiked sample), methods and equations used to calculate the QC acceptance criteria for the spiked analytes, percent recovery data for all spiked analytes.

The data reviewer must verify that all reported equations and percent recoveries are correct before proceeding to the next section.

4.3 Were matrix spikes performed at concentration equal to 100ug/L for acid compounds, and 200ug/l for base compounds (Method 3500B-4), or those specified in project plan. [ ] ___ ✓

4.4 How many semivolatile spike recoveries are outside Laboratory in house MS/MSD recovery limits (use recovery limits values in Method 8270D-43&44 Table 6 if in house values not available).

Water ____ out of ____

Solids ____ out of ____

YES NO N/A

4.5 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water ____ out of ____

Solids ____ out of ____

ACTION: Circle all outliers with red pencil.

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria to determine the need for some qualification of the data.

4.6 Was a Laboratory Control Sample (LCS) analyzed with each analytical batch? [✓] ___ ___

NOTE: When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

5.0 Blanks (Form IV/Equivalent)

5.1 Is the Method Blank Summary (Form IV) present? [✓] ___ ___

5.2 Frequency of Analysis:

Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? [✓] ___ ___

5.3 Has a method blank been analyzed either after

YES NO N/A

the calibration standard or at any other time during the analytical shift for each GC/MS system used ? [✓] ___ ___

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, use professional judgement to determine if the associated sample data should be qualified.

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for the semivolatiles? [✓] ___ ___

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ [✓] ___

6.2 Do any field/rinse/ blanks have positive results for target analytes and/or TICs (if required, see section 10 below)? ___ [✓] ___

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field Blanks must be qualified for outlying surrogates, poor spectra, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify sample results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

YES NO N/A

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

NOTE: If the laboratory did not report TIC analyses, check the project plans to verify whether or not it was required.

6.3 Are there field/rinse/equipment blanks associated with every sample? ☑ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

6.4 Was a instrument blank analyzed after each sample/dilution which contained a target compound

YES NO N/A

that exceeded the initial calibration range. ___ ___ ☑

6.5 Does the instrument blank have positive results for target analytes and/or TICs? ___ ☑ ___

Note: Use professional judgement to determine if carryover occurred and qualify analytes accordingly.

7.0 GC/MS Apparatus and Materials

7.1 Did the lab use the proper gas chromatographic column for analysis of semivolatiles by Method 8270D? Check raw data, instrument logs or contact the lab to determine what type of column was used. The method requires the use of 30 m x 0.25 mm ID (or 0.32 mm ID), silicone-coated, fused silica, capillary column. ☑ ___ ___

ACTION: If the specified column, or equivalent, was not used, document the effects in the data assessment. Use professional judgement to determine the acceptability of the data.

8.0 GC/MS Instrument Performance Check (Form V/Equivalent)

8.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)? ☑ ___ ___

NOTE: The performance solution should also contain 4,4-DDT, pentachlorophenol, and benzidine to verify injection port inertness and column performance. The degradation of DDT to DDE and DDD must be less than 20% total and the response of pentachlorophenol and benzidine should be within normal ranges for these compounds (based upon lab experience) and show no peak degradation or tailing before samples are analyzed. (see section 5.5

YES NO N/A

page 8270D-12).

8.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? ☑ ___ ___

8.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument? ☑ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

8.4 Have the ion abundances been normalized to m/z 198? ☑ ___ ___

8.5 Have the ion abundance criteria been met for each instrument used? ☑ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

	YES	NO	N/A
ACTION: If ion abundance criteria are not met, take action specified in section 3.2			
8.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.)		✓	
8.7 Have the appropriate number of significant figures (two) been reported?	✓		
ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.			
8.8 Are the spectra of the mass calibration compound acceptable?	✓		
ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.			
9.0 Target Analytes			
9.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate	✓		
b. Matrix spikes and matrix spike duplicates			✓
c. Blanks	✓		
9.2 Has any special cleanup, such as GPC, been performed on all soil/sediment sample extracts (see section 7.2, page 8270D-14)?			✓

	YES	NO	N/A
ACTION: If data suggests that extract cleanup was not performed, use professional judgement. Make note in the data assessment narrative.			
9.3 Are the Reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?			
a. Samples and/or fractions as appropriate	✓		
b. Matrix spikes and matrix spike duplicates (Mass spectra not required)			✓
c. Blanks	✓		
ACTION: If any data are missing, take action specified in 3.2 above.			
9.4 Are the response factors shown in the Quant Report?	✓		
9.5 Is chromatographic performance acceptable with respect to:			
Baseline stability?	✓		
Resolution?	✓		
Peak shape?	✓		
Full-scale graph (attenuation)?	✓		
Other:_____			
ACTION: Use professional judgement to determine the acceptability of the data.			
9.6 Are the lab-generated standard mass spectra of identified semivolatile compounds present for			

	YES	NO	N/A
each sample?	✓		
ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the data assessment narrative. If spectra are missing, reject all positive data.			
9.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	✓		
9.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum?	✓		
9.9 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum?	✓		
ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 9.7, 9.8, and 9.9.			
ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.			

	YES	NO	N/A
10.0 Tentatively Identified Compounds (TIC)			
10.1 If Tentatively Identified Compounds were required for this project, are all Form Is, Part B present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier?			
NOTE: Review sampling reports to determine if the lab was required to identify non target analytes (refer to section 7.6.2, page 8270D-21).			
10.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:			✓
a. Samples and/or fractions as appropriate			✓
b. Blanks			✓
ACTION: If any TIC data are missing, take action specified in 3.2 above.			
ACTION: Add "JN" qualifier only to analytes identified by CAS #.			
10.3 Are any target compounds from one fraction listed as TIC compounds in another (e.g., an acid compound listed as a base neutral TIC)?			✓
ACTION: i. Flag with "R" any target compound listed as a TIC.			
ii. Make sure all rejected compounds are properly reported in the other fraction.			
10.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the			

YES NO N/A

sample mass spectrum? [ ] ___ ___

10.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ___

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate and remove "JN". Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R."

11.0 Compound Quantitation and Reported Detection Limits

11.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found? ___ [✓] ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

11.2 Are the method detection limits adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ ___

YES NO N/A

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I (if present) and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red " X" across the entire page of all Form I's that should not be used, including any in the summary package.

12.0 Standards Data (GC/MS)

12.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

13.0 GC/MS Initial Calibration (Form VI/Equivalent)

13.1 Is the Initial Calibration Form (Form VI/ Equivalent) present and complete for the semivolatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard row data are missing, take action specified in 3.2 above.

13.2 Are all base neutral or acid RRFs > 0.050? [✓] ___ ___

YES NO N/A

Check the **average RRFs** of the four System Performance Check Compounds (SPCCs): N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. These compounds must have **average RRFs** greater than or equal to 0.05 before running samples and should not show any peak tailing.

ACTION: Circle all outliers in red.

ACTION: For any target analyte with **average RRF <0.05**

1. "R" all non-detects;

2. "J" all positive results.

13.3 Are response factors for base neutral or acid target analytes stable over the concentration range of the calibration (% Relative standard deviation [%RSD] < 20.0%)? [✓] ___ ___

NOTE: The % RSD for each individual Calibration Check Compound (CCC, Method 8270D-40 see Table 4) must be less than 30% before analysis can begin. If grater 30%, the lab must clean and recalibrate the instrument.

CALIBRATION CHECK COMPOUNDS

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol

YES NO N/A

Benzo(a)pyrene

ACTION: If the %RSD for any CCC >30% and no corrective action taken, then "J" qualify all positive hits and "UJ" qualify all non-detects.

ACTION: Circle all outliers in red.

ACTION: If the % RSD is ≥ 20.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non- detect results for that analyte "R," unusable. Alternatively, the lab should calculate first or second order regression fit of the calibration curve and select the fit which introduces the least amount of error.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

13.4 Did the laboratory calculate the calibration curve by the least squares regression fit? ___ [✓] ___

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) ___ [✓] ___

ACTION: Circle Errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

13.5 Do the target compounds for this SDG include Pesticides? [ ] ___ ___

YES NO N/A

13.6 If the pesticide compounds include DDT, was the percent breakdown of DDT to DDD and DDE greater than 20%? ___ [ ] ✓

ACTION: If DDT percent breakdown exceeds 20%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE results are positive, qualify the quantitation limit for DDT as unusable, "R".

ii. Qualify all positive results for DDD and DDE as presumptively present at an approximate concentration "JN".

14.0 GC/MS Calibration Verification (Form VII/Equivalent)

14.1 Are the Calibration Verification Forms (Form VII) present and complete for all compounds of interest? [✓] ___ ___

14.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? [✓] ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

_____

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed within twelve hours of every sample analysis,

YES NO N/A

call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

14.3 Do any of the SPCCs have an RRF <0.05? ___ [✓] ___

If YES, make a note in data assessment if the lab did not take corrective action specified in section 7.4.4, page 8270D-18. [ ] ✓ ___

14.4 Do any of the CCCs have a %D between the initial and continuing RRF which exceeds 20.0%?

ACTION: If yes, make a note in data assessment.

14.5 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds 20.0%? ___ [ ] ✓ ___

ACTION: Circle all outliers in red.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is above 90%, qualify all non-detects for that analyte as "R", unusable.

14.6 Do any semivolatile compounds have a RRF < 0.05? ___ [✓] ___

ACTION: Circle all outliers in red.

ACTION: If RRF < 0.05, qualify as unusable ("R") associated non-detects and "J" associated positive values.

14.7 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or percent difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more). ___ [ ] ✓ ___

YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect(s) in the data assessments.

15.0 Internal Standards (Form VIII)

15.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to + 100%) for each continuing calibration? [✓] ___ ___

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area	LowerLimit	Upper Limit

(Attach additional sheets if necessary.)

Note: Check Table 5, 8270D-41 for associated analytes.

ACTION: i. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

ii. Non-detects associated with IS > 100% should not be qualified.

YES NO N/A

iii. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

15.2 Are the retention times of all internal standards within 30 seconds of the associated calibration standard? [✓] ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

16.0 Laboratory Control Samples (LCS)

16.1 Were any LCS samples run in order to verify analytes which failed criteria for spike recovery? [ ] ✓ ___

16.2 Did the lab spike LCS sample spiked with the same analytes and the same concentrations as the matrix spike? [ ] ___ ✓

16.3 Were the mean and standard deviation of all analytes within the QC Acceptance ranges as shown in Table 6, 8270D-43? [✓] ___ ___

ACTION: If the recovery of any analyte falls out of the designated range, the analytical results for that compound is suspect and should be qualified "J" in the unspiked samples.

17.0 Field Duplicates

17.1 Were any field duplicates submitted for semivolatile analysis? [ ] ✓ ___

YES NO N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

Initial Calibration Date: 5/1/2013
RRF and %RSD Calculations:

Compound Name: 1,4-dioxane
Lab Value: 0.130

Area of Compound	394986
Area of Internal STD	243500
Conc. of Internal STD	4
Conc. of Compound	50
Calculated RRF	0.130

Compound Name: 1,4-dioxane
Lab Value: 13.4

RRF of STD 1	0.185
RRF of STD 2	0.1450523
RRF of STD 3	0.1304524
RRF of STD 4	0.1265765
RRF of STD 5	0.133586
RRF of STD 6	0.1360939
RRF of STD 7	0.1351959
RRF of STD 8	0.1297695
Calculated % RSD	13.4

Continuing Calibration File ID: 7/5/2013
RRF and %D Calculations:

Compound Name: 1,4-dioxane
Lab Value: 0.123

Area of Compound	95947
Area of Internal STD	312945
Conc. of Internal STD	4
Conc. of Compound	10
Calculated RRF	0.123

Compound Name: 1,4-dioxane
Lab Value: 12.500

Average RRF	0.140
Calibration Check RRF	0.1226375
Calculated % D	12.5

DataQual
Environmental Services, LLC

CH2M HILL-VBO
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

December 9, 2013
SDG# 1306108, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1306108. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24 and 8270D-Rev 4, August 2008-SOP #HW-22,), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA	SVOA
VEP4-TB01-061013	1306108-01	water	X	
VEP4-GW16-0613	1306108-02	water	X	X
VEP4-EB01-061013-GW	1306108-03	water	X	X
VEP4-GW17-0613	1306108-04	water	X	X
VEP4-GW17P-0613	1306108-05	water	X	X

The following quality control samples were provided with this SDG: sample VEP4-EB01-061013-GW - equipment blank; sample VEP4-TB01-061013- trip blank; sample VEP4-GW17P-0613- field duplicate of sample VEP4-GW17-0613.

The samples were evaluated based on the following criteria:

- Data Completeness
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Field Duplicates
- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

The field duplicate pair exhibited non-compliant field duplicate reproducibility which resulted in qualifications to the data.

SVOA

No qualifications were required to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were required as the raw data was not printed dark enough to read in the original package. The laboratory was contacted and updated pages were submitted.

Technical Holding Times

According to chain of custody records, sampling was performed on 6/10/13 and samples were received at the laboratory 6/11-12/13. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

Field Duplicates

VOA

Sample VEP4-GW17-0613 and duplicate sample VEP4-GW17P-0613 exhibited non-compliant field duplicate reproducibility for the compounds listed in the compounds listed in the table below, qualifications were applied as stated.

Sample ID	Compound	% RPD	Qualifier	Qual Code
VEP4-GW17-0613	tetrachloroethene	22	J	FD
VEP4-GW17P-0613	trichloroethene	21		

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Masehhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
VEP4-GW17-0613, VEP4-GW17P-0613	tetrachloroethene trichloroethene	+	J	FD

SVOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.
U*	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.
RL**	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action -	The sample result is greater than the RL and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R -	Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.
J -	Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.
J/UJ -	Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.
Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action -	The sample result is greater than the RL and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.
R -	Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.
J -	Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL	reporting limit
PQL	practical quantitation limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1306108

007

ANALYSIS DATA SHEET

VEP4-TB01-061013

Laboratory: Empirical Laboratories, LLC — SDG: 1306108
Client: CH2M Hill, Inc. — Project: Vieques East SWMU 20
Matrix: Water — Laboratory ID: 1306108-01 — File ID: 0610803.D
Sampled: 06/10/13 08:00 — Prepared: 06/17/13 00:00 — Analyzed: 06/17/13 10:29
Solids: — Preparation: 5030B — Dilution: 1
Batch: 3F17003 — Sequence: 3F16906 — Calibration: 3157003 — Instrument: MS-VOA8

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.12	93.7	75 - 120	
Dibromofluoromethane	30.00	32.44	108	85 - 115	
1,2-Dichloroethane-d4	30.00	30.27	101	70 - 120	
Toluene-d8	30.00	28.96	96.5	85 - 120	

MM 112013

ANALYSIS DATA SHEET

VEP4-GW16-0613

Laboratory: Empirical Laboratories, LLC — SDG: 1306108
Client: CH2M Hill, Inc. — Project: Vieques East SWMU 20
Matrix: Water — Laboratory ID: 1306108-02RE1 — File ID: 0610802R.D
Sampled: 06/10/13 08:40 — Prepared: 06/18/13 00:00 — Analyzed: 06/18/13 12:23
Solids: — Preparation: 5030B — Dilution: 1
Batch: 3F18003 — Sequence: 3F17031 — Calibration: 3157003 — Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene	**0.340**	0.250	0.500	1.00	J
79-01-6	Trichloroethene	**14.7**	0.100	0.200	0.500	
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.53	91.8	75 - 120	
Dibromofluoromethane	30.00	32.11	107	85 - 115	
1,2-Dichloroethane-d4	30.00	29.59	98.6	70 - 120	
Toluene-d8	30.00	28.84	96.1	85 - 120	

MM 112013

ANALYSIS DATA SHEET

VEP4-EB01-061013-GW

Laboratory: Empirical Laboratories, LLC — SDG: 1306108
Client: CH2M Hill, Inc. — Project: Vieques East SWMU 20
Matrix: Water — Laboratory ID: 1306108-03 — File ID: 0610803.D
Sampled: 06/10/13 09:43 — Prepared: 06/17/13 00:00 — Analyzed: 06/17/13 10:57
Solids: — Preparation: 5030B — Dilution: 1
Batch: 3F17003 — Sequence: 3F16906 — Calibration: 3157003 — Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.34	94.5	75 - 120	
Dibromofluoromethane	30.00	33.29	111	85 - 115	
1,2-Dichloroethane-d4	30.00	30.17	101	70 - 120	
Toluene-d8	30.00	28.22	94.1	85 - 120	

MM 112013

ANALYSIS DATA SHEET

VEP4-GW17-0613

Laboratory:	Empirical Laboratories, LLC		SDG:	1306108	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1306108-04	File ID:	0610804.D
Sampled:	06/10/13 11:25	Prepared:	06/17/13 00:00	Analyzed:	06/17/13 12:21
Solids:		Preparation:	5030B	Dilution:	1
Batch:	3F17003	Sequence:	3F16906	Calibration:	3157003
				Instrument:	MS-VOA4

CAS NO	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene	**0.300**	0.250	0.500	1.00	J
156-59-2	cis-1,2-Dichloroethene	**0.280**	0.250	0.500	1.00	J
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene	**2.40**	0.250	0.500	1.00	~~J~~ FD
79-01-6	Trichloroethene	**114**	0.100	0.200	0.500	~~J~~ FD
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.32	94.4	75 - 120	
Dibromofluoromethane	30.00	33.39	111	85 - 115	
1,2-Dichloroethane-d4	30.00	31.87	106	70 - 120	
Toluene-d8	30.00	29.31	97.7	85 - 120	

MM 11/2013

ANALYSIS DATA SHEET

VEP4-GW17P-0613

Laboratory:	Empirical Laboratories, LLC		SDG:	1306108	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1306108-05	File ID:	0610805D.D
Sampled:	06/10/13 11:30	Prepared:	06/17/13 00:00	Analyzed:	06/17/13 16:04
Solids:		Preparation:	5030B	Dilution:	4
Batch:	3F17003	Sequence:	3F16906	Calibration:	3157003
				Instrument:	MS-VOA4

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.500	1.00	2.00	U
156-59-2	cis-1,2-Dichloroethene		0.500	1.00	2.00	U
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene	**1.92**	0.500	1.00	2.00	~~J~~ FD
79-01-6	Trichloroethene	**92.7**	0.200	0.400	1.00	~~J~~ FD
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.64	95.5	75 - 120	
Dibromofluoromethane	30.00	31.97	107	85 - 115	
1,2-Dichloroethane-d4	30.00	29.52	98.4	70 - 120	
Toluene-d8	30.00	29.73	99.1	85 - 120	

MM 11/2013

ANALYSIS DATA SHEET

VEP4-GW16-0613

Laboratory:	Empirical Laboratories, LLC		SDG:	1306108	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1306108-02	File ID:	0610802.D
Sampled:	06/10/13 08:40	Prepared:	06/12/13 11:50	Analyzed:	07/06/13 01:32
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3F17005	Sequence:	5G18917	Calibration:	3122001
				Instrument:	MS-BNA4

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.231	0.463	0.926	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	46.30	34.17	73.8	50 - 110	
Terphenyl-d14	46.30	37.78	81.6	50 - 135	
2,4,6-Tribromophenol	92.59	88.57	95.7	40 - 125	

MM 11/2013

ANALYSIS DATA SHEET

VEP4-EB01-061013-GW

Laboratory:	Empirical Laboratories, LLC		SDG:	1306108	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1306108-03	File ID:	0610803.D
Sampled:	06/10/13 09:45	Prepared:	06/12/13 15:22	Analyzed:	07/07/13 16:30
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3F17016	Sequence:	3G18906	Calibration:	3122001
				Instrument:	MS-BNA4

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.231	0.463	0.926	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	46.30	39.06	84.4	50 - 110	
Terphenyl-d14	46.30	41.43	89.5	50 - 135	
2,4,6-Tribromophenol	92.59	94.94	103	40 - 125	

MM 11/2013

ANALYSIS DATA SHEET

VEP4-GW17-0613

Laboratory:	Empirical Laboratories, LLC	SDG:	1306108		
Client:	CH2M Hill, Inc.	Project:	Voogues East SWMU 20		
Matrix:	Water	Laboratory ID:	1306108-03	File ID:	06100804.D
Sampled:	06/10/13 11:25	Prepared:	06/17/13 15:22	Analyzed:	07/07/13 16:58
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3F17016	Sequence:	3G18906	Calibration:	3122001
				Instrument:	MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.231	0.463	0.926	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	46.30	41.47	89.6	50 - 110	
Terphenyl-d14	46.30	41.97	90.6	50 - 135	
2,4,6-Tribromophenol	92.59	94.37	102	40 - 125	

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ANALYSIS DATA SHEET

VEP4-GW17P-0613

Laboratory:	Empirical Laboratories, LLC	SDG:	1306108		
Client:	CH2M Hill, Inc.	Project:	Voogues East SWMU 20		
Matrix:	Water	Laboratory ID:	1306108-05	File ID:	06100805.D
Sampled:	06/10/13 11:30	Prepared:	06/17/13 15:22	Analyzed:	07/07/13 17:25
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3F17016	Sequence:	3G18906	Calibration:	3122001
				Instrument:	MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.231	0.463	0.926	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	46.30	37.99	82.1	50 - 110	
Terphenyl-d14	46.30	40.45	87.4	50 - 135	
2,4,6-Tribromophenol	92.59	90.68	97.9	40 - 125	

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ELECTRONIC CHAIN OF CUSTODY RECORD

C.O.C. 20130610-ON-EMP-01

PLEASE PRINT

EMPIRICAL
621 Mainstream Dr.
Suite 270
Nashville, TN 37228
phone: 615-345-1115

1306108

Report to: CH2MHILL
Company Name: 15010 Conference Dr. ; 200
Address: Chantilly, VA 20151
Attn: Mike Zamboni
Phone: 703.376.5301
Fax: 703.376.5801

Invoice to: See Contact
Company Name:
Address:
Attn:
Phone:
Fax:

Project Name/Number: not required
Sampler (Print): not required
Sampler (Signature): not required
Purchase Order Number: 943380

Sample Identification	Location	Date Collected	Time Collected	Time Zone	No. of Containers	Aq	Soil	Sed	Wipe	Analysis Requested/Method Number	Comments
VEP4-TB01-061013	Trip Blank	6/10/13	0820	ET	2	X					-01
VEP4-GW16-0613	MW-16	6/10/13	0810		10	X			●	X X X X X X X X X X X X X X	-02
VEP4-EB01-061013-GW	Equipment Blank	6/10/13	0945		15	X			●		-03
VEP4-GW17-0613	MW-17	6/10/13	1125		15	X			●		-04
VEP4-GW17P-0613	Field Duplicate	6/10/13	1130		15	X			●		-05

Matrix: Aq, Sed, Soil, Wipe, Other

Date Shipped:
Carrier:
Waybill No.:
Comments:

Sample Disposal: ☐ Return to client ☐ Disposal by Lab (fee may apply) ☐ Archive for ___ months

Turnaround Requested: Check one ☐ Standard 2-3 wk. ☐ One week ☐ 24/48 Hrs ☐ Other

Relinquished by: Date 6/10/13 Time 1200 Received by:
Relinquished by: Date Time Received by:
Relinquished by: Date Time Received by: not applicable
Relinquished by: Date Time Received by: Received by Lab by: 6/10/13 1630

Shuttle Temperature:

White: Return to client with report
Yellow: Laboratory Copy
Pink: Sampler

Note: The first sampled date of the ARF will be used as the COC number unless indicated otherwise.

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EMPIRICAL LABORATORIES COOLER RECEIPT FORM

Cooler Received/Opened On: 06/11/13 @ 0820 Workorder# 1306108

1. Tracking # 2485 (last 4 digits, FedEx)
   Courier: FED-EX
2. Temperature of rep. sample or temp blank when opened: 2.4 °C + correction factor (-0.1) = 2.3 °C
3. If item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA
4. Were custody seals on outside of cooler? YES NO NA
   If yes, how many and where: 2-FRONT & BACK
5. Were the seals intact, signed, and dated correctly? YES NO NA
6. Were custody papers inside cooler? YES NO NA

I certify that I opened the cooler and answered questions 1-6 (initial) _____

7. Were custody seals on containers: YES NO and intact YES NO NA
   Were these signed and dated correctly? YES NO NA
8. Packing material used? Bubblewrap Plastic bag Peanuts Vermiculite Foam insert Paper Other None
9. Cooling process: Ice Icepack Ice (direct contact) Dry ice Other None
10. Did all containers arrive in good condition (unbroken)? YES NO NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES NO NA
12. Did all container labels and tags agree with custody papers? YES NO NA
13. a. Were VOA vials received? YES NO NA
    b. Was there any observable headspace present in any VOA vial? YES NO NA
14. Was there a Trip Blank in this cooler? YES NO NA If multiple coolers, sequence # ____

I certify that I unpacked the cooler and answered questions 7-14 (initial) _____

15. a. Did preservatives reached the correct pH level? YES NO NA
    b. Did the bottle labels indicate that the correct preservatives were used YES NO NA
16. Was residual chlorine present? YES NO NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial) _____

17. Were custody papers properly filled out (ink, signed, etc)? YES NO NA
18. Did you sign the custody papers in the appropriate place? YES NO NA
19. Were correct containers used for the analysis requested? YES NO NA
20. Was sufficient amount of sample sent in each container? YES NO NA

I certify that I entered this project into LIMS and answered questions 17-20 (initial) _____

I certify that I attached a label with the unique LIMS number to each container (initial) _____

I certify that I have performed a second check of the LIMS information against the COC to confirm accuracy (initial) _____

21. Were there Non-Conformance issues at login? YES NO Was a NCR generated? YES NO #: ____

Additional Details: MISSING ALL VOA'S, MISSING ALL OF VEP4-EB01-061013-GW! VEP4-GW17P-0613 & MISSING TRIP BLANK

1/12/13

1306108 Summ Package

014

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EMPIRICAL LABORATORIES
COOLER RECEIPT FORM

Cooler Received/Opened On: 06/12/13 @ 840 Workorder# 1306108

1. Tracking # 2620 (last 4 digits, FedEx)
   Courier: FEDEX
2. Temperature of rep. sample or temp blank when opened: 1.5 °C + correction factor (-0.1) = 1.4 °C
3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA
4. Were custody seals on outside of cooler? YES NO NA
   If yes, how many and where: 2, 1 on Front, 1 on back
5. Were the seals intact, signed, and dated correctly? YES NO NA
6. Were custody papers inside cooler? YES NO NA

I certify that I opened the cooler and answered questions 1-6 (initial) JG

7. Were custody seals on containers: YES NO and intact YES NO NA
   Were these signed and dated correctly? YES NO NA
8. Packing material used: Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry Ice Other None
10. Did all containers arrive in good condition (unbroken)? YES NO NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES NO NA
12. Did all container labels and tags agree with custody papers? YES NO NA
13. a. Were VOA vials received? YES NO NA
    b. Was there any observable headspace present in any VOA vial? YES NO NA
14. Was there a Trip Blank in this cooler? YES NO NA If multiple coolers, sequence # 2

I certify that I unloaded the cooler and answered questions 7-14 (initial)

15. a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES NO NA
    b. Did the bottle labels indicate that the correct preservatives were used YES NO NA
16. Was residual chlorine present? YES NO NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial)

17. Were custody papers properly filled out (ink, signed, etc)? YES NO NA
18. Did you sign the custody papers in the appropriate place? YES NO NA
19. Were correct containers used for the analysis requested? YES NO NA
20. Was sufficient amount of sample sent in each container? YES NO NA

I certify that I entered this project into LIMS and answered questions 17-20 (initial)

I certify that I attached a label with the unique LIMS number to each container (initial)

I certify that I have performed a second check of the LIMS information against the COC to confirm accuracy (initial)

21. Were there Non-Conformance issues at login? YES NO Was a NCR generated? YES NO #

Additional Details:

020

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Sample Delivery Group Case Narrative

Receipt Information

The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. Samples were subcontracted to Test America for Volatile Fatty Acids.

Samples were received on two different days, 6/11/2013 and 6/12/2013. All samples were received within temperature and hold time compliance.

Changes to the Revision

Revision 01: The package was revised to replace the raw data that was not dark enough to be read in the original package.

Analytical Information

All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:

The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

021

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SW8260B:
Note – Sample 1306108-05 was analyzed at a 2x only due to high concentrations of target analytes detected during screening. No lower analysis was able to be performed.

No additional anomalies or deviations are noted.

SW8270D BNA:
No anomalies or deviations are noted.

RSK175 MEE:
No anomalies or deviations are noted.

Wet Chemistry:
The following compounds are qualified with an M to indicate that the LOQ was raised to the concentration of the reporting limit standard within criteria:
Chloride (2.5mg/L) in 1306108-02

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

022

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YES NO N/A

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 1306108 LAB: Empirical

SITE NAME: Vieques Summer 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓ __ __

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓ __ __

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ __ __

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. **VOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓ __ __

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓ __ __

1.3 Sample Conditions/Problems

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? __ ✓ __

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

2.0 Holding Times

A 6/10/13 A 6/17-13
A 6/11-13 A 2.3°C

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? __ ✓ __

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table I:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water ✓ __ __

b. Soil [ ] __ __

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water ✓ __ __

b. Soil [ ] __ __

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. Lab ✓ __ __

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] __ ✓

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] ✓ __

If yes, were samples reanalyzed? [ ] __ ✓

Were method blanks reanalyzed? [ ] __ ✓

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] [✓] ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ [✓]

C. Med Soil [ ] ___ [✓]

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ [✓]

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] [✓] ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent)

No MS/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] ___ [✓]

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] ___ [✓]

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month (page 8000C, section 9.5.1))

a. Water [ ] ___ [✓]

b. Waste [ ] ___ [✓]

c. Soil/Solid [ ] ___ [✓]

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [ ] ___ [✓]

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ [✓]

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? ✓ ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? ✓ ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? ✓ ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? ✓ ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ✓ ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	≥ CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates ___ ___ ✓

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ___ ___ ✓

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? ✓ ___ ___

YES NO N/A

Resolution? ✓ ___ ___

Peak shape? ✓ ___ ___

Full-scale graph (attenuation)? ✓ ___ ___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? ✓ ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reportec compound within 0.06 RRT units of the standard RRT in the continuing calibration? ✓ ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ✓ ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ✓ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ ___

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ ___

b. Blanks [ ] ___ ___

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ ___

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ ___

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ___

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] ___ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [M] ___ ___

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [M] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? [M] ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39)qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? [M] ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. [M] ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? ☑ ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) ☐ ☑ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? ☑ ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ☑ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? ☑ ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). ☐ ☑ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? ☑ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? ☑ ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:
1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.
2. Do not qualify non-detects when the associated IS are counts area > + 100%.
3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".
4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ☑ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ✓ ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

VEP4-GW17-0613
VEP4-GW17P-0613 > qual, see attached form

Sample VEP4-GW17P-0613 ran @ 1:2 dil only

047

- 30 VOA -

DataQual

VOA

FIELD DUPLICATE SAMPLE SUMMARY

Sample ID: VEP4-GW17-0613
Duplicate Sample ID: VEP4-GW17-0613

Water: RPD>20%
Soil: RPD>30%

Compound	Sample Conc.	Dup. Sample Conc.	%RPD
tetrachloroethene	2.4	1.92	22
trichloroethene	114	92.7	21
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
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			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!

COMMENTS: Qualify copmpounds with %RPD above 20% as estimated (J/UJ)

* one of the results below the LOD
if both results are below the LOD the results are not compared

049

DataQual

VOA

Initial Calibration Date: 6/5/2013
RRF and %RSD Calculations:

Compound Name: vinyl chloride
Lab Value: 0.2104

Area of Compound	1419609
Area of Internal STD	1012244
Conc. of Internal STD	30
Conc. of Compound	200
Calculated RRF	0.210

Compound Name: 1,1-dichloroethene
Lab Value: 4.2

RRF of STD 1	0.4208
RRF of STD 2	0.3931
RRF of STD 3	0.4145
RRF of STD 4	0.4066
RRF of STD 5	0.4149
RRF of STD 6	0.3940
RRF of STD 7	0.3740
RRF of STD 8	0.3998
RRF of STD 9	0.3759
Calculated % RSD	4.2

Continuing Calibration File ID: 6/17/2013
RRF and %D Calculations:

Compound Name: cis-1,2-dichloroethene
Lab Value: 0.314

Area of Compound	1013448
Area of Internal STD	967418
Conc. of Internal STD	30
Conc. of Compound	100
Calculated RRF	0.314

Compound Name: trichloroethene
Lab Value: 3.4

Average RRF	0.292
Calibration Check RRF	0.302
Calculated % D	-3.4

049

USEPA Region II
SW846 Method 8270D (Rev.4, January 1998)

Date: August, 2008
SOP HW-22 Rev.4

YES NO N/A

E - The concentration of this analyte exceeds the calibration range of the instrument.

A - Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 1306108 LAB: Empirical

SITE NAME: Vieques Summer

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the data assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative or cover letter present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

- 6 -

050

YES NO N/A

II. **SEMIVOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? ✓ __ __

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? __ ✓ __

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, all non-detects data are qualified as unusable (R), and detects are flagged "J".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (10°C), flag all positive results "J" and all non-detects "UJ". t 2.3°C

a 6/10/13 e 6/12-17
b 6/11-12 a 7/6-7

2.0 Holding Times

2.1 Have any semivolatile technical holding times, determined from date of collection to date of extraction, been exceeded? __ ✓ __

Continuous extraction of water samples for semivolatile analysis must be started within 7 days of the date of collection. Soil/sediment samples must be extracted within 14 days of collection. Extracts must be analyzed within

YES NO N/A

40 days of the date of extraction.

Table of Holding Time Violations

Sample ID	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted (See Traffic Report)	Date Analyzed
			NA		

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

YES NO N/A

3.0 Surrogate Recovery (Form II/Equivalent)

3.1 Have the semi volatile surrogate recoveries been listed on CLP Surrogate Recovery forms (Form II) for each of the following matrices:

a. Low Water ✓ __ __

b. Low/Med Soil [ ] __ __

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery Summary forms for each matrix:

a. Low Water ✓ __ __

b. Low/Med Soil [ ] __ __

ACTION: If CLP deliverables are unavailable, document the effect(s) in data assessments. In some cases the lab may have to be contacted to obtain the data necessary to complete the validation.

3.3 Were outliers marked correctly with an asterisk? [ ] __ ✓

ACTION: Circle all outliers in red.

3.4 Were two or more base neutral OR acid surrogate recoveries out of specification for any sample or method blank (Reviewer should use lab in house recovery limits. Use surrogate recovery limits from USEPA National Functional Guidlines January 2005 page 130, if in house limits are not available. See Method 8000B-43 or 8000C-24). [ ] ✓ __

Note: Examine lab in house limits for reasonableness.

If yes, were samples re-analyzed? [ ] __ ✓

YES NO N/A

Were method blanks re-analyzed? [ ] __ ✓

ACTION: If all surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet method specifications, for the affected fraction only (i.e. either base-neutral or acid compounds):

1. Flag all positive results as estimated ("J").

2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.

3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Positive results for the fraction with < 10% surrogate recovery are qualified with "J".

2. Non-detects for that fraction should be qualified as unusable (R) .

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II? __ ✓ __

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document

YES NO N/A

effect in data assessments.

4.0 Matrix Spikes (Form III/Equivalent)

No MS/MSD

4.1 Have the semivolatile Matrix Spike and Matrix Spike Duplicate/or duplicate unspiked Sample recoveries been listed on the Recovery Form (Form III)? [ ] ___ ✓

NOTE: Method 3500B/page 4 states the spiking compounds:

Base/neutrals	Acids
1,2,4-Trichlorobenzene	Pentachlorophenol
Acenaphthene	Phenol
2,4-Dinitrotoluene	2-Chlorophenol
Pyrene	4-Chloro-3-methylphenol
N-Nitroso-di-n-propylamine	4-Nitrophenol
1,4-Dichlorobenzene	

Note: Some projects may require the spiking of specific compounds of interest.

Note: See Method 8270D-sec 8.4.2 for deciding on whether to prepare and analyze duplicate samples or a martix spike/matrix spike duplicate. If samples are expected to contain target analytes, then laboratory may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratory should use a matrix spike and matrix spike duplicate pair.

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water [ ] ___ ✓

b. Low Solid [ ] ___ ✓

c. Med Solid [ ] ___ ✓

YES NO N/A

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. It may be necessary to contact the lab to obtain the required data.

NOTE: If the data has not been reported on CLP equivalent form, then the laboratory must provide the information necessary to evaluate the spike recoveries in the MS and MSD. The required data which should have been provided by the lab include the analytes and concentrations used for spiking, background concentrations of the spiked analytes (i.e., concentrations in unspiked sample), methods and equations used to calculate the QC acceptance criteria for the spiked analytes, percent recovery data for all spiked analytes.

The data reviewer must verify that all reported equations and percent recoveries are correct before proceeding to the next section.

4.3 Were matrix spikes performed at concentration equal to 100ug/L for acid compounds, and 200ug/l for base compounds (Method 3500B-4), or those specified in project plan. [ ] ___ ✓

4.4 How many semivolatile spike recoveries are outside Laboratory in house MS/MSD recovery limits (use recovery limits values in Method 8270D-43&44 Table 6 if in house values not available).

Water	Solids
___ out of ___	___ out of ___

YES NO N/A

4.5 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water	Solids
___ out of ___	___ out of ___

ACTION: Circle all outliers with red pencil.

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria to determine the need for some qualification of the data.

4.6 Was a Laboratory Control Sample (LCS) analyzed with each analytical batch? [✓] ___ ___

NOTE: When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

5.0 Blanks (Form IV/Equivalent)

5.1 Is the Method Blank Summary (Form IV) present? [✓] ___ ___

5.2 Frequency of Analysis:

Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? [✓] ___ ___

5.3 Has a method blank been analyzed either after

YES NO N/A

the calibration standard or at any other time during the analytical shift for each GC/MS system used ? [✓] ___ ___

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, use professional judgement to determine if the associated sample data should be qualified.

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for the semivolatiles? [✓] ___ ___

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ [✓] ___

6.2 Do any field/rinse/ Blanks have positive results for target analytes and/or TICs (if required, see section 10 below)? ___ [✓] ___

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field Blanks must be qualified for outlying surrogates, poor spectra, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify sample results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

YES NO N/A

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

NOTE: If the laboratory did not report TIC analyses, check the project plans to verify whether or not it was required.

6.3 Are there field/rinse/equipment blanks associated with every sample? ☑ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

6.4 Was a instrument blank analyzed after each sample/dilution which contained a target compound

YES NO N/A

that exceeded the initial calibration range. ☐ ___ ☑

6.5 Does the instrument blank have positive results for target analytes and/or TICs? ___ ☑ ___

Note: Use professional judgement to determine if carryover occurred and qualify analytes accordingly.

7.0 GC/MS Apparatus and Materials

7.1 Did the lab use the proper gas chromatographic column for analysis of semivolatiles by Method 8270D? Check raw data, instrument logs or contact the lab to determine what type of column was used. The method requires the use of 30 m x 0.25 mm ID (or 0.32 mm ID), silicone-coated, fused silica, capillary column. ☑ ___ ___

ACTION: If the specified column, or equivalent, was not used, document the effects in the data assessment. Use professional judgement to determine the acceptability of the data.

8.0 GC/MS Instrument Performance Check (Form V/Equivalent)

8.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)? ☑ ___ ___

NOTE: The performance solution should also contain 4,4-DDT, pentachlorophenol, and benzidine to verify injection port inertness and column performance. The degradation of DDT to DDE and DDD must be less than 20% total and the response of pentachlorophenol and benzidine should be within normal ranges for these compounds (based upon lab experience) and show no peak degradation or tailing before samples are analyzed. (see section 5.5

YES NO N/A

page 8270D-12).

8.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? ☑ ___ ___

8.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument? ☑ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

8.4 Have the ion abundances been normalized to m/z 198? ☑ ___ ___

8.5 Have the ion abundance criteria been met for each instrument used? ☑ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

	YES	NO	N/A
ACTION: If ion abundance criteria are not met, take action specified in section 3.2			
8.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.)		✓	
8.7 Have the appropriate number of significant figures (two) been reported?	✓		
ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.			
8.8 Are the spectra of the mass calibration compound acceptable?	✓		
ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.			
9.0 Target Analytes			
9.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate	✓		
b. Matrix spikes and matrix spike duplicates			✓
c. Blanks	✓		
9.2 Has any special cleanup, such as GPC, been performed on all soil/sediment sample extracts (see section 7.2, page 8270D-14)?			✓

	YES	NO	N/A
ACTION: If data suggests that extract cleanup was not performed, use professional judgement. Make note in the data assessment narrative.			
9.3 Are the Reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?			
a. Samples and/or fractions as appropriate	✓		
b. Matrix spikes and matrix spike duplicates (Mass spectra not required)			✓
c. Blanks	✓		
ACTION: If any data are missing, take action specified in 3.2 above.			
9.4 Are the response factors shown in the Quant Report?	✓		
9.5 Is chromatographic performance acceptable with respect to:			
Baseline stability?	✓		
Resolution?	✓		
Peak shape?	✓		
Full-scale graph (attenuation)?	✓		
Other:_____			
ACTION: Use professional judgement to determine the acceptability of the data.			
9.6 Are the lab-generated standard mass spectra of identified semivolatile compounds present for			

	YES	NO	N/A
each sample?	✓		
ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the data assessment narrative. If spectra are missing, reject all positive data.			
9.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	✓		
9.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum?	✓		
9.9 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum?	✓		
ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 9.7, 9.8, and 9.9.			
ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.			

	YES	NO	N/A
10.0 Tentatively Identified Compounds (TIC)			
10.1 If Tentatively Identified Compounds were required for this project, are all Form Is, Part B present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier?			
NOTE: Review sampling reports to determine if the lab was required to identify non target analytes (refer to section 7.6.2, page 8270D-21).			
10.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:			✓
a. Samples and/or fractions as appropriate			✓
b. Blanks			✓
ACTION: If any TIC data are missing, take action specified in 3.2 above.			
ACTION: Add "JN" qualifier only to analytes identified by CAS #.			
10.3 Are any target compounds from one fraction listed as TIC compounds in another (e.g., an acid compound listed as a base neutral TIC)?			✓
ACTION: i. Flag with "R" any target compound listed as a TIC.			
ii. Make sure all rejected compounds are properly reported in the other fraction.			
10.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the			

YES NO N/A

sample mass spectrum? [ ] ___ [✓]

10.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ [✓]

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate and remove "JN". Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R."

11.0 Compound Quantitation and Reported Detection Limits

11.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found? ___ [✓] ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

11.2 Are the method detection limits adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ [✓]

YES NO N/A

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I (if present) and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red " X" across the entire page of all Form I's that should not be used, including any in the summary package.

12.0 Standards Data (GC/MS)

12.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

13.0 GC/MS Initial Calibration (Form VI/Equivalent)

13.1 Is the Initial Calibration Form (Form VI/ Equivalent) present and complete for the semivolatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard row data are missing, take action specified in 3.2 above.

13.2 Are all base neutral or acid RRFs > 0.050? [✓] ___ ___

YES NO N/A

Check the **average RRFs** of the four System Performance Check Compounds (SPCCs): N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. These compounds must have **average RRFs** greater than or equal to 0.05 before running samples and should not show any peak tailing.

ACTION: Circle all outliers in red.

ACTION: For any target analyte with **average RRF <0.05**

1. "R" all non-detects;

2. "J" all positive results.

13.3 Are response factors for base neutral or acid target analytes stable over the concentration range of the calibration (% Relative standard deviation [%RSD] < 20.0%)? [✓] ___ ___

NOTE: The % RSD for each individual Calibration Check Compound (CCC, Method 8270D-40 see Table 4) must be less than 30% before analysis can begin. If grater 30%, the lab must clean and recalibrate the instrument.

CALIBRATION CHECK COMPOUNDS

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol

YES NO N/A

Benzo(a)pyrene

ACTION: If the %RSD for any CCC >30% and no corrective action taken, then "J" qualify all positive hits and "UJ" qualify all non-detects.

ACTION: Circle all outliers in red.

ACTION: If the % RSD is ≥ 20.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non- detect results for that analyte "R," unusable. Alternatively, the lab should calculate first or second order regression fit of the calibration curve and select the fit which introduces the least amount of error.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

13.4 Did the laboratory calculate the calibration curve by the least squares regression fit? ___ [✓] ___

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) ___ [✓] ___

ACTION: Circle Errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

13.5 Do the target compounds for this SDG include Pesticides? [ ] [✓] ___

YES NO N/A

13.6 If the pesticide compounds include DDT, was the percent breakdown of DDT to DDD and DDE greater than 20%? ___ ☐ ✓

ACTION: If DDT percent breakdown exceeds 20%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE results are positive, qualify the quantitation limit for DDT as unusable, "R".

ii. Qualify all positive results for DDD and DDE as presumptively present at an approximate concentration "JN".

14.0 GC/MS Calibration Verification (Form VII/Equivalent)

14.1 Are the Calibration Verification Forms (Form VII) present and complete for all compounds of interest? ☑ ___ ___

14.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ☑ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

_____

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed within twelve hours of every sample analysis,

YES NO N/A

call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

14.3 Do any of the SPCCs have an RRF <0.05? ___ ☐ ✓ ___

If YES, make a note in data assessment if the lab did not take corrective action specified in section 7.4.4, page 8270D-18. ☐ ✓ ___

14.4 Do any of the CCCs have a %D between the initial and continuing RRF which exceeds 20.0%?

ACTION: If yes, make a note in data assessment.

14.5 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds 20.0%? ___ ☐ ✓ ___

ACTION: Circle all outliers in red.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is above 90%, qualify all non-detects for that analyte as "R", unusable.

14.6 Do any semivolatile compounds have a RRF < 0.05? ___ ☐ ✓ ___

ACTION: Circle all outliers in red.

ACTION: If RRF < 0.05, qualify as unusable ("R") associated non-detects and "J" associated positive values.

14.7 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or percent difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more). ___ ☐ ✓ ___

YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect(s) in the data assessments.

15.0 Internal Standards (Form VIII)

15.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to + 100%) for each continuing calibration? ☑ ___ ___

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area	LowerLimit	Upper Limit

(Attach additional sheets if necessary.)

Note: Check Table 5, 8270D-41 for associated analytes.

ACTION: i. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

ii. Non-detects associated with IS > 100% should not be qualified.

YES NO N/A

iii. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

15.2 Are the retention times of all internal standards within 30 seconds of the associated calibration standard? ☑ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

16.0 Laboratory Control Samples (LCS)

16.1 Were any LCS samples run in order to verify analytes which failed criteria for spike recovery? ☐ ✓ ___

16.2 Did the lab spike LCS sample spiked with the same analytes and the same concentrations as the matrix spike? ☐ ___ ✓

16.3 Were the mean and standard deviation of all analytes within the QC acceptance ranges as shown in Table 6, 8270D-43? ☑ ___ ___

ACTION: If the recovery of any analyte falls out of the designated range, the analytical results for that compound is suspect and should be qualified "J" in the unspiked samples.

17.0 Field Duplicates

17.1 Were any field duplicates submitted for semivolatile analysis? ☑ ___ ___

YES NO N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

VEP4-GW17-0613
VEP4-GW17R-0613 > NOG

Initial Calibration Date: 5/1/2013
RRF and %RSD Calculations:

Compound Name: 1,4-dioxane
Lab Value: 0.130

Area of Compound	394986
Area of Internal STD	243500
Conc. of Internal STD	4
Conc. of Compound	50
Calculated RRF	0.130

Compound Name: 1,4-dioxane
Lab Value: 13.4

RRF of STD 1	0.185
RRF of STD 2	0.1450523
RRF of STD 3	0.1304524
RRF of STD 4	0.1265765
RRF of STD 5	0.133586
RRF of STD 6	0.1360939
RRF of STD 7	0.1351959
RRF of STD 8	0.1297695
Calculated % RSD	13.4

Continuing Calibration File ID: 7/5/2013
RRF and %D Calculations:

Compound Name: 1,4-dioxane
Lab Value: 0.123

Area of Compound	95947
Area of Internal STD	312945
Conc. of Internal STD	4
Conc. of Compound	10
Calculated RRF	0.123

Compound Name: 1,4-dioxane
Lab Value: 12.500

Average RRF	0.140
Calibration Check RRF	0.1226375
Calculated % D	12.5

DataQual
Environmental Services, LLC

CH2M HILL-VBO
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

December 11, 2013
SDG# 1306197, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1306197. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24 and 8270D-Rev 4, August 2008-SOP #HW-22,), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA	SVOA
VEP4-TB01-061713	1306197-01	water	X	
VEP4-GW20-0613	1306197-02	water	X	X
VEP4-EB01-061713-GW	1306197-03	water	X	X

The following quality control samples were provided with this SDG: sample VEP4-EB01-061713-GW- equipment blank and sample VEP4-TB01-061713- trip blank.

The samples were evaluated based on the following criteria:

- Data Completeness
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Field Duplicates NA
- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

5830 Amberway Drive • St. Louis, MO 63128 • 314-330-1327 • Fax 314-849-6264

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

No qualifications were required to the data.

SVOA

No qualifications were required to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were required as the raw data was not printed dark enough to read in the original package. The laboratory was contacted and updated pages were submitted.

Technical Holding Times

According to chain of custody records, sampling was performed on 6/17/13 and samples were received at the laboratory 6/18/13. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

SVOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.
U*	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.
RL**	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action -	The sample result is greater than the RL and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R -	Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.
J -	Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.
J/UJ -	Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.
Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action -	The sample result is greater than the RL and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.
R -	Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.
J -	Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL	reporting limit
PQL	practical quantitation limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1306197

007

ANALYSIS DATA SHEET

VEP4-TB01-061713

Laboratory: Empirical Laboratories, LLC SDG: 1306197
Client: CH2M Hill, Inc. Project: Vieques East SWMU 20
Matrix: Water Laboratory ID: 1306197-01 File ID: 0619701.D
Sampled: 06/17/13 08:00 Prepared: 06/20/13 00:00 Analyzed: 06/20/13 10:28
Solids: Preparation: 5030B Dilution: 1
Batch: 3F20012 Sequence: 3F17203 Calibration: 3157003 Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.04	93.5	75 - 120	
Dibromofluoromethane	30.00	32.13	107	85 - 115	
1,2-Dichloroethane-d4	30.00	31.95	106	70 - 120	
Toluene-d8	30.00	30.53	102	85 - 120	

lm 112013

009

ANALYSIS DATA SHEET

VEP4-GW20-0613

Laboratory: Empirical Laboratories, LLC SDG: 1306197
Client: CH2M Hill, Inc. Project: Vieques East SWMU 20
Matrix: Water Laboratory ID: 1306197-02 File ID: 0619702.D
Sampled: 06/17/13 10:50 Prepared: 06/20/13 00:00 Analyzed: 06/20/13 15:34
Solids: Preparation: 5030B Dilution: 1
Batch: 3F20012 Sequence: 3F17203 Calibration: 3157003 Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene	**1.06**	0.250	0.500	1.00	
79-01-6	Trichloroethene	**52.2**	0.100	0.200	0.500	
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.30	91.0	75 - 120	
Dibromofluoromethane	30.00	32.01	107	85 - 115	
1,2-Dichloroethane-d4	30.00	30.91	103	70 - 120	
Toluene-d8	30.00	27.70	92.3	85 - 120	

lm 112013

009

ANALYSIS DATA SHEET

VEP4-EB01-061713-GW

Laboratory: Empirical Laboratories, LLC SDG: 1306197
Client: CH2M Hill, Inc. Project: Vieques East SWMU 20
Matrix: Water Laboratory ID: 1306197-03 File ID: 0619703.D
Sampled: 06/17/13 11:20 Prepared: 06/20/13 00:00 Analyzed: 06/20/13 11:24
Solids: Preparation: 5030B Dilution: 1
Batch: 3F20012 Sequence: 3F17203 Calibration: 3157003 Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.17	93.9	75 - 120	
Dibromofluoromethane	30.00	32.83	109	85 - 115	
1,2-Dichloroethane-d4	30.00	29.70	99.0	70 - 120	
Toluene-d8	30.00	28.40	94.7	85 - 120	

lm 112013

010

ANALYSIS DATA SHEET

VEP4-GW20-0613

Laboratory:	Empirical Laboratories, LLC		SDG:	1306197	
Client:	CH2M Hill, Inc.		Project:	Virginia East SWMU 20	
Matrix:	Water	Laboratory ID:	1306197-02	File ID:	0619702.D
Sampled:	06/17/13 10:30	Prepared:	06/24/13 11:17	Analyzed:	07/09/13 16:46
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3F23004	Sequence:	3G19104	Calibration:	3122001

Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.234	0.467	0.935	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	46.72	33.44	71.6	50 - 110	
Terphenyl-d14	46.72	39.72	85.0	50 - 135	
2,4,6-Tribromophenol	93.46	83.65	89.5	40 - 125	

1/12/2016

ANALYSIS DATA SHEET

VEP4-EB01-061713-GW

Laboratory:	Empirical Laboratories, LLC		SDG:	1306197	
Client:	CH2M Hill, Inc.		Project:	Virginia East SWMU 20	
Matrix:	Water	Laboratory ID:	1306197-03	File ID:	0619703.D
Sampled:	06/17/13 11:20	Prepared:	06/24/13 11:17	Analyzed:	07/09/13 17:14
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3F23004	Sequence:	3G19104	Calibration:	3122001

Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.236	0.472	0.943	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	47.17	38.44	81.5	50 - 110	
Terphenyl-d14	47.17	42.33	89.7	50 - 135	
2,4,6-Tribromophenol	94.34	97.72	104	40 - 125	

1/12/2016

ELECTRONIC CHAIN OF CUSTODY RECORD

C.O.C. 20130617-GW-EMP-01

EMPIRICAL
621 Mainstream Dr.
Suite 270
Nashville, TN 37228
phone: 615-345-1115

Report to: PLEASE PRINT
Company Name: CH2MHILL
Address: 15010 Conference Dr. ; 200
Chantilly, VA 20151
Attn: Mike Zamboni
Phone: 703.376.5301
Fax: 703.376.5801

Invoice to: PLEASE PRINT
Company Name: See Contact
Address:
Attn:
Phone:
Fax:

Project Name/Number: not required
Purchase Order Number: 943380
Sampler (Print): not required
Sampler (Signature): not required

Date Shipped: 6/17/13
Carrier: FedEx
Way Bill No.: 798013630759
Comments:

	Sample Identification	Location	Date collected	Time collected	Time Zone	No. of Containers	Air	Solid	Soil	Water	Analysis Requested/Method Number	
-01	VEP4-TB01-061713		6/17/13	08:00	AST	2	✓					trip blank
-02	VEP4-GW20-0613		6/17/13	10:30	AST	5		✓	✓	✓		
-03	VEP4-EB01-061713-GW		6/17/13	11:20	AST	5	✓			✓		equipment blank

Shuttle Temperature:
Turnaround Requested: Check one ☐ Standard 2-3 wk ☐ One week ☐ (643)
Sample Disposal: ☐ Return to client ☐ Dispose by Lab after turnaround ☐ Other
not applicable

	Date	Time		Date	Time		Date	Time
Relinquished by sampler:	6/17/13	11:30	Received by:			Relinquished by:		
Relinquished by:	Date	Time	Received by:	Date	Time	Relinquished by:	Date	Time
						Received at lab by:		

White: Return to client with report
Yellow: Laboratory Copy
Pink: Sampler

Note: The first sampled date of the ARF will be used as the COC number unless indicated otherwise.

1306197

EMPIRICAL LABORATORIES COOLER RECEIPT FORM

Cooler Received/Opened On: 06/18/13 @ 0849 Workorder# 1306197

1. Tracking # 0759 (last 4 digits, FedEx)
   Courier: FEDEX
2. Temperature of rep. sample or temp blank when opened: 4.3 °C + correction factor (-0.1) = 4.2 °C
3. If item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA
4. Were custody seals on outside of cooler? YES NO NA
   If yes, how many and where: 2-FRONT, BACK
5. Were the seals intact, signed, and dated correctly? YES NO NA
6. Were custody papers inside cooler? YES NO NA

I certify that I opened the cooler and answered questions 1-6 (initial) [illegible]

7. Were custody seals on containers: YES NO and intact YES NO NA
   Were these signed and dated correctly? YES NO NA
8. Packing material used? Bubble wrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry Ice Other None
10. Did all containers arrive in good condition (unbroken)? YES NO NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES NO NA
12. Did all container labels and tags agree with custody papers? YES NO NA
13. a. Were VOA vials received? YES NO NA
    b. Was there any observable headspace present in any VOA vial? YES NO NA
14. Was there a Trip Blank in this cooler? YES NO NA If multiple coolers, sequence # [illegible]

I certify that I unloaded the cooler and answered questions 7-14 (initial) [illegible]

15. a. Did preservative bottles, did pH test strips suggest preservation reached the correct pH level? YES NO NA
    b. Did the bottle labels indicate that the correct preservatives were used YES NO NA
16. Was residual chlorine present? YES NO NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial) [illegible]

17. Were custody papers properly filled out (ink, signed, etc)? YES NO NA
18. Did you sign the custody papers in the appropriate place? YES NO NA
19. Were correct containers used for the analysis requested? YES NO NA
20. Was sufficient amount of sample sent in each container? YES NO NA

I certify that I entered this project into LIMS and answered questions 17-20 (initial) [illegible]

I certify that I attached a label with the unique LIMS number to each container (initial) [illegible]

I certify that I have performed a second check of the LIMS information against the COC to confirm accuracy (initial) [illegible]

21. Were there Non-Conformance issues at login? YES NO Was a NCR generated? YES NO #

Additional Details:

Sample Delivery Group Case Narrative

Receipt Information
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Changes to the Revision
Revision 01: The package was revised to replace the raw data that was not dark enough to be read in the original package.

Analytical Information
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:
The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

015

SW8260B:
No anomalies or deviations are noted.

SW8270D BNA:
No anomalies or deviations are noted.

019

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 1306197 LAB: Empirical

SITE NAME: Vieques SWMU 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓ __ __

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓ __ __

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ __ __

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. **VOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓ __ __

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓ __ __

1.3 Sample Conditions/Problems

017

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? __ ✓ __

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? __ ✓ __

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

019

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water [✓] ___ ___

b. Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water [✓] ___ ___

b. Soil [ ] ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. [✓] ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ [✓]

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] [✓] ___

If yes, were samples reanalyzed? [ ] ___ [✓]

Were method blanks reanalyzed? [ ] ___ [✓]

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] [✓] ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ [✓]

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] [✓] ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent)

no MS/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] ___ ✓

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] ___ ✓

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month (page 8000C, section 9.5.))

a. Water [ ] ___ ✓

b. Waste [ ] ___ ✓

c. Soil/Solid [ ] ___ ✓

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [ ] ___ ✓

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ ✓

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? [✓] ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? [✓] ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? [✓] ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? [✓] ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. [ ] ___ ✓

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	≥ CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone
** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates [ ] ___ ✓

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) [ ] ___ ✓

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? ✓ ___ ___

YES NO N/A

Resolution? ✓ ___ ___

Peak shape? ✓ ___ ___

Full-scale graph (attenuation)? ✓ ___ ___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? ✓ ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? ✓ ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ✓ ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ✓ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

No TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ ✓

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ ✓

b. Blanks [ ] ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ ✓

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ ✓

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ___

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] ✓ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ ✓

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39) qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? [✓] ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. [✓] ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) [ ] ✓ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? [✓] ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? [✓] ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). [ ] ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? M ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be > the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? M ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:
1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.
2. Do not qualify non-detects when the associated IS are counts area > + 100%.
3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".
4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? M ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ___ ✓ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

Initial Calibration Date: 6/5/2013
RRF and %RSD Calculations:

Compound Name: vinyl chloride
Lab Value: 0.2104

Area of Compound	1419609
Area of Internal STD	1012244
Conc. of Internal STD	30
Conc. of Compound	200
Calculated RRF	0.210

Compound Name: 1,1-dichloroethene
Lab Value: 4.2

RRF of STD 1	0.4208
RRF of STD 2	0.3931
RRF of STD 3	0.4145
RRF of STD 4	0.4066
RRF of STD 5	0.4149
RRF of STD 6	0.3940
RRF of STD 7	0.3740
RRF of STD 8	0.3998
RRF of STD 9	0.3759
Calculated % RSD	4.2

Continuing Calibration File ID: 6/20/2013
RRF and %D Calculations:

Compound Name: cis-1,2-dichloroethene
Lab Value: 0.312

Area of Compound	1209058
Area of Internal STD	1160732
Conc. of Internal STD	30
Conc. of Compound	100
Calculated RRF	0.312

Compound Name: trichloroethene
Lab Value: 3.2

Average RRF	0.292
Calibration Check RRF	0.302
Calculated % D	-3.2

DataQual **VOA**

SAMPLE CALCULATION

Sample ID: VEP4-GW20-0613
Standard ID: 6/20/2013
Compound: trichloroethene
Concnetration: 52.2 ug/L

	Water (ug/L)	Soil (ug/Kg)	Soil ug/Kg)
Area of Compound	518095		
Area of Internal STD	1019119		
Conc. of Internal (ng)	150	250	
RRF of Compound	0.2922197		
Dilution Factor	1	1	
Weight of Sample	NA		
Volume of Sample	5	NA	
% Moisture	NA		
Aliquot of sample	NA	NA	
Concentration	52.19	#DIV/0!	#DIV/0!

	RT of Internal STD	RT of Compound	RRT
Sample	7.810	8.310	1.064
Standard	7.810	8.310	1.064

043

YES NO N/A

E – The concentration of this analyte exceeds the calibration range of the instrument.

A – Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 130619 LAB: Empirical

SITE NAME: Vieques SWMU 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the data assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative or cover letter present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

YES NO N/A

II. **SEMIVOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report forms present for all samples? ✓ ___ ___

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, all non-detects data are qualified as unusable (R), and detects are flagged "J".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (10°C), flag all positive results "J" and all non-detects "UJ". X 4.2°C

2.0 Holding Times

2.1 Have any semivolatile technical holding times, determined from date of collection to date of extraction, been exceeded? ___ ✓ ___

Continuous extraction of water samples for semivolatile analysis must be started within 7 days of the date of collection. Soil/sediment samples must be extracted within 14 days of collection. Extracts must be analyzed within

044A

YES NO N/A

40 days of the date of extraction.

Table of Holding Time Violations

Sample ID	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted (See Traffic Report)	Date Analyzed

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

045

YES NO N/A

3.0 Surrogate Recovery (Form II/Equivalent)

3.1 Have the semi volatile surrogate recoveries been listed on CLP Surrogate Recovery forms (Form II) for each of the following matrices:

a. Low Water [✓] ___ ___

b. Low/Med Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery Summary forms for each matrix:

a. Low Water [✓] ___ ___

b. Low/Med Soil [ ] ___ ___

ACTION: If CLP deliverables are unavailable, document the effect(s) in data assessments. In some cases the lab may have to be contacted to obtain the data necessary to complete the validation.

3.3 Were outliers marked correctly with an asterisk? [ ] ___ [✓]

ACTION: Circle all outliers in red.

3.4 Were two or more base neutral OR acid surrogate recoveries out of specification for any sample or method blank (Reviewer should use lab in house recovery limits. Use surrogate recovery limits from USEPA National Functional Guidlines January 2005 page 130, if in house limits are not available. See Method 8000B-43 or 8000C-24). [ ] [✓] ___

Note: Examine lab in house limits for reasonableness.

If yes, were samples re-analyzed? [ ] ___ [✓]

YES NO N/A

Were method blanks re-analyzed? [ ] ___ [✓]

ACTION: If all surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet method specifications, for the affected fraction only (i.e. either base-neutral or acid compounds):

1. Flag all positive results as estimated ("J").

2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.

3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Positive results for the fraction with < 10% surrogate recovery are qualified with "J".

2. Non-detects for that fraction should be qualified as unusable (R) .

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ [✓] ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document

YES NO N/A

effect in data assessments.

4.0 Matrix Spikes (Form III/Equivalent)

No MS/MSD

4.1 Have the semivolatile Matrix Spike and Matrix Spike Duplicate/or duplicate unspiked Sample recoveries been listed on the Recovery Form (Form III)? [ ] ___ [✓]

NOTE: Method 3500B/page 4 states the spiking compounds:

Base/neutrals	Acids
1,2,4-Trichlorobenzene	Pentachlorophenol
Acenaphthene	Phenol
2,4-Dinitrotoluene	2-Chlorophenol
Pyrene	4-Chloro-3-methylphenol
N-Nitroso-di-n-propylamine	4-Nitrophenol
1,4-Dichlorobenzene	

Note: Some projects may require the spiking of specific compounds of interest.

Note: See Method 8270D-sec 8.4.2 for deciding on whether to prepare and analyze duplicate samples or a martix spike/matrix spike duplicate. If samples are expected to contain target analytes, then laboratory may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratory should use a matrix spike and matrix spike duplicate pair.

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water [ ] ___ [✓]

b. Low Solid [ ] ___ [✓]

c. Med Solid [ ] ___ [✓]

YES NO N/A

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. It may be necessary to contact the lab to obtain the required data.

NOTE: If the data has not been reported on CLP equivalent form, then the laboratory must provide the information necessary to evaluate the spike recoveries in the MS and MSD. The required data which should have been provided by the lab include the analytes and concentrations used for spiking, background concentrations of the spiked analytes (i.e., concentrations in unspiked sample), methods and equations used to calculate the QC acceptance criteria for the spiked analytes, percent recovery data for all spiked analytes.

The data reviewer must verify that all reported equations and percent recoveries are correct before proceeding to the next section.

4.3 Were matrix spikes performed at concentration equal to 100ug/L for acid compounds, and 200ug/l for base compounds (Method 3500B-4), or those specified in project plan. [ ] ___ [✓]

4.4 How many semivolatile spike recoveries are outside Laboratory in house MS/MSD recovery limits (use recovery limits values in Method 8270D-43&44 Table 6 if in house values not available).

Water	Solids
____ out of ____	____ out of ____

YES NO N/A

4.5 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water ____ out of ____

Solids ____ out of ____

ACTION: Circle all outliers with red pencil.

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria to determine the need for some qualification of the data.

4.6 Was a Laboratory Control Sample (LCS) analyzed with each analytical batch? ✓ ___ ___

NOTE: When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

5.0 Blanks (Form IV/Equivalent)

5.1 Is the Method Blank Summary (Form IV) present? ✓ ___ ___

5.2 Frequency of Analysis:

Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? ✓ ___ ___

5.3 Has a method blank been analyzed either after

YES NO N/A

the calibration standard or at any other time during the analytical shift for each GC/MS system used ? ✓ ___ ___

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, use professional judgement to determine if the associated sample data should be qualified.

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for the semivolatiles? ✓ ___ ___

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ✓ ___

6.2 Do any field/rinse/ blanks have positive results for target analytes and/or TICs (if required, see section 10 below)? ___ ✓ ___

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field Blanks must be qualified for outlying surrogates, poor spectra, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify sample results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

YES NO N/A

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and > blank contamination	No qualification required

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

NOTE: If the laboratory did not report TIC analyses, check the project plans to verify whether or not it was required.

6.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

6.4 Was a instrument blank analyzed after each sample/dilution which contained a target compound

	YES	NO	N/A
that exceeded the initial calibration range.	[ ]		✓
6.5 Does the instrument blank have positive results for target analytes and/or TICs?		✓	

Note: Use professional judgement to determine if carryover occurred and qualify analytes accordingly.

7.0 GC/MS Apparatus and Materials

	YES	NO	N/A
7.1 Did the lab use the proper gas chromatographic column for analysis of semivolatiles by Method 8270D? Check raw data, instrument logs or contact the lab to determine what type of column was used. The method requires the use of 30 m x 0.25 mm ID (or 0.32 mm ID), silicone-coated, fused silica, capillary column.	✓		

ACTION: If the specified column, or equivalent, was not used, document the effects in the data assessment. Use professional judgement to determine the acceptability of the data.

8.0 GC/MS Instrument Performance Check (Form V/Equivalent)

	YES	NO	N/A
8.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)?	✓		

NOTE: The performance solution should also contain 4,4-DDT, pentachlorophenol, and benzidine to verify injection port inertness and column performance. The degradation of DDT to DDE and DDD must be less than 20% total and the response of pentachlorophenol and benzidine should be within normal ranges for these compounds (based upon lab experience) and show no peak degradation or tailing before samples are analyzed. (see section 5.5

	YES	NO	N/A
page 8270D-12).			
8.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift?	✓		
8.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument?	✓		

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

	YES	NO	N/A
8.4 Have the ion abundances been normalized to m/z 198?	✓		
8.5 Have the ion abundance criteria been met for each instrument used?	✓		

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action specified in section 3.2

	YES	NO	N/A
8.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.)		✓	
8.7 Have the appropriate number of significant figures (two) been reported?	✓		

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.

	YES	NO	N/A
8.8 Are the spectra of the mass calibration compound acceptable?	✓		

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

9.0 Target Analytes

	YES	NO	N/A
9.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate	✓		
b. Matrix spikes and matrix spike duplicates	[ ]		✓
c. Blanks	✓		
9.2 Has any special cleanup, such as GPC, been performed on all soil/sediment sample extracts (see section 7.2, page 8270D-14)?	[ ]		✓

ACTION: If data suggests that extract cleanup was not performed, use professional judgement. Make note in the data assessment narrative.

	YES	NO	N/A
9.3 Are the Reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?			
a. Samples and/or fractions as appropriate	✓		
b. Matrix spikes and matrix spike duplicates (Mass spectra not required)	✓		
c. Blanks	✓		

ACTION: If any data are missing, take action specified in 3.2 above.

	YES	NO	N/A
9.4 Are the response factors shown in the Quant Report?	✓		
9.5 Is chromatographic performance acceptable with respect to:			
Baseline stability?	✓		
Resolution?	✓		
Peak shape?	✓		
Full-scale graph (attenuation)?	✓		
Other:_____	[ ]		

ACTION: Use professional judgement to determine the acceptability of the data.

9.6 Are the lab-generated standard mass spectra of identified semivolatile compounds present for

YES NO N/A

each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the data assessment narrative. If spectra are missing, reject all positive data.

9.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

9.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

9.9 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 9.7, 9.8, and 9.9.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

YES NO N/A

10.0 Tentatively Identified Compounds (TIC)

NO TICs

10.1 If Tentatively Identified Compounds were required for this project, are all Form Is, Part B present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier?

NOTE: Review sampling reports to determine if the lab was required to identify non target analytes (refer to section 7.6.2,page 8270D-21).

10.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following: [ ] ___ [✓]

a. Samples and/or fractions as appropriate [ ] ___ [✓]

b. Blanks [ ] ___ [✓]

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by CAS #.

10.3 Are any target compounds from one fraction listed as TIC compounds in another (e.g., an acid compound listed as a base neutral TIC)? ___ [ ] [✓]

ACTION: i. Flag with "R" any target compound listed as a TIC.

ii. Make sure all rejected compounds are properly reported in the other fraction.

10.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the

YES NO N/A

sample mass spectrum? [ ] ___ [✓]

10.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ [✓]

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate and remove "JN". Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R."

11.0 Compound Quantitation and Reported Detection Limits

11.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found? ___ [✓] ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

11.2 Are the method detection limits adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ [✓]

YES NO N/A

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I (if present) and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red " X" across the entire page of all Form I's that should not be used, including any in the summary package.

12.0 Standards Data (GC/MS)

12.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

13.0 GC/MS Initial Calibration (Form VI/Equivalent)

13.1 Is the Initial Calibration Form (Form VI/ Equivalent) present and complete for the semivolatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard row data are missing, take action specified in 3.2 above.

13.2 Are all base neutral or acid RRFs > 0.050? [✓] ___ ___

YES NO N/A

Check the **average RRFs** of the four System Performance Check Compounds (SPCCs): N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. These compounds must have **average RRFs** greater than or equal to 0.05 before running samples and should not show any peak tailing.

ACTION: Circle all outliers in red.

ACTION: For any target analyte with **average RRF <0.05**

1. "R" all non-detects;

2. "J" all positive results.

13.3 Are response factors for base neutral or acid target analytes stable over the concentration range of the calibration (% Relative standard deviation [%RSD] < 20.0%)? ✓

NOTE: The % RSD for each individual Calibration Check Compound (CCC, Method 8270D-40 see Table 4) must be less than 30% before analysis can begin. If grater 30%, the lab must clean and recalibrate the instrument.

CALIBRATION CHECK COMPOUNDS

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol

YES NO N/A

Benzo(a)pyrene

ACTION: If the %RSD for any CCC >30% and no corrective action taken, then "J" qualify all positive hits and "UJ" qualify all non-detects.

ACTION: Circle all outliers in red.

ACTION: If the % RSD is ≥ 20.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non- detect results for that analyte "R," unusable. Alternatively, the lab should calculate first or second order regression fit of the calibration curve and select the fit which introduces the least amount of error.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

13.4 Did the laboratory calculate the calibration curve by the least squares regression fit? ✓

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) ✓

ACTION: Circle Errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

13.5 Do the target compounds for this SDG include Pesticides? ✓

YES NO N/A

13.6 If the pesticide compounds include DDT, was the percent breakdown of DDT to DDD and DDE greater than 20%? ✓

ACTION: If DDT percent breakdown exceeds 20%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE results are positive, qualify the quantitation limit for DDT as unusable, "R".

ii. Qualify all positive results for DDD and DDE as presumptively present at an approximate concentration "JN".

14.0 GC/MS Calibration Verification (Form VII/Equivalent)

14.1 Are the Calibration Verification Forms (Form VII) present and complete for all compounds of interest? ✓

14.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

ACTION: If any forms are missing or no calibration verification standard has been analyzed within twelve hours of every sample analysis,

YES NO N/A

call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

14.3 Do any of the SPCCs have an RRF <0.05? ✓

If YES, make a note in data assessment if the lab did not take corrective action specified in section 7.4.4, page 8270D-18. ✓

14.4 Do any of the CCCs have a %D between the initial and continuing RRF which exceeds 20.0%?

ACTION: If yes, make a note in data assessment.

14.5 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds 20.0%? ✓

ACTION: Circle all outliers in red.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is above 90%, qualify all non-detects for that analyte as "R", unusable.

14.6 Do any semivolatile compounds have a RRF < 0.05? ✓

ACTION: Circle all outliers in red.

ACTION: If RRF < 0.05, qualify as unusable ("R") associated non-detects and "J" associated positive values.

14.7 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or percent difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more). ✓

YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect(s) in the data assessments.

15.0 Internal Standards (Form VIII)

15.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to + 100%) for each continuing calibration? ✓

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area	LowerLimit	Upper Limit

(Attach additional sheets if necessary.)

Note: Check Table 5, 8270D-41 for associated analytes.

ACTION: i. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

ii. Non-detects associated with IS > 100% should not be qualified.

YES NO N/A

iii. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

15.2 Are the retention times of all internal standards within 30 seconds of the associated calibration standard? ✓

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

16.0 Laboratory Control Samples (LCS)

16.1 Were any LCS samples run in order to verify analytes which failed criteria for spike recovery? ✓

16.2 Did the lab spike LCS sample spiked with the same analytes and the same concentrations as the matrix spike? ✓

16.3 Were the mean and standard deviation of all analytes within the QC acceptance ranges as shown in Table 6, 8270D-43? ✓

ACTION: If the recovery of any analyte falls out of the designated range, the analytical results for that compound is suspect and should be qualified "J" in the unspiked samples.

17.0 Field Duplicates

17.1 Were any field duplicates submitted for semivolatile analysis? ✓

YES NO N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

DataQual
Environmental Services, LLC

CH2M HILL-VBO
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

December 11, 2013
SDG# 1307031, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1307031. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24 and 8270D-Rev 4, August 2008-SOP #HW-22,), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA	SVOA
VEP4-GW17D-0713	1307031-01	water	X	X
VEP4-EB01-070113	1307031-02	water	X	X
VEP4-TB01-070113	1307031-03	water	X	

The following quality control samples were provided with this SDG: sample VEP4-EB01-070113- equipment blank and sample VEP4-TB01-070113- trip blank.

The samples were evaluated based on the following criteria:

- Data Completeness
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Field Duplicates NA
- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

5830 Amberway Drive • St. Louis, MO 63128 • 314-330-1327 • Fax 314-849-6264

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

No qualifications were required to the data.

SVOA

No qualifications were required to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were required as the raw data was not printed dark enough to read in the original package. The laboratory was contacted and updated pages were submitted.

Technical Holding Times

According to chain of custody records, sampling was performed on 7/1/13 and samples were received at the laboratory 7/2/13. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

SVOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U not detected above the reported sample quantitation limit
J estimated value
UJ reported quantitation limit is qualified as estimated
N analyte has been tentatively identified
JN analyte has been tentatively identified, estimated value
R result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.

U* The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.

RL** The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.

J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.

Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL	reporting limit
PQL	practical quantitation limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

ANALYSIS DATA SHEET

VEP4-GW17D-0713

Laboratory: Empirical Laboratories, LLC SDG: 1307031
Client: CH2M Hill, Inc. Project: Vieques East SWMU 20
Matrix: Water Laboratory ID: 1307031-01 File ID: 0703101.D
Sampled: 07/01/13 10:15 Prepared: 07/08/13 17:04 Analyzed: 07/08/13 17:04
Solids: Preparation: 5030B Dilution: 1
Batch: 3G08005 Sequence: 3G19006 Calibration: 3157003 Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene	**0.600**	0.250	0.500	1.00	J
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene	**1.07**	0.250	0.500	1.00	
79-01-6	Trichloroethene	**58.8**	0.100	0.200	0.500	
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	26.58	88.6	75 - 120	
Dibromofluoromethane	30.00	32.47	108	85 - 115	
1,2-Dichloroethane-d4	30.00	29.60	98.7	70 - 120	
Toluene-d8	30.00	29.26	97.5	85 - 120	

MK 11/24/13

ANALYSIS DATA SHEET

VEP4-EB01-070113

Laboratory: Empirical Laboratories, LLC SDG: 1307031
Client: CH2M Hill, Inc. Project: Vieques East SWMU 20
Matrix: Water Laboratory ID: 1307031-02 File ID: 0703102.D
Sampled: 07/01/13 11:30 Prepared: 07/08/13 11:29 Analyzed: 07/08/13 11:29
Solids: Preparation: 5030B Dilution: 1
Batch: 3G08005 Sequence: 3G19006 Calibration: 3157003 Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	26.02	86.7	75 - 120	
Dibromofluoromethane	30.00	33.46	112	85 - 115	
1,2-Dichloroethane-d4	30.00	30.46	102	70 - 120	
Toluene-d8	30.00	28.68	95.6	85 - 120	

MK 11/24/13

ANALYSIS DATA SHEET

VEP4-TB01-070113

Laboratory:	Empirical Laboratories, LLC			SDG:	1307031
Client:	CH2M Hill, Inc.			Project:	Vieques East SWMU 20
Matrix:	Water	Laboratory ID:	1307031-03	File ID:	0703103.D
Sampled:	07/01/13 11:00	Prepared:	07/08/13 11:57	Analyzed:	07/08/13 11:57
Solids:		Preparation:	5030B	Dilution:	1
Batch:	3G08005	Sequence:	3G19006	Calibration:	3157003
Instrument:	MS-VOA4				

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	26.54	88.5	75 - 120	
Dibromofluoromethane	30.00	32.16	107	85 - 115	
1,2-Dichloroethane-d4	30.00	30.85	103	70 - 120	
Toluene-d8	30.00	28.46	94.9	85 - 120	

WM 11/24/13

ANALYSIS DATA SHEET

VEP4-GW17D-0713

Laboratory:	Empirical Laboratories, LLC			SDG:	1307031
Client:	CH2M Hill, Inc.			Project:	Vieques East SWMU 20
Matrix:	Water	Laboratory ID:	1307031-01	File ID:	0703101.D
Sampled:	07/01/13 10:15	Prepared:	07/08/13 14:15	Analyzed:	07/10/13 18:11
Solids:		Preparation:	EXT. 3510	Dilution:	1
Batch:	3G07005	Sequence:	3G19201	Calibration:	3122001
Instrument:	MS-BNA4				

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.245	0.490	0.980	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	49.02	33.50	68.3	50 - 110	
Terphenyl-d14	49.02	40.39	82.4	50 - 135	
2,4,6-Tribromophenol	98.04	52.79	53.8	40 - 125	

WM 11/24/13

ANALYSIS DATA SHEET

VEP4-EB01-070113

Laboratory:	Empirical Laboratories, LLC			SDG:	1307031
Client:	CH2M Hill, Inc.			Project:	Vieques East SWMU 20
Matrix:	Water	Laboratory ID:	1307031-02	File ID:	0703102.D
Sampled:	07/01/13 11:30	Prepared:	07/08/13 14:15	Analyzed:	07/10/13 18:38
Solids:		Preparation:	EXT. 3510	Dilution:	1
Batch:	3G07005	Sequence:	3G19201	Calibration:	3122001
Instrument:	MS-BNA4				

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.240	0.481	0.962	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	48.08	41.54	86.4	50 - 110	
Terphenyl-d14	48.08	43.21	89.9	50 - 135	
2,4,6-Tribromophenol	96.15	98.94	103	40 - 125	

WM 11/24/13

ELECTRONIC CHAIN OF CUSTODY RECORD

EMPIRICAL
621 Mainstream Dr.
Suite 270
Nashville, TN 37228
phone: 615-345-1115

1307031

C.O.C. 20130701-GW-EMP-01

Report to: PLEASE PRINT
Company Name: CH2MHILL Phone: 703.376.5301
Address: 15010 Conference Dr. ; 200
Chantilly, VA 20151 Fax: 703.376.5801
Attn: Mike Zamboni

Invoice to: PLEASE PRINT
Company Name: See Contact Phone:
Address: Fax:
Attn:

Project Name/Number: Sampler (Print): not required
Purchase Order Number: 943380 Sampler (Signature): not required

Date Shipped: 07/01/13
Carrier: FedEx
Waybill No.: 796128682762

	Sample Identification	Location	Date Collected	Time Collected	Time Zone	No. of Containers	Aq	Sed.	Soil	GW	Analysis 1	Analysis 2	Comments
01	VEP4-GW17D-0713		7/1/13	1015	AST	5				✓	x	x	MW-17D
02	VEP4-EB01-070113		7/1/13	1130	AST	5				✓	x	x	equipment blank
03	VEP4-TB01-070113		7/1/13	1100	AST	2				✓	x		trip blank

Shuttle Temperature:
Turnaround Requested: Check one: ☒ Standard 2-3 wk ☐ One week ☐ 24/48 Hrs ☐ Other
Sample Disposal: ☐ Return to client ☐ Disposal by Lab (if no answer) not applicable
Relinquished by sampler: Date Time Received by:
Relinquished by: Date Time Received by:
Relinquished by: Date 7/2/13 Time 0920 Received at lab by:

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

Note: The first sampled date of the ARF will be used as the COC number unless indicated otherwise.

7/2/13
JG 7/2/13

EMPIRICAL LABORATORIES
COOLER RECEIPT FORM

Cooler Received/Opened On: ~~07/13~~ @ 0820

Workorder# 1307031

1. Tracking # 2762 (last 4 digits, FedEx)

   Courier: FEDEX

2. Temperature of rep. sample or temp blank when opened: 0.1 °C + correction factor (0.0) = 0.1 °C
3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA
4. Were custody seals on outside of cooler? YES NO NA

   If yes, how many and where: 1 on front
5. Were the seals intact, signed, and dated correctly? YES NO NA
6. Were custody papers inside cooler? YES NO NA

I certify that I opened the cooler and answered questions 1-6 (initial) JG

7. Were custody seals on containers: YES NO and intact YES NO NA

   Were these signed and dated correctly? YES NO NA
8. Packing material used? Bubblewrap Plastic bag Peanuts Vermiculite Foam insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry ice Other None
10. Did all containers arrive in good condition (unbroken)? YES NO NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES NO NA
12. Did all container labels and tags agree with custody papers? YES NO NA
13. a. Were VOA vials received? YES NO NA

    b. Was there any observable headspace present in any VOA vial? YES NO NA
14. Was there a Trip Blank in this cooler? YES NO NA If multiple coolers, sequence # ____

I certify that I unloaded the cooler and answered questions 7-14 (initial) JG

15. a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES NO NA

    b. Did the bottle labels indicate that the correct preservatives were used YES NO NA
16. Was residual chlorine present? YES NO NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial) JG

17. Were custody papers properly filled out (ink, signed, etc)? YES NO NA
18. Did you sign the custody papers in the appropriate place? YES NO NA
19. Were correct containers used for the analysis requested? YES NO NA
20. Was sufficient amount of sample sent in each container? YES NO NA

I certify that I entered this project into LIMS and answered questions 17-20 (initial) JG

I certify that I attached a label with the unique LIMS number to each container (initial) JG

I certify that I have performed a second check of the LIMS information against the COC to confirm accuracy (initial) ____

21. Were there Non-Conformance issues at login? YES NO Was a NCR generated? YES NO #____

Additional Details:

Page 1 of 1

014

Sample Delivery Group Case Narrative

Receipt Information

The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Changes to the Revision

Revision 01: The package was revised to replace the raw data that was not dark enough to be read in the original package.

Analytical Information

All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:

The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

015

SW8260B:
No anomalies or deviations are noted.

SW8270D BNA:
No anomalies or deviations are noted.

016

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 1307031 LAB: Empirical

SITE NAME: Virgin Summit

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ☑ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ☑ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ☑ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. **VOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ☑ ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ☑ ___ ___

1.3 Sample Conditions/Problems

- 6 VOA -

017

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

7/1/18 7/8
7/2 0.1°C

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ ✓ ___

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water ✓ ___ ___

b. Soil ___ ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water ✓ ___ ___

b. Soil ___ ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. ✓ ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? ___ ___ ✓

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. ___ ✓ ___

If yes, were samples reanalyzed? ___ ___ ✓

Were method blanks reanalyzed? ___ ___ ✓

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? ___ ✓ ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. ✓ ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ [✓]

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] [✓] ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent)

No MS/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] ___ [✓]

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] ___ [✓]

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month (page 8000C, section 9.5.))

a. Water [ ] ___ [✓]

b. Waste [ ] ___ [✓]

c. Soil/Solid [ ] ___ [✓]

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [ ] ___ [✓]

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ [✓]

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? ✓ ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? ✓ ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? ✓ ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? ✓ ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ✓ ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone
** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable? ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates [ ] ___ ✓

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) [ ] ___ ✓

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? ✓ ___ ___

YES NO N/A

Resolution? ✓ ___ ___

Peak shape? ✓ ___ ___

Full-scale graph (attenuation)? ✓ ___ ___

Other: _____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? ✓ ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? ✓ ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ✓ ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ✓ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ ✓

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ ✓

b. Blanks [ ] ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ ✓

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ ✓

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] ✓ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ ✓

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39) qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? [✓] ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. [✓] ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) [ ] ✓ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? ☑ ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ☑ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? ☑ ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). ☐ ☑ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? ☑ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? ☑ ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:
1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.
2. Do not qualify non-detects when the associated IS are counts area > + 100%.
3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".
4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ☑ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ☐ ☑ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

YES NO N/A

E - The concentration of this analyte exceeds the calibration range of the instrument.

A - Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: B07031 LAB: Empirical

SITE NAME: Vieques Sample 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format? ✓ __ __

ACTION: If not, note the effect on review of the data in the data assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative or cover letter present? ✓ __ __

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ __ __

YES NO N/A

II. SEMIVOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? ✓ __ __

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? __ ✓ __

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, all non-detects data are qualified as unusable (R), and detects are flagged "J".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (10°C), flag all positive results "J" and all non-detects "UJ". ✓ 7/1/13 ✓ 7/8 ✓ 7/12 ✓ 7/10

2.0 Holding Times

2.1 Have any semivolatile technical holding times, determined from date of collection to date of extraction, been exceeded? __ ✓ __

Continuous extraction of water samples for semivolatile analysis must be started within 7 days of the date of collection. Soil/sediment samples must be extracted within 14 days of collection. Extracts must be analyzed within

YES NO N/A

40 days of the date of extraction.

Table of Holding Time Violations

Sample ID	Sample Matrix	Date Sampled	Date Lab Received (See Traffic Report)	Date Extracted	Date Analyzed

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

YES NO N/A

3.0 Surrogate Recovery (Form II/Equivalent)

3.1 Have the semi volatile surrogate recoveries been listed on CLP Surrogate Recovery forms (Form II) for each of the following matrices:

a. Low Water ✓ __ __

b. Low/Med Soil [ ] __ __

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery Summary forms for each matrix:

a. Low Water ✓ __ __

b. Low/Med Soil [ ] __ __

ACTION: If CLP deliverables are unavailable, document the effect(s) in data assessments. In some cases the lab may have to be contacted to obtain the data necessary to complete the validation.

3.3 Were outliers marked correctly with an asterisk? [ ] __ ✓

ACTION: Circle all outliers in red.

3.4 Were two or more base neutral OR acid surrogate recoveries out of specification for any sample or method blank (Reviewer should use lab in house recovery limits. Use surrogate recovery limits from USEPA National Functional Guidlines January 2005 page 130, if in house limits are not available. See Method 8000B-43 or 8000C-24). [ ] ✓ __

Note: Examine lab in house limits for reasonableness.

If yes, were samples re-analyzed? [ ] __ ✓

YES NO N/A

Were method blanks re-analyzed? [ ] ___ ✓

ACTION: If all surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet method specifications, for the affected fraction only (i.e. either base-neutral or acid compounds):

1. Flag all positive results as estimated ("J").

2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.

3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Positive results for the fraction with < 10% surrogate recovery are qualified with "J".

2. Non-detects for that fraction should be qualified as unusable (R).

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ ✓ ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document

YES NO N/A

effect in data assessments.

4.0 Matrix Spikes (Form III/Equivalent) NO MS/MSD

4.1 Have the semivolatile Matrix Spike and Matrix Spike Duplicate/or duplicate unspiked Sample recoveries been listed on the Recovery Form (Form III)? [ ] ___ ✓

NOTE: Method 3500B/page 4 states the spiking compounds:

Base/neutrals	Acids
1,2,4-Trichlorobenzene	Pentachlorophenol
Acenaphthene	Phenol
2,4-Dinitrotoluene	2-Chlorophenol
Pyrene	4-Chloro-3-methylphenol
N-Nitroso-di-n-propylamine	4-Nitrophenol
1,4-Dichlorobenzene	

Note: Some projects may require the spiking of specific compounds of interest.

Note: See Method 8270D-sec 8.4.2 for deciding on whether to prepare and analyze duplicate samples or a martix spike/matrix spike duplicate. If samples are expected to contain target analytes, then laboratory may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratory should use a matrix spike and matrix spike duplicate pair.

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water [ ] ___ ✓

b. Low Solid [ ] ___ ✓

c. Med Solid [ ] ___ ✓

YES NO N/A

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. It may be necessary to contact the lab to obtain the required data.

NOTE: If the data has not been reported on CLP equivalent form, then the laboratory must provide the information necessary to evaluate the spike recoveries in the MS and MSD. The required data which should have been provided by the lab include the analytes and concentrations used for spiking, background concentrations of the spiked analytes (i.e., concentrations in unspiked sample), methods and equations used to calculate the QC acceptance criteria for the spiked analytes, percent recovery data for all spiked analytes.

The data reviewer must verify that all reported equations and percent recoveries are correct before proceeding to the next section.

4.3 Were matrix spikes performed at concentration equal to 100ug/L for acid compounds, and 200ug/l for base compounds (Method 3500B-4), or those specified in project plan. [ ] ___ ✓

4.4 How many semivolatile spike recoveries are outside Laboratory in house MS/MSD recovery limits (use recovery limits values in Method 8270D-43&44 Table 6 if in house values not available).

Water ____ out of ____

Solids ____ out of ____

YES NO N/A

4.5 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water ____ out of ____

Solids ____ out of ____

ACTION: Circle all outliers with red pencil.

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria to determine the need for some qualification of the data.

4.6 Was a Laboratory Control Sample (LCS) analyzed with each analytical batch? [✓] ___ ___

NOTE: When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

5.0 Blanks (Form IV/Equivalent)

5.1 Is the Method Blank Summary (Form IV) present? [✓] ___ ___

5.2 Frequency of Analysis:

Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? [✓] ___ ___

5.3 Has a method blank been analyzed either after

YES NO N/A

the calibration standard or at any other time during the analytical shift for each GC/MS system used ? ✓ ___ ___

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, use professional judgement to determine if the associated sample data should be qualified.

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for the semivolatiles? N/A ___ ___

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ✓ ___

6.2 Do any field/rinse/ blanks have positive results for target analytes and/or TICs (if required, see section 10 below)? ___ ✓ ___

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field Blanks must be qualified for outlying surrogates, poor spectra, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify sample results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

YES NO N/A

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

NOTE: If the laboratory did not report TIC analyses, check the project plans to verify whether or not it was required.

6.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

6.4 Was a instrument blank analyzed after each sample/dilution which contained a target compound

YES NO N/A

that exceeded the initial calibration range. N/A ___ ✓

6.5 Does the instrument blank have positive results for target analytes and/or TICs? ___ ✓ ___

Note: Use professional judgement to determine if carryover occurred and qualify analytes accordingly.

7.0 GC/MS Apparatus and Materials

7.1 Did the lab use the proper gas chromatographic column for analysis of semivolatiles by Method 8270D? Check raw data, instrument logs or contact the lab to determine what type of column was used. The method requires the use of 30 m x 0.25 mm ID (or 0.32 mm ID), silicone-coated, fused silica, capillary column. N/A ___ ___

ACTION: If the specified column, or equivalent, was not used, document the effects in the data assessment. Use professional judgement to determine the acceptability of the data.

8.0 GC/MS Instrument Performance Check (Form V/Equivalent)

8.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)? ✓ ___ ___

NOTE: The performance solution should also contain 4,4-DDT, pentachlorophenol, and benzidine to verify injection port inertness and column performance. The degradation of DDT to DDE and DDD must be less than 20% total and the response of pentachlorophenol and benzidine should be within normal ranges for these compounds (based upon lab experience) and show no peak degradation or tailing before samples are analyzed. (see section 5.5

YES NO N/A

page 8270D-12).

8.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? ✓ ___ ___

8.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

8.4 Have the ion abundances been normalized to m/z 198? ✓ ___ ___

8.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

YES NO N/A

ACTION: If ion abundance criteria are not met, take action specified in section 3.2

8.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.) ___ ✓ ___

8.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.

8.8 Are the spectra of the mass calibration compound acceptable? ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

9.0 Target Analytes

9.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates ___ ___ ✓

c. Blanks ✓ ___ ___

9.2 Has any special cleanup, such as GPC, been performed on all soil/sediment sample extracts (see section 7.2, page 8270D-14)? ___ ___ ✓

YES NO N/A

ACTION: If data suggests that extract cleanup was not performed, use professional judgement. Make note in the data assessment narrative.

9.3 Are the Reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ___ ___ ✓

c. Blanks ✓ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

9.4 Are the response factors shown in the Quant Report? ✓ ___ ___

9.5 Is chromatographic performance acceptable with respect to:

Baseline stability? ✓ ___ ___

Resolution? ✓ ___ ___

Peak shape? ✓ ___ ___

Full-scale graph (attenuation)? ✓ ___ ___

Other:_____ ___ ___ ___

ACTION: Use professional judgement to determine the acceptability of the data.

9.6 Are the lab-generated standard mass spectra of identified semivolatile compounds present for

YES NO N/A

each sample? ✓ ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the data assessment narrative. If spectra are missing, reject all positive data.

9.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? ✓ ___ ___

9.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ✓ ___ ___

9.9 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ✓ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 9.7, 9.8, and 9.9.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

YES NO N/A

10.0 Tentatively Identified Compounds (TIC)

10.1 If Tentatively Identified Compounds were required for this project, are all Form Is, Part B present: and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier?

NOTE: Review sampling reports to determine if the lab was required to identify non target analytes (refer to section 7.6.2,page 8270D-21).

10.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following: [ ] ___ ✓

a. Samples and/or fractions as appropriate [ ] ___ ✓

b. Blanks [ ] ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by CAS #.

10.3 Are any target compounds from one fraction listed as TIC compounds in another (e.g., an acid compound listed as a base neutral TIC)? ___ [ ] ___

ACTION: i. Flag with "R" any target compound listed as a TIC.

ii. Make sure all rejected compounds are properly reported in the other fraction.

10.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the

YES NO N/A

sample mass spectrum? [ ] ___ ✓

10.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate and remove "JN". Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R."

11.0 Compound Quantitation and Reported Detection Limits

11.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found? ___ ✓ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

11.2 Are the method detection limits adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ ✓

YES NO N/A

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I (if present) and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red " X" across the entire page of all Form I's that should not be used, including any in the summary package.

12.0 Standards Data (GC/MS)

12.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant. Reports) present for initial and continuing calibration? ✓ ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

13.0 GC/MS Initial Calibration (Form VI/Equivalent)

13.1 Is the Initial Calibration Form (Form VI/ Equivalent) present and complete for the semivolatile fraction? ✓ ___ ___

ACTION: If any calibration forms or standard row data are missing, take action specified in 3.2 above.

13.2 Are all base neutral or acid RRFs > 0.050? ✓ ___ ___

YES NO N/A

Check the **average RRFs** of the four System Performance Check Compounds (SPCCs): N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. These compounds must have **average RRFs** greater than or equal to 0.05 before running samples and should not show any peak tailing.

ACTION: Circle all outliers in red.

ACTION: For any target analyte with **average RRF <0.05**

1. "R" all non-detects;

2. "J" all positive results.

13.3 Are response factors for base neutral or acid target analytes stable over the concentration range of the calibration (% Relative standard deviation [%RSD] < 20.0%)? ✓ ___ ___

NOTE: The % RSD for each individual Calibration Check Compound (CCC, Method 8270D-40 see Table 4) must be less than 30% before analysis can begin. If grater 30%, the lab must clean and recalibrate the instrument.

CALIBRATION CHECK COMPOUNDS

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol

YES NO N/A

Benzo(a)pyrene

ACTION: If the %RSD for any CCC >30% and no corrective action taken, then "J" qualify all positive hits and "UJ" qualify all non-detects.

ACTION: Circle all outliers in red.

ACTION: If the % RSD is ≥ 20.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non- detect results for that analyte "R," unusable. Alternatively, the lab should calculate first or second order regression fit of the calibration curve and select the fit which introduces the least amount of error.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

13.4 Did the laboratory calculate the calibration curve by the least squares regression fit? ___ ✓ ___

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) ___ ✓ ___

ACTION: Circle Errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

13.5 Do the target compounds for this SDG include Pesticides? ✓ ___ ___

YES NO N/A

13.6 If the pesticide compounds include DDT, was the percent breakdown of DDT to DDD and DDE greater than 20%? ___ ✓ ___

ACTION: If DDT percent breakdown exceeds 20%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE results are positive, qualify the quantitation limit for DDT as unusable, "R".

ii. Qualify all positive results for DDD and DDE as presumptively present at an approximate concentration "JN".

14.0 GC/MS Calibration Verification (Form VII/Equivalent)

14.1 Are the Calibration Verification Forms (Form VII) present and complete for all compounds of interest? ✓ ___ ___

14.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

_____

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed within twelve hours of every sample analysis,

YES NO N/A

call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

14.3 Do any of the SPCCs have an RRF <0.05? ___ ✓ ___

If YES, make a note in data assessment if the lab did not take corrective action specified in section 7.4.4, page 8270D-18. ✓ ___ ___

14.4 Do any of the CCCs have a %D between the initial and continuing RRF which exceeds 20.0%?

ACTION: If yes, make a note in data assessment.

14.5 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds 20.0%? ___ ✓ ___

ACTION: Circle all outliers in red.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is above 90%, qualify all non-detects for that analyte as "R", unusable.

14.6 Do any semivolatile compounds have a RRF < 0.05? ___ ✓ ___

ACTION: Circle all outliers in red.

ACTION: If RRF < 0.05, qualify as unusable ("R") associated non-detects and "J" associated positive values.

14.7 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or percent difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more). ___ ✓ ___

YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect(s) in the data assessments.

15.0 Internal Standards (Form VIII)

15.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to + 100%) for each continuing calibration? ✓ ___ ___

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area	LowerLimit	Upper Limit

(Attach additional sheets if necessary.)

Note: Check Table 5, 8270D-41 for associated analytes.

ACTION: i. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

ii. Non-detects associated with IS > 100% should not be qualified.

YES NO N/A

iii. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

15.2 Are the retention times of all internal standards within 30 seconds of the associated calibration standard? ☑ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

16.0 Laboratory Control Samples (LCS)

16.1 Were any LCS samples run in order to verify analytes which failed criteria for spike recovery? ☐ ✓ ___

16.2 Did the lab spike LCS sample spiked with the same analytes and the same concentrations as the matrix spike? ☐ ___ ✓

16.3 Were the mean and standard deviation of all analytes within the QC acceptance ranges as shown in Table 6, 8270D-43? ☑ ___ ___

ACTION: If the recovery of any analyte falls out of the designated range, the analytical results for that compound is suspect and should be qualified "J" in the unspiked samples.

17.0 Field Duplicates

17.1 Were any field duplicates submitted for semivolatile analysis? ☐ ✓ ___

YES NO N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

DataQual
Environmental Services, LLC

CH2M HILL-VBO
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

December 11, 2013
SDG# 1307037, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1307037. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24 and 8270D-Rev 4, August 2008-SOP #HW-22,), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA	SVOA
VEP4-GW13D-0713	1307037-01	water	X	X
VEP4-TB01-070213	1307037-02	water	X	
VEP4-EB01-070213	1307037-03	water	X	X

The following quality control samples were provided with this SDG: sample VEP4-EB01-070113- equipment blank and sample VEP4-TB01-070113- trip blank.

The samples were evaluated based on the following criteria:

- Data Completeness
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Field Duplicates NA
- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

No qualifications were required to the data.

SVOA

No qualifications were required to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were required as the raw data was not printed dark enough to read in the original package. The laboratory was contacted and updated pages were submitted.

Technical Holding Times

According to chain of custody records, sampling was performed on 7/2/13 and samples were received at the laboratory 7/3/13. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

SVOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U not detected above the reported sample quantitation limit
J estimated value
UJ reported quantitation limit is qualified as estimated
N analyte has been tentatively identified
JN analyte has been tentatively identified, estimated value
R result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.

U* The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.

RL** The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.

J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.
Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL reporting limit
PQL practical quantitation limit
IDL instrument detection limit
MDL method detection limit
CRDL contract required detection limit
CRQL contract required quantitation limit
\+ positive result
\- non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1307037

007

ANALYSIS DATA SHEET

VEP4-GW13D-071J

Laboratory: Empirical Laboratories, LLC — SDG: 1307037
Client: CH2M Hill, Inc — Project: Vieques East SWMU 20
Matrix: Water — Laboratory ID: 1307037-01 — File ID: 0703701.D
Sampled: 07/02/13 10:35 — Prepared: 07/05/13 19:03 — Analyzed: 07/05/13 19:03
Solids: — Preparation: 5030B — Dilution: 1
Batch: 3G05004 — Sequence: 3G18909 — Calibration: 3157003 — Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene	**0.780**	0.250	0.500	1.00	J
79-01-6	Trichloroethene	**48.8**	0.100	0.200	0.500	
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	26.62	88.7	75 - 120	
Dibromofluoromethane	30.00	32.17	107	85 - 115	
1,2-Dichloroethane-d4	30.00	30.07	100	70 - 120	
Toluene-d8	30.00	28.69	95.6	85 - 120	

MM 112413

ANALYSIS DATA SHEET

VEP4-TB01-070213

Laboratory: Empirical Laboratories, LLC — SDG: 1307037
Client: CH2M Hill, Inc — Project: Vieques East SWMU 20
Matrix: Water — Laboratory ID: 1307037-02 — File ID: 0703702.D
Sampled: 07/02/13 11:55 — Prepared: 07/08/13 12:25 — Analyzed: 07/08/13 12:25
Solids: — Preparation: 5030B — Dilution: 1
Batch: 3G08003 — Sequence: 3G19906 — Calibration: 3157003 — Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	26.22	87.4	75 - 120	
Dibromofluoromethane	30.00	32.48	108	85 - 115	
1,2-Dichloroethane-d4	30.00	30.40	101	70 - 120	
Toluene-d8	30.00	28.30	94.3	85 - 120	

MM 112413

ANALYSIS DATA SHEET

VEP4-EB01-070213

Laboratory: Empirical Laboratories, LLC — SDG: 1307037
Client: CH2M Hill, Inc — Project: Vieques East SWMU 20
Matrix: Water — Laboratory ID: 1307037-03 — File ID: 0703703.D
Sampled: 07/02/13 12:10 — Prepared: 07/08/13 12:53 — Analyzed: 07/08/13 12:53
Solids: — Preparation: 5030B — Dilution: 1
Batch: 3G08005 — Sequence: 3G19906 — Calibration: 3157003 — Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.54	91.8	75 - 120	
Dibromofluoromethane	30.00	32.98	110	85 - 115	
1,2-Dichloroethane-d4	30.00	30.59	102	70 - 120	
Toluene-d8	30.00	30.32	101	85 - 120	

MM 112413

ANALYSIS DATA SHEET

VEP4-GW13D-0713

Laboratory:	Empirical Laboratories, LLC	SDG:	1307037		
Client:	CH2M Hill, Inc.	Project:	Virginia East SWMU 20		
Matrix:	Water	Laboratory ID:	1307037-01	File ID:	0703703.D
Sampled:	07/02/13 10:35	Prepared:	07/08/13 14:15	Analyzed:	07/10/13 19:33
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3G07005	Sequence:	3G19201	Calibration:	3122001
				Instrument:	MS-BNA4

CAS NO	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.240	0.481	0.962	U
Total Target Analytes Reported: 1						

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	48.08	37.36	77.7	50 - 110	
Terphenyl-d14	48.08	41.26	85.8	50 - 135	
2,4,6-Tribromophenol	96.15	42.40	44.1	40 - 125	

1/12/13

ANALYSIS DATA SHEET

VEP4-EB01-070213

Laboratory:	Empirical Laboratories, LLC	SDG:	1307037		
Client:	CH2M Hill, Inc.	Project:	Virginia East SWMU 20		
Matrix:	Water	Laboratory ID:	1307037-03	File ID:	0703703.D
Sampled:	07/02/13 12:10	Prepared:	07/08/13 14:15	Analyzed:	07/10/13 20:00
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3G07005	Sequence:	3G19201	Calibration:	3122001
				Instrument:	MS-BNA4

CAS NO	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.250	0.500	1.00	U
Total Target Analytes Reported: 1						

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	50.00	32.72	65.4	50 - 110	
Terphenyl-d14	50.00	38.92	77.8	50 - 135	
2,4,6-Tribromophenol	100.0	79.50	79.5	40 - 125	

1/12/13

ELECTRONIC CHAIN OF CUSTODY RECORD

C.O.C. 20-130703-GW-EMP-01

PLEASE PRINT

EMPIRICAL
621 Mainstream Dr.
Suite 270
Nashville, TN 37228

phone: 615-345-1115

Report to: CH2MHILL
Company Name: 15010 Conference Dr. ; 200
Address: Chantilly, VA 20151
Attn: Mike Zamboni
Phone: 703.376.5301
Fax: 703.376.5801

Invoice to: See Contact
Company Name:
Address:
Attn:
Phone:
Fax:

Project: Name/Number: not required
Sampler (Print): not required
Purchase Order Number: 943380
Sampler (Signature):

Date Shipped: 07/02/13
Carrier: FedEx
Waybill No.: 7981403446039
Comments:

Sample Ident/Location	Date Collected	Time Collected	Time Zone	Matrix: Aq	Soil	Sed	Wipe	Analysis Requested/Method Number	
VEP4-GW13D-0713	7/2/13	10:35	AST	5			✓	1,4-Dioxane	MW-13D
~~VEP4-GW24-0713~~	7/2/13		AST	5			✓	1,4-Dioxane	MW-21
VEP4-TB01-070213	7/2/13	11:55	AST	2			✓	1,4-Dioxane	trip blank
VEP4-EB01-070213	7/2/13	12:10	AST	5			✓	1,4-Dioxane	equipment blank

Shipping Temperature:
Turnaround Requested: Check one: ☐ Emergency ☐ Rush ☐ One week ☐ Other
Sample Disposal: ☐ Return to client ☐ Disposal by lab ☐ Archive for ___ months
Relinquished by sampler: Date 7/2/13 Time 1415
Received by: Date Time
Relinquished by: Date Time
Received by: Date Time
Relinquished by: Date Time
Received by: Date 7/3/13 Time 0850
Received for lab by: not applicable

Note: The first sampled date of the ARF will be used as the COC number unless indicated otherwise.

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

EMPIRICAL LABORATORIES COOLER RECEIPT FORM

Cooler Received/Opened On: 07/03/13 @ 0830 Workorder# 1307037

1. Tracking # 4639 (last 4 digits, FedEx)
   Courier: FEDEX
2. Temperature of rep. sample or temp blank when opened: 2.5 °C + correction factor (0.0) = 2.5 °C
3. If item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA
4. Were custody seals on outside of cooler? YES NO NA
   If yes, how many and where: 2, 1 on front + 1 on back
5. Were the seals intact, signed, and dated correctly? YES NO NA
6. Were custody papers inside cooler? YES NO NA

I certify that I opened the cooler and answered questions 1-6 (initial) JG

7. Were custody seals on containers: YES NO and intact YES NO NA
   Were these signed and dated correctly? YES NO NA
8. Packing material used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry Ice Other None
10. Did all containers arrive in good condition (unbroken)? YES NO NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES NO NA
12. Did all container labels and tags agree with custody papers? YES NO NA
13. a. Were VOA vials received? YES NO NA
    b. Was there any observable headspace present in any VOA vial? JG 7/3/13 YES NO NA
14. Was there a Trip Blank in this cooler? YES NO NA If multiple coolers, sequence #: ____

I certify that I unloaded the cooler and answered questions 7-14 (initial) JG

15. a. Did pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES NO NA
    b. Did the bottle labels indicate that the correct preservatives were used YES NO NA
16. Was residual chlorine present? YES NO NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial) JG

17. Were custody papers properly filled out (ink, signed, etc)? YES NO NA
18. Did you sign the custody papers in the appropriate place? YES NO NA
19. Were correct containers used for the analysis requested? YES NO NA
20. Was sufficient amount of sample sent in each container? YES NO NA

I certify that I entered this project into LIMS and answered questions 17-20 (initial) JG

I certify that I attached a label with the unique LIMS number to each container (initial) JG

I certify that I have performed a second check of the LIMS information against the COC to confirm accuracy (initial) ____

21. Were there Non-Conformance issues at login? YES NO Was a NCR generated? YES NO #____

Additional Details:

C:\Documents and Settings\Emp\Desktop\Sec COR\cor.xls

Page 1 of 1

Sample Delivery Group Case Narrative

Receipt Information
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Changes to the Revision
Revision 01: The package was revised to replace the raw data that was not dark enough to be read in the original package.

Analytical Information
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:
The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

015

SW8260B:
No anomalies or deviations are noted.

SW8270D BNA:
No anomalies or deviations are noted.

016

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 1307037 LAB: Empirical

SITE NAME: Vieques SUMM 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓ __ __

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓ __ __

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ __ __

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. **VOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓ __ __

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓ __ __

1.3 Sample Conditions/Problems

- 6 VOA -

017

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? __ ✓ __

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? __ ✓ __

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

- 7 VOA -

018

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water [✓] ___ ___

b. Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water [✓] ___ ___

b. Soil [ ] ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. [✓] ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ [✓]

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] [✓] ___

If yes, were samples reanalyzed? [ ] ___ [✓]

Were method blanks reanalyzed? [ ] ___ [✓]

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] [✓] ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ [✓]

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] [✓] ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent)

No MS/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] ___ ___ ✓

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] ___ ✓

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month [page 8000C, section 9.5.])

a. Water [ ] ___ ✓

b. Waste [ ] ___ ✓

c. Soil/Solid [ ] ___ ✓

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [ ] ___ ✓

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ ✓

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? [✓] ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? [✓] ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? [✓] ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? [✓] ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. [ ] ✓ ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	≥ CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates [ ] ___ [✓]

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) [ ] ___ [✓]

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? [✓] ___ ___

YES NO N/A

Resolution? [✓] ___ ___

Peak shape? [✓] ___ ___

Full-scale graph (attenuation)? [✓] ___ ___

Other: _____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

No TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ [✓]

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ [✓]

b. Blanks [ ] ___ [✓]

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ [✓]

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ [✓]

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ [✓]

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] [✓] ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] [ ] [✓]

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] [ ] [ ]

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? [✓] [ ] [ ]

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39) qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? [✓] [ ] [ ]

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. [ ] [✓] [ ]

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? [✓] [ ] [ ]

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) [ ] [✓] [ ]

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? [✓] [ ] [ ]

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? [✓] [ ] [ ]

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? [✓] [ ] [ ]

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). [ ] [✓] [ ]

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? ___ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? ___ ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:
1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.
2. Do not qualify non-detects when the associated IS are counts area > + 100%.
3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".
4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ___ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ___ ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

SAMPLE CALCULATION

Sample ID: VEPA-GW13D-0713
Standard ID: 7/5/2013
Compound: tetrachloroethene
Concnetration: 0.78 ug/L

	Water (ug/L)	Soil (ug/Kg)	Soil ug/Kg)
Area of Compound	7618		
Area of Internal STD	439622		
Conc. of Internal (ng)	150	250	
RRF of Compound	0.6698359		
Dilution Factor	1	1	
Weight of Sample	NA		
Volume of Sample	5	NA	
% Moisture	NA		
Aliquot of sample	NA	NA	
Concentration	0.78	#DIV/0!	#DIV/0!

	RT of Internal STD	RT of Compound	RRT
Sample	10.940	10.320	0.943
Standard	10.940	10.330	0.944

YES NO N/A

E – The concentration of this analyte exceeds the calibration range of the instrument.

A – Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 1307037 LAB: Empirical

SITE NAME: Vieques SWMU 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format? ☑ ___ ___

ACTION: If not, note the effect on review of the data in the data assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative or cover letter present? ☑ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ☑ ___ ___

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YES NO N/A

II. SEMIVOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? ☑ ___ ___

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ☑ ___

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, all non-detects data are qualified as unusable (R), and detects are flagged "J".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (10°C), flag all positive results "J" and all non-detects "UJ". t 25°C

2.0 Holding Times

2.1 Have any semivolatile technical holding times, determined from date of collection to date of extraction, been exceeded? ___ ☑ ___

Continuous extraction of water samples for semivolatile analysis must be started within 7 days of the date of collection. Soil/sediment samples must be extracted within 14 days of collection. Extracts must be analyzed within

YES NO N/A

40 days of the date of extraction.

Table of Holding Time Violations

Sample ID	Sample Matrix	Date Sampled	Date Lab Received (See Traffic Report)	Date Extracted	Date Analyzed

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

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YES NO N/A

3.0 Surrogate Recovery (Form II/Equivalent)

3.1 Have the semi volatile surrogate recoveries been listed on CLP Surrogate Recovery forms (Form II) for each of the following matrices:

a. Low Water ☑ ___ ___

b. Low/Med Soil ☐ ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery Summary forms for each matrix:

a. Low Water ☑ ___ ___

b. Low/Med Soil ☐ ___ ___

ACTION: If CLP deliverables are unavailable, document the effect(s) in data assessments. In some cases the lab may have to be contacted to obtain the data necessary to complete the validation.

3.3 Were outliers marked correctly with an asterisk? ☐ ___ ☑

ACTION: Circle all outliers in red.

3.4 Were two or more base neutral OR acid surrogate recoveries out of specification for any sample or method blank (Reviewer should use lab in house recovery limits. Use surrogate recovery limits from USEPA National Functional Guidlines January 2005 page 130, if in house limits are not available. See Method 8000B-43 or 8000C-24). ☐ ☑ ___

Note: Examine lab in house limits for reasonableness.

If yes, were samples re-analyzed? ☐ ___ ☑

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YES NO N/A

Were method blanks re-analyzed? [ ] ___ ✓

ACTION: If all surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet method specifications, for the affected fraction only (i.e. either base-neutral or acid compounds):

1. Flag all positive results as estimated ("J").

2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.

3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Positive results for the fraction with < 10% surrogate recovery are qualified with "J".

2. Non-detects for that fraction should be qualified as unusable (R) .

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ ✓ ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document

YES NO N/A

effect in data assessments.

4.0 Matrix Spikes (Form III/Equivalent)

No MS/MSD

4.1 Have the semivolatile Matrix Spike and Matrix Spike Duplicate/or duplicate unspiked Sample recoveries been listed on the Recovery Form (Form III)? [ ] ___ ✓

NOTE: Method 3500B/page 4 states the spiking compounds:

Base/neutrals	Acids
1,2,4-Trichlorobenzene	Pentachlorophenol
Acenaphthene	Phenol
2,4-Dinitrotoluene	2-Chlorophenol
Pyrene	4-Chloro-3-methylphenol
N-Nitroso-di-n-propylamine	4-Nitrophenol
1,4-Dichlorobenzene	

Note: Some projects may require the spiking of specific compounds of interest.

Note: See Method 8270D-sec 8.4.2 for deciding on whether to prepare and analyze duplicate samples or a martix spike/matrix spike duplicate. If samples are expected to contain target analytes, then laboratory may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratory should use a matrix spike and matrix spike duplicate pair.

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water [ ] ___ ✓

b. Low Solid [ ] ___ ✓

c. Med Solid [ ] ___ ✓

YES NO N/A

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. It may be necessary to contact the lab to obtain the required data.

NOTE: If the data has not been reported on CLP equivalent form, then the laboratory must provide the information necessary to evaluate the spike recoveries in the MS and MSD. The required data which should have been provided by the lab include the analytes and concentrations used for spiking, background concentrations of the spiked analytes (i.e., concentrations in unspiked sample), methods and equations used to calculate the QC acceptance criteria for the spiked analytes, percent recovery data for all spiked analytes.

The data reviewer must verify that all reported equations and percent recoveries are correct before proceeding to the next section.

4.3 Were matrix spikes performed at concentration equal to 100ug/L for acid compounds, and 200ug/l for base compounds (Method 3500B-4), or those specified in project plan. [ ] ___ ✓

4.4 How many semivolatile spike recoveries are outside Laboratory in house MS/MSD recovery limits (use recovery limits values in Method 8270D-43&44 Table 6 if in house values not available).

Water	Solids
___ out of ___	___ out of ___

YES NO N/A

4.5 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water	Solids
___ out of ___	___ out of ___

ACTION: Circle all outliers with red pencil.

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria to determine the need for some qualification of the data.

4.6 Was a Laboratory Control Sample (LCS) analyzed with each analytical batch? ✓ ___ ___

NOTE: When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

5.0 Blanks (Form IV/Equivalent)

5.1 Is the Method Blank Summary (Form IV) present? ✓ ___ ___

5.2 Frequency of Analysis:

Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? ✓ ___ ___

5.3 Has a method blank been analyzed either after

YES NO N/A

the calibration standard or at any other time during the analytical shift for each GC/MS system used ? ✓

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, use professional judgement to determine if the associated sample data should be qualified.

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for the semivolatiles? ✓

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ✓

6.2 Do any field/rinse/ blanks have positive results for target analytes and/or TICs (if required, see section 10 below)? ✓

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field Blanks must be qualified for outlying surrogates, poor spectra, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify sample results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

YES NO N/A

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	≥ CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

NOTE: If the laboratory did not report TIC analyses, check the project plans to verify whether or not it was required.

6.3 Are there field/rinse/equipment blanks associated with every sample? ✓

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

6.4 Was a instrument blank analyzed after each sample/dilution which contained a target compound

YES NO N/A

that exceeded the initial calibration range. ✓

6.5 Does the instrument blank have positive results for target analytes and/or TICs? ✓

Note: Use professional judgement to determine if carryover occurred and qualify analytes accordingly.

7.0 GC/MS Apparatus and Materials

7.1 Did the lab use the proper gas chromatographic column for analysis of semivolatiles by Method 8270D? Check raw data, instrument logs or contact the lab to determine what type of column was used. The method requires the use of 30 m x 0.25 mm ID (or 0.32 mm ID), silicone-coated, fused silica, capillary column. ✓

ACTION: If the specified column, or equivalent, was not used, document the effects in the data assessment. Use professional judgement to determine the acceptability of the data.

8.0 GC/MS Instrument Performance Check (Form V/Equivalent)

8.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)? ✓

NOTE: The performance solution should also contain 4,4-DDT, pentachlorophenol, and benzidine to verify injection port inertness and column performance. The degradation of DDT to DDE and DDD must be less than 20% total and the response of pentachlorophenol and benzidine should be within normal ranges for these compounds (based upon lab experience) and show no peak degradation or tailing before samples are analyzed. (see section 5.5

YES NO N/A

page 8270D-12).

8.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? [✓] ___ ___

8.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument? [✓] ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

8.4 Have the ion abundances been normalized to m/z 198? [✓] ___ ___

8.5 Have the ion abundance criteria been met for each instrument used? [✓] ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

YES NO N/A

ACTION: If ion abundance criteria are not met, take action specified in section 3.2

8.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.) ___ [✓] ___

8.7 Have the appropriate number of significant figures (two) been reported? [✓] ___ ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.

8.8 Are the spectra of the mass calibration compound acceptable? [✓] ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

9.0 Target Analytes

9.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates [ ] ___ [✓]

c. Blanks [✓] ___ ___

9.2 Has any special cleanup, such as GPC, been performed on all soil/sediment sample extracts (see section 7.2, page 8270D-14)? [ ] ___ [✓]

YES NO N/A

ACTION: If data suggests that extract cleanup was not performed, use professional judgement. Make note in the data assessment narrative.

9.3 Are the Reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) [✓] ___ ___

c. Blanks [✓] ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

9.4 Are the response factors shown in the Quant Report? [✓] ___ ___

9.5 Is chromatographic performance acceptable with respect to:

Baseline stability? [✓] ___ ___

Resolution? [✓] ___ ___

Peak shape? [✓] ___ ___

Full-scale graph (attenuation)? [✓] ___ ___

Other:_____ [ ] ___ ___

ACTION: Use professional judgement to determine the acceptability of the data.

9.6 Are the lab-generated standard mass spectra of identified semivolatile compounds present for

YES NO N/A

each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the data assessment narrative. If spectra are missing, reject all positive data.

9.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

9.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

9.9 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 9.7, 9.8, and 9.9.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

YES NO N/A

10.0 Tentatively Identified Compounds (TIC)

10.1 If Tentatively Identified Compounds were required for this project, are all Form Is, Part B present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier?

NO TICs

NOTE: Review sampling reports to determine if the lab was required to identify non target analytes (refer to section 7.6.2,page 8270D-21).

10.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following: [ ] ___ ✓

a. Samples and/or fractions as appropriate [ ] ___ ✓

b. Blanks [ ] ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by CAS #.

10.3 Are any target compounds from one fraction listed as TIC compounds in another (e.g., an acid compound listed as a base neutral TIC)? ___ [ ] ✓

ACTION: i. Flag with "R" any target compound listed as a TIC.

ii. Make sure all rejected compounds are properly reported in the other fraction.

10.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the

YES NO N/A

sample mass spectrum? [ ] ___ ✓

10.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate and remove "JN". Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R."

11.0 Compound Quantitation and Reported Detection Limits

11.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found? ___ ✓ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

11.2 Are the method detection limits adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ ✓

YES NO N/A

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I (if present) and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red " X" across the entire page of all Form I's that should not be used, including any in the summary package.

12.0 Standards Data (GC/MS)

12.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration? ✓ ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

13.0 GC/MS Initial Calibration (Form VI/Equivalent)

13.1 Is the Initial Calibration Form (Form VI/ Equivalent) present and complete for the semivolatile fraction? ✓ ___ ___

ACTION: If any calibration forms or standard row data are missing, take action specified in 3.2 above.

13.2 Are all base neutral or acid RRFs > 0.050? ✓ ___ ___

YES NO N/A

Check the **average RRFs** of the four System Performance Check Compounds (SPCCs): N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. These compounds must have **average RRFs** greater than or equal to 0.05 before running samples and should not show any peak tailing.

ACTION: Circle all outliers in red.

ACTION: For any target analyte with **average RRF <0.05**

1. "R" all non-detects;

2. "J" all positive results.

13.3 Are response factors for base neutral or acid target analytes stable over the concentration range of the calibration (% Relative standard deviation [%RSD] < 20.0%)? ✓ ___ ___

NOTE: The % RSD for each individual Calibration Check Compound (CCC, Method 8270D-40 see Table 4) must be less than 30% before analysis can begin. If grater 30%, the lab must clean and recalibrate the instrument.

CALIBRATION CHECK COMPOUNDS

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol

YES NO N/A

Benzo(a)pyrene

ACTION: If the %RSD for any CCC >30% and no corrective action taken, then "J" qualify all positive hits and "UJ" qualify all non-detects.

ACTION: Circle all outliers in red.

ACTION: If the % RSD is ≥ 20.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non- detect results for that analyte "R," unusable. Alternatively, the lab should calculate first or second order regression fit of the calibration curve and select the fit which introduces the least amount of error.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

13.4 Did the laboratory calculate the calibration curve by the least squares regression fit? ___ ✓ ___

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) ___ ✓ ___

ACTION: Circle Errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

13.5 Do the target compounds for this SDG include Pesticides? ___ ✓ ___

YES NO N/A

13.6 If the pesticide compounds include DDT, was the percent breakdown of DDT to DDD and DDE greater than 20%? ___ ___ ✓

ACTION: If DDT percent breakdown exceeds 20%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE results are positive, qualify the quantitation limit for DDT as unusable, "R".

ii. Qualify all positive results for DDD and DDE as presumptively present at an approximate concentration "JN".

14.0 GC/MS Calibration Verification (Form VII/Equivalent)

14.1 Are the Calibration Verification Forms (Form VII) present and complete for all compounds of interest? ✓ ___ ___

14.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

ACTION: If any forms are missing or no calibration verification standard has been analyzed within twelve hours of every sample analysis,

YES NO N/A

call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

14.3 Do any of the SPCCs have an RRF <0.05? ___ ✓ ___

If YES, make a note in data assessment if the lab did not take corrective action specified in section 7.4.4, page 8270D-18. ___ ✓ ___

14.4 Do any of the CCCs have a %D between the initial and continuing RRF which exceeds 20.0%?

ACTION: If yes, make a note in data assessment.

14.5 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds 20.0%? ___ ✓ ___

ACTION: Circle all outliers in red.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is above 90%, qualify all non-detects for that analyte as "R", unusable.

14.6 Do any semivolatile compounds have a RRF < 0.05? ___ ✓ ___

ACTION: Circle all outliers in red.

ACTION: If RRF < 0.05, qualify as unusable ("R") associated non-detects and "J" associated positive values.

14.7 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or percent difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more). ___ ✓ ___

YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect(s) in the data assessments.

15.0 Internal Standards (Form VIII)

15.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to + 100%) for each continuing calibration? ✓ ___ ___

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area	LowerLimit	Upper Limit

(Attach additional sheets if necessary.)

Note: Check Table 5, 8270D-41 for associated analytes.

ACTION: i. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

ii. Non-detects associated with IS > 100% should not be qualified.

YES NO N/A

iii. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

15.2 Are the retention times of all internal standards within 30 seconds of the associated calibration standard? ✓

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

16.0 Laboratory Control Samples (LCS)

16.1 Were any LCS samples run in order to verify analytes which failed criteria for spike recovery? ✓

16.2 Did the lab spike LCS sample spiked with the same analytes and the same concentrations as the matrix spike? ✓

16.3 Were the mean and standard deviation of all analytes within the QC acceptance ranges as shown in Table 6, 8270D-43? ✓

ACTION: If the recovery of any analyte falls out of the designated range, the analytical results for that compound is suspect and should be qualified "J" in the unspiked samples.

17.0 Field Duplicates

17.1 Were any field duplicates submitted for semivolatile analysis? ✓

YES NO N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

DataQual
Environmental Services, LLC

CH2M HILL-VBO
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

December 9, 2013
SDG# 1307148, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1307148. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24 and 8270D-Rev 4, August 2008-SOP #HW-22,), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA	SVOA
VEP4-GW21-0713	1307148-01	water	X	X
VEP4-EB01-071613	1307148-02	water	X	X
VEP4-TB01-071613	1307148-03	water	X	

The following quality control samples were provided with this SDG: sample VEP4-EB01-071613 - equipment blank and sample VEP4-TB01-071613- trip blank.

The samples were evaluated based on the following criteria:

- Data Completeness
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Field Duplicates NA
- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

Due to high %D in the continuing calibration, qualifications were added to the data.

SVOA

No qualifications were required to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were required as the raw data was not printed dark enough to read in the original package. The laboratory was contacted and updated pages were submitted.

Technical Holding Times

According to chain of custody records, sampling was performed on 7/16/13 and samples were received at the laboratory 7/16/13. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

Initial/Continuing Calibration

VOA

Calibration standards exhibited %Ds that were non-compliant. A summary of these non-compliances and affected samples are noted in the following table. Sample results were qualified as indicated.

Standard ID	Compound(s)	%D	Samples	Q Flag	Qual Code
CC 7/22/13	vinyl chloride	25.5	all samples	J/UJ	CCH

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
all samples	vinyl chloride	+/-	J/UJ	CCH

SVOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U not detected above the reported sample quantitation limit
J estimated value
UJ reported quantitation limit is qualified as estimated
N analyte has been tentatively identified
JN analyte has been tentatively identified, estimated value
R result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.

U* The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.

RL** The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.

J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.
Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL reporting limit
PQL practical quantitation limit
IDL instrument detection limit
MDL method detection limit
CRDL contract required detection limit
CRQL contract required quantitation limit
+ positive result
- non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1307148

007

ANALYSIS DATA SHEET

VEP4-GW21-0713

Laboratory: Empirical Laboratories, LLC — SDG: 1307148
Client: CH2M Hill, Inc. — Project: Vieques East SWMU 20
Matrix: Water — Laboratory ID: 1307148-03 — File ID: 0714801.D
Sampled: 07/16/13 11:25 — Prepared: 07/22/13 23:27 — Analyzed: 07/22/13 23:27
Solids: — Preparation: 5030B — Dilution: 1
Batch: 3G22033 — Sequence: 3G20429 — Calibration: 3197002 — Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene	6.80	0.100	0.200	0.500	
75-01-4	Vinyl chloride		0.140	0.200	0.500	~~UX~~ UJ CCH

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.03	96.8	75 - 120	
Dibromofluoromethane	30.00	29.04	96.8	85 - 115	
1,2-Dichloroethane-d4	30.00	30.82	103	70 - 120	
Toluene-d8	30.00	30.38	101	85 - 120	

MM 112013

009

ANALYSIS DATA SHEET

VEP4-EB01-071613

Laboratory: Empirical Laboratories, LLC — SDG: 1307148
Client: CH2M Hill, Inc. — Project: Vieques East SWMU 20
Matrix: Water — Laboratory ID: 1307148-02 — File ID: 0714802.D
Sampled: 07/16/13 12:00 — Prepared: 07/22/13 22:32 — Analyzed: 07/22/13 22:32
Solids: — Preparation: 5030B — Dilution: 1
Batch: 3G22033 — Sequence: 3G20429 — Calibration: 3197002 — Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	~~UX~~ UJ CCH

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.95	93.2	75 - 120	
Dibromofluoromethane	30.00	29.40	98.0	85 - 115	
1,2-Dichloroethane-d4	30.00	31.16	104	70 - 120	
Toluene-d8	30.00	29.32	97.7	85 - 120	

MM 112013

004

ANALYSIS DATA SHEET

VEP4-TB01-071613

Laboratory: Empirical Laboratories, LLC — SDG: 1307148
Client: CH2M Hill, Inc. — Project: Vieques East SWMU 20
Matrix: Water — Laboratory ID: 1307148-04 — File ID: 0714803.D
Sampled: 07/16/13 12:50 — Prepared: 07/22/13 22:59 — Analyzed: 07/22/13 22:59
Solids: — Preparation: 5030B — Dilution: 1
Batch: 3G22033 — Sequence: 3G20429 — Calibration: 3197002 — Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	~~UX~~ UJ CCH

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.67	92.2	75 - 120	
Dibromofluoromethane	30.00	29.03	96.8	85 - 115	
1,2-Dichloroethane-d4	30.00	29.78	99.3	70 - 120	
Toluene-d8	30.00	29.29	97.6	85 - 120	

MM 112013

010

ANALYSIS DATA SHEET

VEP4-GW21-0713

Laboratory:	Empirical Laboratories, LLC		SDG:	1307148	
Client:	CH2M Hill, Inc.		Project:	Vinyard East SWMU 20	
Matrix:	Water	Laboratory ID:	1307148-01	File ID:	0714801.D
Sampled:	07/16/13 11:25	Prepared:	07/18/13 15:45	Analyzed:	07/25/13 11:01
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3G17024	Sequence:	3G20619	Calibration:	1122001
				Instrument:	MS-BNA4

CAS NO	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.248	0.495	0.990	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	49.50	39.61	80.0	50 - 110	
Terphenyl-d14	49.50	43.12	87.1	50 - 135	

011

ANALYSIS DATA SHEET

VEP4-EB01-071613

Laboratory:	Empirical Laboratories, LLC		SDG:	1307148	
Client:	CH2M Hill, Inc.		Project:	Vinyard East SWMU 20	
Matrix:	Water	Laboratory ID:	1307148-02	File ID:	0714802.D
Sampled:	07/16/13 12:00	Prepared:	07/18/13 15:45	Analyzed:	07/25/13 11:29
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3G17024	Sequence:	3G20619	Calibration:	1122001
				Instrument:	MS-BNA4

CAS NO	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.238	0.476	0.952	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	47.62	37.55	78.9	50 - 110	
Terphenyl-d14	47.62	40.53	85.1	50 - 135	

01

10

1307148 Summ Package

ELECTRONIC CHAIN OF CUSTODY RECORD

C.O.C. 20130716-GW-EMP-01

PLEASE PRINT

EMPIRICAL
621 Mainstream Dr.
Suite 270
Nashville, TN 37228

phone: 615-34. 1115

Report to: PLEASE PRINT
Company Name: CH2MHILL
Address: 15010 Conference Dr. ; 200
Chantilly, VA 20151
Attn: Mike Zamboni
Phone: 703.376.5301
Fax: 703.376.5801

Invoice to:
Company Name: See Contact
Address:
Attn:
Phone:
Fax:

Project Name/Number: not required
Sampler (Print): not required
Purchase Order Number: 943380
Sampler (Signature): not required

Date Shipped: 07/16/13
Carrier: FedEx
Waybill No.: 796238697942
Comments:

Analysis Requested/Method Number

Sample Identification	Location	Date Collected	Time Collected	Line Item	Matrix: W	Soil	Sed.	by	No. of Containers	Analysis Requested/Method Number	Comments
VEP4-GW21-0713		7/16/13	11:25	AST	✓				5		MW-21
VEP4-EB01-071613		7/16/13	12:00	AST	✓				5		equipment blank
VEP4-TB01-071613		7/16/13	12:50	AST	✓				2		trip blank

Shuttle Temperature:

Sample Disposal: ☐ Return to client ☐ Disposed by Lab (after 60 days) ☐ Other: not applicable

Temperature Requested: Check one ☐ Standard 2-3 wk ☐ One week ☐ 24-48 Hrs ☐ Other

Relinquished by: Date 7/16/13 Time 1500 Received by: Date Time
Relinquished by: Date Time Received by: Date Time
Relinquished by: Date Time Received by: Date Time
Relinquished by: Date Time Received by: Date Time
Relinquished by: Date Time Received by: Date Time
Relinquished by: Date Time Received by: Date Time
Relinquished by: Date Time Received by: Date Time
Relinquished by: Date Time Received lab by: 7/17/13 0830

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

Note: The first sampled date of the ARF will be used as the COC number unless indicated otherwise.

1307148

EMPIRICAL LABORATORIES COOLER RECEIPT FORM

Cooler Received/Opened On: 07/17/13 @ 0830

Workorder# 1307148

1. Tracking # 7942 (last 4 digits, FedEx)
   Courier: FEDEX
2. Temperature of rep. sample or temp blank when opened: 0.1 °C + correction factor (0.0) = 0.1 °C
3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA
4. Were custody seals on outside of cooler? YES NO NA
   If yes, how many and where: 2, 1 on front + 1 on back
5. Were the seals intact, signed, and dated correctly? YES NO NA
6. Were custody papers inside cooler? YES NO NA

I certify that I opened the cooler and answered questions 1-6 (initial) JG

7. Were custody seals on containers: YES NO and intact YES NO NA
   Were these signed and dated correctly? YES NO NA
8. Packing material used: Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry Ice Other None
10. Did all containers arrive in good condition (unbroken)? YES NO NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES NO NA
12. Did all container labels and tags agree with custody papers? YES NO NA
13. a. Were VOA vials received? YES NO NA
    b. Was there any observable headspace present in any VOA vial? YES NO NA
14. Was there a Trip Blank in this cooler? YES NO NA If multiple coolers, sequence # ____

I certify that I unloaded the cooler and answered questions 7-14 (initial) R

15. a. Are pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES NO NA
    b. Did the bottle labels indicate that the correct preservatives were used YES NO NA
16. Was residual chlorine present? YES NO NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial) R

17. Were custody papers properly filled out (ink, signed, etc)? YES NO NA
18. Did you sign the custody papers in the appropriate place? YES NO NA
19. Were correct containers used for the analysis requested? YES NO NA
20. Was sufficient amount of sample sent in each container? YES NO NA

I certify that I entered this project into LIMS and answered questions 17-20 (initial) R

I certify that I attached a label with the unique LIMS number to each container (initial) R

I certify that I have performed a second check of the LIMS information against the COC to confirm accuracy (initial) R

21. Were there Non-Conformance issues at login? YES NO Was a NCR generated? YES NO #____

Additional Details:

C:\Documents and Settings\bwright\Desktop\New CRF.doc\.doc

Page 1 of 1

014

Sample Delivery Group Case Narrative

Receipt Information
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Changes to the Revision
Revision 01: The package was revised to replace the raw data that was not dark enough to be read in the original package.

Analytical Information
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:
The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

015

SW8260B:
The following continuing calibration verifications exceeded criteria:
3G20429-CCV1 with a positive bias for Vinyl Chloride

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

SW8270D BNA:
No anomalies or deviations are noted.

016

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 1307148 LAB: Empirical

SITE NAME: Vieques SWM 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ☑ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ☑ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ☑ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. VOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ☑ ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ☑ ___ ___

1.3 Sample Conditions/Problems

017

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ☑ ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

A 7/10/18 A 7/22
A 7/16 A 0.1°C

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ ☑ ___

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

018

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water [✓] ___ ___

b. Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water [✓] ___ ___

b. Soil [ ] ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. lab [✓] ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ [✓]

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] [✓] ___

If yes, were samples reanalyzed? [ ] ___ [✓]

Were method blanks reanalyzed? [ ] ___ [✓]

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] [✓] ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ [✓]

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] [✓] ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent)

No MS/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] ___ ___

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] ___ ___

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month (page 8000C, section 9.5.1)

a. Water [ ] ___ ✓

b. Waste [ ] ___ ✓

c. Soil/Solid [ ] ___ ✓

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [ ] ___ ✓

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ ✓

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? [✓] ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? [✓] ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? [✓] ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? [✓] ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. [ ] ___ ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

VEP4-TB01 071613
VEP4-EB01-071613 7ug/L

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	≥ CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	≥ CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone
** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates [ ] ___ [✓]

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) [ ] ___ [✓]

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? [✓] ___ ___

YES NO N/A

Resolution? [✓] ___ ___

Peak shape? [✓] ___ ___

Full-scale graph (attenuation)? [✓] ___ ___

Other: _____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reportec compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ [✓]

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ [✓]

b. Blanks [ ] ___ [✓]

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ [✓]

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ [✓]

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ [✓]

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] [✓] ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? ___ ___ ✓

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? ✓ ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? ✓ ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39)qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. ✓ ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) ___ ✓ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? ✓ ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). ✓ ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ANALYSIS SEQUENCE SUMMARY
SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	1307148
Client:	CH2M Hill, Inc.	Project:	Vieques East SWMU 20
Sequence:	3G20429	Instrument:	MS-VOA4
Calibration:	3197002		

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
MS Tune	3G20429-TUN1	0722TUNE.D	07/22/13 19:17
Calibration Check	3G20429-CCV1	0722CCVE.D	07/22/13 19:45
LCS	3G22033-BS1	0722LCSE.D	07/22/13 20:13
Blank	3G22033-BLK1	0722BLKE.D	07/22/13 22:04
VEP4-EB01-071613	1307148-02	0714802.D	07/22/13 22:32
VEP4-TB01-071613	1307148-03	0714803.D	07/22/13 22:59
VEP4-GW21-0713	1307148-01	0714801.D	07/22/13 23:27

039

CONTINUING CALIBRATION CHECK
SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	1307148
Client:	CH2M Hill, Inc.	Project:	Vieques East SWMU 20
Instrument ID:	MS-VOA4	Calibration:	3197002
Lab File ID:	0722CCVE.D	Calibration Date:	07/14/13 04:13
Sequence:	3G20429	Injection Date:	07/22/13
Lab Sample ID:	3G20429-CCV1	Injection Time:	19:45

COMPOUND	TYPE	CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
		STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT (%)
1,1-Dichloroethane	A	100.0	103.3	0.2465185	0.2546958		3.3	20
cis-1,2-Dichloroethene	A	100.0	98.25	0.3021903	0.2968973		-1.8	20
trans-1,2-Dichloroethene	A	100.0	101.7	0.2776047	0.2823507		1.7	20
Tetrachloroethene	A	100.0	114.7	0.7212722	0.8274475		14.7	20
Trichloroethene	A	100.0	97.49	0.2848513	0.2776983		-2.5	20
Vinyl chloride	A	100.0	125.5	0.1923252	0.2413471		25.5 *	20
Bromofluorobenzene	A	30.00	30.17	0.9107961	0.9159295		0.6	20
Dibromofluoromethane	A	30.00	28.87	0.2934799	0.2824468		-3.8	20
1,2-Dichloroethane-d4	A	30.00	29.83	5.961142E-02	5.926932E-02		-0.6	20
Toluene-d8	A	30.00	30.57	2.402477	2.448341		1.9	20

JMS

040

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? IM ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds in section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? IM ___ ___

041

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:
1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.
2. Do not qualify non-detects when the associated IS are counts area > + 100%.
3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".
4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? IM ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

042

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ___ ✓ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

YES NO N/A

E - The concentration of this analyte exceeds the calibration range of the instrument.

A - Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 136 7148 LAB: Compuchem

SITE NAME: Vieques Sonna 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the data assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative or cover letter present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

YES NO N/A

II. SEMIVOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? ✓ ___ ___

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, all non-detects data are qualified as unusable (R), and detects are flagged "J".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (10°C), flag all positive results "J" and all non-detects "UJ". 7/16/18 7/18 7/19 7/20

2.0 Holding Times

2.1 Have any semivolatile technical holding times, determined from date of collection to date of extraction, been exceeded? ___ ✓ ___

Continuous extraction of water samples for semivolatile analysis must be started within 7 days of the date of collection. Soil/sediment samples must be extracted within 14 days of collection. Extracts must be analyzed within

YES NO N/A

40 days of the date of extraction.

Table of Holding Time Violations

(See Traffic Report)

Sample ID	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted	Date Analyzed

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

YES NO N/A

3.0 Surrogate Recovery (Form II/Equivalent)

3.1 Have the semi volatile surrogate recoveries been listed on CLP Surrogate Recovery forms (Form II) for each of the following matrices:

a. Low Water [✓] ___ ___

b. Low/Med Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery Summary forms for each matrix:

a. Low Water [✓] ___ ___

b. Low/Med Soil [ ] ___ ___

ACTION: If CLP deliverables are unavailable, document the effect(s) in data assessments. In some cases the lab may have to be contacted to obtain the data necessary to complete the validation.

3.3 Were outliers marked correctly with an asterisk? [ ] ___ [✓]

ACTION: Circle all outliers in red.

3.4 Were two or more base neutral OR acid surrogate recoveries out of specification for any sample or method blank (Reviewer should use lab in house recovery limits. Use surrogate recovery limits from USEPA National Functional Guidlines January 2005 page 130, if in house limits are not available. See Method 8000B-43 or 8000C-24). [ ] [✓] ___

Note: Examine lab in house limits for reasonableness.

If yes, were samples re-analyzed? [ ] ___ [✓]

041

YES NO N/A

Were method blanks re-analyzed? [ ] ___ [✓]

ACTION: If all surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet method specifications, for the affected fraction only (i.e. either base-neutral or acid compounds):

1. Flag all positive results as estimated ("J").

2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.

3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Positive results for the fraction with < 10% surrogate recovery are qualified with "J".

2. Non-detects for that fraction should be qualified as unusable (R) .

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ [✓] ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document

041

YES NO N/A

effect in data assessments.

4.0 Matrix Spikes (Form III/Equivalent)

No MS/MSD

4.1 Have the semivolatile Matrix Spike and Matrix Spike Duplicate/or duplicate unspiked Sample recoveries been listed on the Recovery Form (Form III)? [ ] ___ [✓]

NOTE: Method 3500B/page 4 states the spiking compounds:

Base/neutrals	Acids
1,2,4-Trichlorobenzene	Pentachlorophenol
Acenaphthene	Phenol
2,4-Dinitrotoluene	2-Chlorophenol
Pyrene	4-Chloro-3-methylphenol
N-Nitroso-di-n-propylamine	4-Nitrophenol
1,4-Dichlorobenzene	

Note: Some projects may require the spiking of specific compounds of interest.

Note: See Method 8270D-sec 8.4.2 for deciding on whether to prepare and analyze duplicate samples or a martix spike/matrix spike duplicate. If samples are expected to contain target analytes, then laboratory may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratory should use a matrix spike and matrix spike duplicate pair.

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water [ ] ___ [✓]

b. Low Solid [ ] ___ [✓]

c. Med Solid [ ] ___ [✓]

041

YES NO N/A

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. It may be necessary to contact the lab to obtain the required data.

NOTE: If the data has not been reported on CLP equivalent form, then the laboratory must provide the information necessary to evaluate the spike recoveries in the MS and MSD. The required data which should have been provided by the lab include the analytes and concentrations used for spiking, background concentrations of the spiked analytes (i.e., concentrations in unspiked sample), methods and equations used to calculate the QC acceptance criteria for the spiked analytes, percent recovery data for all spiked analytes.

The data reviewer must verify that all reported equations and percent recoveries are correct before proceeding to the next section.

4.3 Were matrix spikes performed at concentration equal to 100ug/L for acid compounds, and 200ug/l for base compounds (Method 3500B-4), or those specified in project plan. [ ] ___ [✓]

4.4 How many semivolatile spike recoveries are outside Laboratory in house MS/MSD recovery limits (use recovery limits values in Method 8270D-43&44 Table 6 if in house values not available).

Water	Solids
___ out of ___	___ out of ___

051

YES NO N/A

4.5 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water ____ out of ____

Solids ____ out of ____

ACTION: Circle all outliers with red pencil.

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria to determine the need for some qualification of the data.

4.6 Was a Laboratory Control Sample (LCS) analyzed with each analytical batch? ✓ ___ ___

NOTE: When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

5.0 Blanks (Form IV/Equivalent)

5.1 Is the Method Blank Summary (Form IV) present? ✓ ___ ___

5.2 Frequency of Analysis:

Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? ✓ ___ ___

5.3 Has a method blank been analyzed either after

YES NO N/A

the calibration standard or at any other time during the analytical shift for each GC/MS system used ? ✓ ___ ✓

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, use professional judgement to determine if the associated sample data should be qualified.

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for the semivolatiles? ✓ ___ ___

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ✓ ___

6.2 Do any field/rinse/ blanks have positive results for target analytes and/or TICs (if required, see section 10 below)? ___ ✓ ___

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field Blanks must be qualified for outlying surrogates, poor spectra, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify sample results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

YES NO N/A

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

NOTE: If the laboratory did not report TIC analyses, check the project plans to verify whether or not it was required.

6.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

6.4 Was a instrument blank analyzed after each sample/dilution which contained a target compound

	YES	NO	N/A
that exceeded the initial calibration range.	[ ]		✓
6.5 Does the instrument blank have positive results for target analytes and/or TICs?		✓	

Note: Use professional judgement to determine if carryover occurred and qualify analytes accordingly.

7.0 GC/MS Apparatus and Materials

	YES	NO	N/A
7.1 Did the lab use the proper gas chromatographic column for analysis of semivolatiles by Method 8270D? Check raw data, instrument logs or contact the lab to determine what type of column was used. The method requires the use of 30 m x 0.25 mm ID (or 0.32 mm ID), silicone-coated, fused silica, capillary column.	✓		

ACTION: If the specified column, or equivalent, was not used, document the effects in the data assessment. Use professional judgement to determine the acceptability of the data.

8.0 GC/MS Instrument Performance Check (Form V/Equivalent)

	YES	NO	N/A
8.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)?	✓		

NOTE: The performance solution should also contain 4,4-DDT, pentachlorophenol, and benzidine to verify injection port inertness and column performance. The degradation of DDT to DDE and DDD must be less than 20% total and the response of pentachlorophenol and benzidine should be within normal ranges for these compounds (based upon lab experience) and show no peak degradation or tailing before samples are analyzed. (see section 5.5

	YES	NO	N/A
page 8270D-12).			
8.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift?	✓		
8.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument?	✓		

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

	YES	NO	N/A
8.4 Have the ion abundances been normalized to m/z 198?	✓		
8.5 Have the ion abundance criteria been met for each instrument used?	✓		

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action specified in section 3.2

	YES	NO	N/A
8.6 Are there any transcription/calculation errors between mass lists and Form Va? (Check at least two values but if errors are found, check more.)		✓	
8.7 Have the appropriate number of significant figures (two) been reported?	✓		

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.

	YES	NO	N/A
8.8 Are the spectra of the mass calibration compound acceptable?	✓		

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

9.0 Target Analytes

	YES	NO	N/A
9.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate	✓		
b. Matrix spikes and matrix spike duplicates	[ ]		✓
c. Blanks	✓		
9.2 Has any special cleanup, such as GPC, been performed on all soil/sediment sample extracts (see section 7.2, page 8270D-14)?	[ ]		✓

ACTION: If data suggests that extract cleanup was not performed, use professional judgement. Make note in the data assessment narrative.

	YES	NO	N/A
9.3 Are the Reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?			
a. Samples and/or fractions as appropriate	✓		
b. Matrix spikes and matrix spike duplicates (Mass spectra not required)	[ ]		✓
c. Blanks	✓		

ACTION: If any data are missing, take action specified in 3.2 above.

	YES	NO	N/A
9.4 Are the response factors shown in the Quant Report?	✓		
9.5 Is chromatographic performance acceptable with respect to:			
Baseline stability?	✓		
Resolution?	✓		
Peak shape?	✓		
Full-scale graph (attenuation)?	✓		
Other:_____	[ ]		

ACTION: Use professional judgement to determine the acceptability of the data.

9.6 Are the lab-generated standard mass spectra of identified semivolatile compounds present for

YES NO N/A

each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the data assessment narrative. If spectra are missing, reject all positive data.

9.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

9.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

9.9 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 9.7, 9.8, and 9.9.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

YES NO N/A

10.0 Tentatively Identified Compounds (TIC)

No TICs

10.1 If Tentatively Identified Compounds were required for this project, are all Form Is, Part B present: and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier?

NOTE: Review sampling reports to determine if the lab was required to identify non target analytes (refer to section 7.6.2,page 8270D-21).

10.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following: [✓] ___ ✓

a. Samples and/or fractions as appropriate [✓] ___ ✓

b. Blanks [✓] ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by CAS #.

10.3 Are any target compounds from one fraction listed as TIC compounds in another (e.g., an acid compound listed as a base neutral TIC)? ___ [✓] ✓

ACTION: i. Flag with "R" any target compound listed as a TIC.

ii. Make sure all rejected compounds are properly reported in the other fraction.

10.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the

YES NO N/A

sample mass spectrum? [✓] ___ ✓

10.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [✓] ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate and remove "JN". Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R."

11.0 Compound Quantitation and Reported Detection Limits

11.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found? ___ [✓] ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

11.2 Are the method detection limits adjusted to reflect sample dilutions and, for soils, sample moisture? [✓] ___ ✓

YES NO N/A

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I (if present) and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red " X" across the entire page of all Form I's that should not be used, including any in the summary package.

12.0 Standards Data (GC/MS)

12.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

13.0 GC/MS Initial Calibration (Form VI/Equivalent)

13.1 Is the Initial Calibration Form (Form VI/ Equivalent) present and complete for the semivolatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard row data are missing, take action specified in 3.2 above.

13.2 Are all base neutral or acid RRFs > 0.050? [✓] ___ ___

YES NO N/A

Check the **average RRFs** of the four System Performance Check Compounds (SPCCs): N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. These compounds must have **average RRFs** greater than or equal to 0.05 before running samples and should not show any peak tailing.

ACTION: Circle all outliers in red.

ACTION: For any target analyte with **average RRF <0.05**

1. "R" all non-detects;

2. "J" all positive results.

13.3 Are response factors for base neutral or acid target analytes stable over the concentration range of the calibration (% Relative standard deviation [%RSD] < 20.0%)? ___ ✓ ___

NOTE: The % RSD for each individual Calibration Check Compound (CCC, Method 8270D-40 see Table 4) must be less than 30% before analysis can begin. If grater 30%, the lab must clean and recalibrate the instrument.

CALIBRATION CHECK COMPOUNDS

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol

YES NO N/A

Benzo(a)pyrene

ACTION: If the %RSD for any CCC >30% and no corrective action taken, then "J" qualify all positive hits and "UJ" qualify all non-detects.

ACTION: Circle all outliers in red.

ACTION: If the % RSD is ≥ 20.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non- detect results for that analyte "R," unusable. Alternatively, the lab should calculate first or second order regression fit of the calibration curve and select the fit which introduces the least amount of error.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

13.4 Did the laboratory calculate the calibration curve by the least squares regression fit? ___ ✓ ___

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) ___ ✓ ___

ACTION: Circle Errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

13.5 Do the target compounds for this SDG include Pesticides? ___ ✓ ___

YES NO N/A

13.6 If the pesticide compounds include DDT, was the percent breakdown of DDT to DDD and DDE greater than 20%? ___ ___ ✓

ACTION: If DDT percent breakdown exceeds 20%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE results are positive, qualify the quantitation limit for DDT as unusable, "R".

ii. Qualify all positive results for DDD and DDE as presumptively present at an approximate concentration "JN".

14.0 GC/MS Calibration Verification (Form VII/Equivalent)

14.1 Are the Calibration Verification Forms (Form VII) present and complete for all compounds of interest? ✓ ___ ___

14.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

_____

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed within twelve hours of every sample analysis,

YES NO N/A

call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

14.3 Do any of the SPCCs have an RRF <0.05? ___ ✓ ___

If YES, make a note in data assessment if the lab did not take corrective action specified in section 7.4.4, page 8270D-18. ✓ ___ ___

14.4 Do any of the CCCs have a %D between the initial and continuing RRF which exceeds 20.0%?

ACTION: If yes, make a note in data assessment.

14.5 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds 20.0%? ___ ✓ ___

ACTION: Circle all outliers in red.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is above 90%, qualify all non-detects for that analyte as "R", unusable.

14.6 Do any semivolatile compounds have a RRF < 0.05? ___ ✓ ___

ACTION: Circle all outliers in red.

ACTION: If RRF < 0.05, qualify as unusable ("R") associated non-detects and "J" associated positive values.

14.7 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or percent difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more). ___ ✓ ___

YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect(s) in the data assessments.

15.0 Internal Standards (Form VIII)

15.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to + 100%) for each continuing calibration? ✓ ___ ___

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area	LowerLimit	Upper Limit

(Attach additional sheets if necessary.)

Note: Check Table 5, 8270D-41 for associated analytes.

ACTION: i. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

ii. Non-detects associated with IS > 100% should not be qualified.

YES NO N/A

iii. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

15.2 Are the retention times of all internal standards within 30 seconds of the associated calibration standard? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

16.0 Laboratory Control Samples (LCS)

16.1 Were any LCS samples run in order to verify analytes which failed criteria for spike recovery? ___ ✓ ___

16.2 Did the lab spike LCS sample spiked with the same analytes and the same concentrations as the matrix spike? ___ ___ ✓

16.3 Were the mean and standard deviation of all analytes within the QC acceptance ranges as shown in Table 6, 8270D-43? ✓ ___ ___

ACTION: If the recovery of any analyte falls out of the designated range, the analytical results for that compound is suspect and should be qualified "J" in the unspiked samples.

17.0 Field Duplicates

17.1 Were any field duplicates submitted for semivolatile analysis? ___ ✓ ___

YES NO N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

DataQual
Environmental Services, LLC

CH2M HILL-VBO
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

December 10, 2013
SDG# 1307165, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1307165. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24 and 8270D-Rev 4, August 2008-SOP #HW-22,), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA	SVOA
VEP4-GW22-0713	1307165-01	water	X	X
VEP4-EB01-071713	1307165-02	water	X	X
VEP4-TB01-071713	1307165-03	water	X	

The following quality control samples were provided with this SDG: sample VEP4-EB01-071713-GW - equipment blank and sample VEP4-TB01-071713- trip blank.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Field Duplicates NA
- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

5830 Amberway Drive • St. Louis, MO 63128 • 314-330-1327 • Fax 314-849-6264

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

No qualifications were required to the data.

SVOA

No qualifications were required to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to chain of custody records, sampling was performed on 7/17/13 and samples were received at the laboratory 7/18/13. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

SVOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.
U*	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.
RL**	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action -	The sample result is greater than the RL and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.

J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.

Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL	reporting limit
PQL	practical quantitation limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

ANALYSIS DATA SHEET

VEP4-GW22-0713

Laboratory: Empirical Laboratories, LLC — SDG: 1307165
Client: CH2M Hill, Inc — Project: Vieques East SWMU 20
Matrix: Water — Laboratory ID: 1307165-01 — File ID: 0716501.D
Sampled: 07/17/13 12:05 — Prepared: 07/24/13 11:51 — Analyzed: 07/24/13 11:51
Solids: — Preparation: 5030B — Dilution: 1
Batch: 3G24027 — Sequence: 3G20604 — Calibration: 3205002 — Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene	1.73	0.100	0.200	0.500	
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.94	99.8	75 - 120	
Dibromofluoromethane	30.00	30.90	103	85 - 115	
1,2-Dichloroethane-d4	30.00	31.93	106	70 - 120	
Toluene-d8	30.00	30.13	100	85 - 120	

Um 11/20/13

ANALYSIS DATA SHEET

VEP4-EB01-071713

Laboratory: Empirical Laboratories, LLC — SDG: 1307165
Client: CH2M Hill, Inc. — Project: Vieques East SWMU 20
Matrix: Water — Laboratory ID: 1307165-02 — File ID: 0716502.D
Sampled: 07/17/13 12:45 — Prepared: 07/24/13 00:00 — Analyzed: 07/25/13 00:14
Solids: — Preparation: 5030B — Dilution: 1
Batch: 3G24028 — Sequence: 3G20605 — Calibration: 3205002 — Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.84	96.1	75 - 120	
Dibromofluoromethane	30.00	29.59	98.6	85 - 115	
1,2-Dichloroethane-d4	30.00	30.80	103	70 - 120	
Toluene-d8	30.00	30.93	103	85 - 120	

Um 11/20/13

ANALYSIS DATA SHEET

VEP4-TB01-071713

Laboratory:	Empirical Laboratories, LLC		SDG:	1307165	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1307165-03	File ID:	0716503.D
Sampled:	07/17/13 13:00	Prepared:	07/24/13 00:00	Analyzed:	07/25/13 00:43
Solids:		Preparation:	5030B	Dilution:	1
Batch:	3G24028	Sequence:	3G20605	Calibration:	3205002

Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.250	0.500	1.00	U
75-01-4	Vinyl chloride		0.100	0.200	0.500	U
Total Target Analytes Reported: 6			0.140	0.200	0.500	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.80	99.3	75 - 120	
Dibromofluoromethane	30.00	29.80	99.3	85 - 115	
1,2-Dichloroethane-d4	30.00	31.28	104	70 - 120	
Toluene-d8	30.00	30.16	101	85 - 120	

MM 112013

010

ANALYSIS DATA SHEET

VEP4-GW22-0713

Laboratory:	Empirical Laboratories, LLC		SDG:	1307165	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1307165-01	File ID:	0716501.D
Sampled:	07/17/13 12:05	Prepared:	07/19/13 11:30	Analyzed:	08/04/13 17:56
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3G18946	Sequence:	3H21804	Calibration:	3217001

Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.236	0.472	0.943	U
Total Target Analytes Reported: 1						

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	47.17	38.64	81.9	50 - 110	
Terphenyl-d14	47.17	34.23	72.6	50 - 135	
2,4,6-Tribromophenol	94.34	60.74	64.4	40 - 125	

MM 112013

011

ANALYSIS DATA SHEET

VEP4-EB01-071713

Laboratory:	Empirical Laboratories, LLC		SDG:	1307165	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1307165-02	File ID:	0716502.D
Sampled:	07/17/13 12:45	Prepared:	07/19/13 11:30	Analyzed:	08/04/13 18:26
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3G18946	Sequence:	3H21804	Calibration:	3217001

Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.240	0.481	0.962	U
Total Target Analytes Reported: 1						

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	48.08	30.94	64.4	50 - 110	
Terphenyl-d14	48.08	32.34	67.1	50 - 135	
2,4,6-Tribromophenol	96.15	60.77	63.2	40 - 125	

MM 112013

012

1307165 Summ Package

013

ELECTRONIC CHAIN OF CUSTODY RECORD

C.O.C. 20130717-GW-EMP-01

PLEASE PRINT

EMPIRICAL
621 Mainstream Dr.
Suite 270
Nashville, TN 37228

phone: 615-345-1115

Report to: PLEASE PRINT
Company Name: CH2MHILL
Address: 15010 Conference Dr. ; 200
Chantilly, VA 20151
Attn: Mike Zamboni
Phone: 703.376.5301
Fax: 703.376.5801

Invoice to: See Contact
Company Name: Phone:
Address: Fax:
Attn:

Purchase Order Number: 943380
Project Name/Number: not required
Sampler (Signature): not required
Sampler (Print):

Date Shipped: 07/17/13
Carrier: FedEx
Waybill No.: 796246996021
Comments:

Sample Identification	Location	Date Collected	Time Collected	Time Zone	Matrix (G W, Air, Soil, Sed.)	Analysis Requested/Method Number	
VEP4-GW22-0713		7/17/13	12:05	AST	5 GW	✓ ✓	MW-22
VEP4-EB01-071713		7/17/13	12:45	AST	5 GW	✓ ✓	equipment blank
VEP4-TB01-071713		7/17/13	13:00	AST	2 GW	✓ ✓	trip blank

7 DAY TAT
NOEMAL TAT
NORMAL TAT

Shuttle Temperature:
Turnaround Requested: Check one: ☐ Standard 2-3 wks ☐ Rush (Date needed:)
Sample Disposal: ☐ Return to client ☐ Disposal by Lab (Fee applies) ☐ Other ☐ 24/48 Hrs
Relinquished by: Date 7/18/13 Time 1345 Received by: Date Time Received by: Date Time not applicable
Relinquished by: Date Time Received by: Relinquished by: Date 7/18/13 Time 0830 Received by:

White: Return to client with report
Yellow: Laboratory Copy
Pink: Sampler

Note: The first sampled date of the ARF will be used as the COC number unless indicated otherwise.

EMPIRICAL LABORATORIES
COOLER RECEIPT FORM

Cooler Received/Opened On: 07/18/13 @ 0830 Workorder# 1307165

1. Tracking # 0621 (last 4 digits, FedEx)

Courier: FEDEX

2. Temperature of rep. sample or temp blank when opened: 0.4 °C + correction factor (0.0) = 0.4 °C

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA

4. Were custody seals on outside of cooler? YES NO NA

If yes, how many and where: 2, 1 on front + 1 on back

5. Were the seals intact, signed, and dated correctly? YES NO NA

6. Were custody papers inside cooler? YES NO NA

I certify that I opened the cooler and answered questions 1-6 (initial) JG

7. Were custody seals on containers: YES NO and intact YES NO NA

Were these signed and dated correctly? YES NO NA

8. Packing material used? Bubblewrap Plastic bag Peanuts Vermiculite Foam insert Paper Other None

9. Cooling process: Ice Ice-pack Ice (direct contact) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? YES NO NA

11. Were all container labels complete (#, date, signed, pres., etc)? YES NO NA

12. Did all container labels and tags agree with custody papers? YES NO NA

13. a. Were VOA vials received? YES NO NA

b. Was there any observable headspace present in any VOA vial? YES NO NA

14. Was there a Trip Blank in this cooler? YES NO NA JG 7/18/13 If multiple coolers, sequence # —

I certify that I unloaded the cooler and answered questions 7-14 (initial) JG

15. a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES NO NA

b. Did the bottle labels indicate that the correct preservatives were used YES NO NA

16. Was residual chlorine present? YES NO NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial) JG

17. Were custody papers properly filled out (ink, signed, etc)? YES NO NA

18. Did you sign the custody papers in the appropriate place? YES NO NA

19. Were correct containers used for the analysis requested? YES NO NA

20. Was sufficient amount of sample sent in each container? YES NO NA

I certify that I entered this project into LIMS and answered questions 17-20 (initial) JG

I certify that I attached a label with the unique LIMS number to each container (initial) JG

I certify that I have performed a second check of the LIMS information against the COC to confirm accuracy (initial) _____

21. Were there Non-Conformance issues at login? YES NO Was a NCR generated? YES NO #_____

Additional Details:

014

Sample Delivery Group Case Narrative

Receipt Information
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Changes to the Revision
This is an original submittal of the final report package.

Analytical Information
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:
The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

015

SW8260B:
No anomalies or deviations are noted.

SW8270D BNA:
No anomalies or deviations are noted.

016

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 1307165 LAB: Empirical

SITE NAME: Vieques Summ 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. VOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓ ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓ ___ ___

1.3 Sample Conditions/Problems

- 6 VOA -

017

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

A 7/17/13 a 7/24-25
A 7/18 t 0.4°C

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ ✓ ___

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water ✓ ___ ___

b. Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water ✓ ___ ___

b. Soil [ ] ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. ✓ ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ ✓

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] ✓ ___

If yes, were samples reanalyzed? [ ] ___ ✓

Were method blanks reanalyzed? [ ] ✓ ___

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] ✓ ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. ✓ ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ ✓

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] ✓ ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent)

No MS/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] ___ ✓

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] ___ ✓

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month (page 8000C, section 9.5.))

a. Water [ ] ___ ✓

b. Waste [ ] ___ ✓

c. Soil/Solid [ ] ___ ✓

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [ ] ___ ✓

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ ✓

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? ✓ ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? ✓ ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? ✓ ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data – chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? ✓ ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ✓ ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates [ ] ___ ✓

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) [ ] ___ ✓

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? ✓ ___ ___

YES NO N/A

Resolution? ✓ ___ ___

Peak shape? ✓ ___ ___

Full-scale graph (attenuation)? [ ] ___ ___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? ✓ ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? ✓ ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ✓ ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ✓ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

no TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ ✓

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ ✓

b. Blanks [ ] ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ ✓

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ ___ ✓

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] ✓ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ ✓

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39)qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? [✓] ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. [✓] ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) [ ] ✓ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? ✓ ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). ___ ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated. "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds in section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? ✓ ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION: 1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.

2. Do not qualify non-detects when the associated IS are counts area > + 100%.

3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".

4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ___ ✓ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

YES NO N/A

E - The concentration of this analyte exceeds the calibration range of the instrument.

A - Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 1307165 LAB: Empirical

SITE NAME: Vieques Summer 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format? ☑ ___ ___

ACTION: If not, note the effect on review of the data in the data assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative or cover letter present? ☑ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ☑ ___ ___

YES NO N/A

II. SEMIVOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? ☑ ___ ___

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ☑ ___

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, all non-detects data are qualified as unusable (R), and detects are flagged "J".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (10°C), flag all positive results "J" and all non-detects "UJ". t 0.4°C

A 7/17/13 e 7/19
N 7/18 a 8/4

2.0 Holding Times

2.1 Have any semivolatile technical holding times, determined from date of collection to date of extraction, been exceeded? ___ ☑ ___

Continuous extraction of water samples for semivolatile analysis must be started within 7 days of the date of collection. Soil/sediment samples must be extracted within 14 days of collection. Extracts must be analyzed within

YES NO N/A

40 days of the date of extraction.

Table of Holding Time Violations

Sample ID	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted (See Traffic Report)	Date Analyzed

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

YES NO N/A

3.0 Surrogate Recovery (Form II/Equivalent)

3.1 Have the semi volatile surrogate recoveries been listed on CLP Surrogate Recovery forms (Form II) for each of the following matrices:

a. Low Water ☑ ___ ___

b. Low/Med Soil ☐ ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery Summary forms for each matrix:

a. Low Water ☑ ___ ___

b. Low/Med Soil ☐ ___ ___

ACTION: If CLP deliverables are unavailable, document the effect(s) in data assessments. In some cases the lab may have to be contacted to obtain the data necessary to complete the validation.

3.3 Were outliers marked correctly with an asterisk? ☐ ___ ✓

ACTION: Circle all outliers in red.

3.4 Were two or more base neutral OR acid surrogate recoveries out of specification for any sample or method blank (Reviewer should use lab in house recovery limits. Use surrogate recovery limits from USEPA National Functional Guidlines January 2005 page 130, if in house limits are not available. See Method 8000B-43 or 8000C-24). ☐ ✓ ___

Note: Examine lab in house limits for reasonableness.

If yes, were samples re-analyzed? ☐ ___ ✓

YES NO N/A

Were method blanks re-analyzed? [ ] ___ ✓

ACTION: If all surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet method specifications, for the affected fraction only (i.e. either base-neutral or acid compounds):

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Positive results for the fraction with < 10% surrogate recovery are qualified with "J".
2. Non-detects for that fraction should be qualified as unusable (R).

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ [✓] ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document

YES NO N/A

effect in data assessments.

4.0 Matrix Spikes (Form III/Equivalent)

NW MS/MSD

4.1 Have the semivolatile Matrix Spike and Matrix Spike Duplicate/or duplicate unspiked Sample recoveries been listed on the Recovery Form (Form III)? [ ] ___ ✓

NOTE: Method 3500B/page 4 states the spiking compounds:

Base/neutrals	Acids
1,2,4-Trichlorobenzene	Pentachlorophenol
Acenaphthene	Phenol
2,4-Dinitrotoluene	2-Chlorophenol
Pyrene	4-Chloro-3-methylphenol
N-Nitroso-di-n-propylamine	4-Nitrophenol
1,4-Dichlorobenzene	

Note: Some projects may require the spiking of specific compounds of interest.

Note: See Method 8270D-sec 8.4.2 for deciding on whether to prepare and analyze duplicate samples or a martix spike/matrix spike duplicate. If samples are expected to contain target analytes, then laboratory may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratory should use a matrix spike and matrix spike duplicate pair.

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water [ ] ___ ✓
b. Low Solid [ ] ___ ✓
c. Med Solid [ ] ___ ✓

YES NO N/A

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. It may be necessary to contact the lab to obtain the required data.

NOTE: If the data has not been reported on CLP equivalent form, then the laboratory must provide the information necessary to evaluate the spike recoveries in the MS and MSD. The required data which should have been provided by the lab include the analytes and concentrations used for spiking, background concentrations of the spiked analytes (i.e., concentrations in unspiked sample), methods and equations used to calculate the QC acceptance criteria for the spiked analytes, percent recovery data for all spiked analytes.

The data reviewer must verify that all reported equations and percent recoveries are correct before proceeding to the next section.

4.3 Were matrix spikes performed at concentration equal to 100ug/L for acid compounds, and 200ug/l for base compounds (Method 3500B-4), or those specified in project plan. [ ] ___ ✓

4.4 How many semivolatile spike recoveries are outside Laboratory in house MS/MSD recovery limits (use recovery limits values in Method 8270D-43&44 Table 6 if in house values not available).

Water	Solids
___ out of ___	___ out of ___

YES NO N/A

4.5 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water	Solids
___ out of ___	___ out of ___

ACTION: Circle all outliers with red pencil.

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria to determine the need for some qualification of the data.

4.6 Was a Laboratory Control Sample (LCS) analyzed with each analytical batch? [✓] ___ ___

NOTE: When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

5.0 Blanks (Form IV/Equivalent)

5.1 Is the Method Blank Summary (Form IV) present? [✓] ___ ___

5.2 Frequency of Analysis:

Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? [✓] ___ ___

5.3 Has a method blank been analyzed either after

YES NO N/A

the calibration standard or at any other time during the analytical shift for each GC/MS system used ? ✓ ___ ___

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, use professional judgement to determine if the associated sample data should be qualified.

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for the semivolatiles? ✓ ___ ___

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ✓ ___

6.2 Do any field/rinse/ blanks have positive results for target analytes and/or TICs (if required, see section 10 below)? ___ ✓ ___

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field Blanks must be qualified for outlying surrogates, poor spectra, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify sample results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

YES NO N/A

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

NOTE: If the laboratory did not report TIC analyses, check the project plans to verify whether or not it was required.

6.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

6.4 Was a instrument blank analyzed after each sample/dilution which contained a target compound

YES NO N/A

that exceeded the initial calibration range. ___ ___ ✓

6.5 Does the instrument blank have positive results for target analytes and/or TICs? ___ ✓ ___

Note: Use professional judgement to determine if carryover occurred and qualify analytes accordingly.

7.0 GC/MS Apparatus and Materials

7.1 Did the lab use the proper gas chromatographic column for analysis of semivolatiles by Method 8270D? Check raw data, instrument logs or contact the lab to determine what type of column was used. The method requires the use of 30 m x 0.25 mm ID (or 0.32 mm ID), silicone-coated, fused silica, capillary column. ✓ ___ ___

ACTION: If the specified column, or equivalent, was not used, document the effects in the data assessment. Use professional judgement to determine the acceptability of the data.

8.0 GC/MS Instrument Performance Check (Form V/Equivalent)

8.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)? ✓ ___ ___

NOTE: The performance solution should also contain 4,4-DDT, pentachlorophenol, and benzidine to verify injection port inertness and column performance. The degradation of DDT to DDE and DDD must be less than 20% total and the response of pentachlorophenol and benzidine should be within normal ranges for these compounds (based upon lab experience) and show no peak degradation or tailing before samples are analyzed. (see section 5.5

YES NO N/A

page 8270D-12).

8.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? ☑ ___ ___

8.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument? ☑ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

8.4 Have the ion abundances been normalized to m/z 198? ☑ ___ ___

8.5 Have the ion abundance criteria been met for each instrument used? ☑ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

YES NO N/A

ACTION: If ion abundance criteria are not met, take action specified in section 3.2

8.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.) ___ ☑ ___

8.7 Have the appropriate number of significant figures (two) been reported? ☑ ___ ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.

8.8 Are the spectra of the mass calibration compound acceptable? ☑ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

9.0 Target Analytes

9.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ☑ ___ ___

b. Matrix spikes and matrix spike duplicates ☐ ___ ☑

c. Blanks ☑ ___ ___

9.2 Has any special cleanup, such as GPC, been performed on all soil/sediment sample extracts (see section 7.2, page 8270D-14)? ☐ ___ ☑

YES NO N/A

ACTION: If data suggests that extract cleanup was not performed, use professional judgement. Make note in the data assessment narrative.

9.3 Are the Reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ☑ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ☐ ___ ☑

c. Blanks ☑ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

9.4 Are the response factors shown in the Quant Report? ☑ ___ ___

9.5 Is chromatographic performance acceptable with respect to:

Baseline stability? ☑ ___ ___

Resolution? ☑ ___ ___

Peak shape? ☑ ___ ___

Full-scale graph (attenuation)? ☑ ___ ___

Other:_____ ☐ ___ ___

ACTION: Use professional judgement to determine the acceptability of the data.

9.6 Are the lab-generated standard mass spectra of identified semivolatile compounds present for

YES NO N/A

each sample? ☑ ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the data assessment narrative. If spectra are missing, reject all positive data.

9.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? ☑ ___ ___

9.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ☑ ___ ___

9.9 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ☑ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 9.7, 9.8, and 9.9.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

YES NO N/A

10.0 Tentatively Identified Compounds (TIC)

10.1 If Tentatively Identified Compounds were required for this project, are all Form Is, Part B present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier? [ ] ___ ___ NO TICs

NOTE: Review sampling reports to determine if the lab was required to identify non target analytes (refer to section 7.6.2,page 8270D-21).

10.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following: [ ] ___ ✓

a. Samples and/or fractions as appropriate [ ] ___ ✓

b. Blanks [ ] ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by CAS #.

10.3 Are any target compounds from one fraction listed as TIC compounds in another (e.g., an acid compound listed as a base neutral TIC)? ___ [ ] ✓

ACTION: i. Flag with "R" any target compound listed as a TIC.

ii. Make sure all rejected compounds are properly reported in the other fraction.

10.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the

YES NO N/A

sample mass spectrum? [ ] ___ ✓

10.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate and remove "JN". Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R."

11.0 Compound Quantitation and Reported Detection Limits

11.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found? ___ ✓ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

11.2 Are the method detection limits adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ ✓

YES NO N/A

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I (if present) and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red " X" across the entire page of all Form I's that should not be used, including any in the summary package.

12.0 Standards Data (GC/MS)

12.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration? ✓ ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

13.0 GC/MS Initial Calibration (Form VI/Equivalent)

13.1 Is the Initial Calibration Form (Form VI/ Equivalent) present and complete for the semivolatile fraction? ✓ ___ ___

ACTION: If any calibration forms or standard row data are missing, take action specified in 3.2 above.

13.2 Are all base neutral or acid RRFs > 0.050? ✓ ___ ___

YES NO N/A

Check the **average RRFs** of the four System Performance Check Compounds (SPCCs): N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. These compounds must have **average RRFs** greater than or equal to 0.05 before running samples and should not show any peak tailing.

ACTION: Circle all outliers in red.

ACTION: For any target analyte with **average RRF <0.05**

1. "R" all non-detects;

2. "J" all positive results.

13.3 Are response factors for base neutral or acid target analytes stable over the concentration range of the calibration (% Relative standard deviation (%RSD) < 20.0%)? ✓ ___ ___

NOTE: The % RSD for each individual Calibration Check Compound (CCC, Method 8270D-40 see Table 4) must be less than 30% before analysis can begin. If grater 30%, the lab must clean and recalibrate the instrument.

CALIBRATION CHECK COMPOUNDS

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol

YES NO N/A

Benzo(a)pyrene

ACTION: If the %RSD for any CCC >30% and no corrective action taken, then "J" qualify all positive hits and "UJ" qualify all non-detects.

ACTION: Circle all outliers in red.

ACTION: If the % RSD is ≥ 20.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non- detect results for that analyte "R," unusable. Alternatively, the lab should calculate first or second order regression fit of the calibration curve and select the fit which introduces the least amount of error.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

13.4 Did the laboratory calculate the calibration curve by the least squares regression fit? ___ ✓ ___

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) ___ ✓ ___

ACTION: Circle Errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

13.5 Do the target compounds for this SDG include Pesticides? ___ ✓ ___

YES NO N/A

13.6 If the pesticide compounds include DDT, was the percent breakdown of DDT to DDD and DDE greater than 20%? ___ ___ ✓

ACTION: If DDT percent breakdown exceeds 20%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE results are positive, qualify the quantitation limit for DDT as unusable, "R".

ii. Qualify all positive results for DDD and DDE as presumptively present at an approximate concentration "JN".

14.0 GC/MS Calibration Verification (Form VII/Equivalent)

14.1 Are the Calibration Verification Forms (Form VII) present and complete for all compounds of interest? ✓ ___ ___

14.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

_____

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed within twelve hours of every sample analysis.

YES NO N/A

call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

14.3 Do any of the SPCCs have an RRF <0.05? ___ ✓ ___

If YES, make a note in data assessment if the lab did not take corrective action specified in section 7.4.4, page 8270D-18. ___ ✓ ___

14.4 Do any of the CCCs have a %D between the initial and continuing RRF which exceeds 20.0%?

ACTION: If yes, make a note in data assessment.

14.5 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds 20.0%? ___ ✓ ___

ACTION: Circle all outliers in red.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is above 90%, qualify all non-detects for that analyte as "R", unusable.

14.6 Do any semivolatile compounds have a RRF < 0.05? ___ ✓ ___

ACTION: Circle all outliers in red.

ACTION: If RRF < 0.05, qualify as unusable ("R") associated non-detects and "J" associated positive values.

14.7 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or percent difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more). ___ ✓ ___

YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect(s) in the data assessments.

15.0 Internal Standards (Form VIII)

15.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to + 100%) for each continuing calibration? ✓ ___ ___

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area	LowerLimit	Upper Limit

(Attach additional sheets if necessary.)

Note: Check Table 5, 8270D-41 for associated analytes.

ACTION: i. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

ii. Non-detects associated with IS > 100% should not be qualified.

YES NO N/A

iii. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

15.2 Are the retention times of all internal standards within 30 seconds of the associated calibration standard? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

16.0 Laboratory Control Samples (LCS)

16.1 Were any LCS samples run in order to verify analytes which failed criteria for spike recovery? __ ✓ ___

16.2 Did the lab spike LCS sample spiked with the same analytes and the same concentrations as the matrix spike? __ ___ ✓

16.3 Were the mean and standard deviation of all analytes within the QC acceptance ranges as shown in Table 6, 8270D-43? ✓ ___ ___

ACTION: If the recovery of any analyte falls out of the designated range, the analytical results for that compound is suspect and should be qualified "J" in the unspiked samples.

17.0 Field Duplicates

17.1 Were any field duplicates submitted for semivolatile analysis? __ ✓ ___

YES NO N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

DataQual
Environmental Services, LLC

CH2M HILL-VBO
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

December 11, 2013
SDG# 1307230, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1307230. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24 and 8270D-Rev 4, August 2008-SOP #HW-22,), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA	SVOA
VEP4-GW23-0713	1307230-01	water	X	X
VEP4-EB01-072313	1307230-02	water	X	X
VEP4-TB01-072313	1307230-03	water	X	

The following quality control samples were provided with this SDG: sample VEP4-EB01-072313- equipment blank and sample VEP4-TB01-072313- trip blank.

The samples were evaluated based on the following criteria:

- Data Completeness
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Field Duplicates NA
- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

No qualifications were required to the data.

SVOA

No qualifications were required to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were required as the raw data was not printed dark enough to read in the original package. The laboratory was contacted and updated pages were submitted.

Technical Holding Times

According to chain of custody records, sampling was performed on 7/23/13 and samples were received at the laboratory 7/24/13. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

SVOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U not detected above the reported sample quantitation limit
J estimated value
UJ reported quantitation limit is qualified as estimated
N analyte has been tentatively identified
JN analyte has been tentatively identified, estimated value
R result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.

U* The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.

RL** The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.

J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.
Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL reporting limit
PQL practical quantitation limit
IDL instrument detection limit
MDL method detection limit
CRDL contract required detection limit
CRQL contract required quantitation limit
+ positive result
- non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1307230

007

ANALYSIS DATA SHEET

VEP4-GW23-0713

Laboratory: Empirical Laboratories, LLC SDG: 1307230
Client: CH2M Hill, Inc. Project: Vieques East SWMU 20
Matrix: Water Laboratory ID: 1307230-01 File ID: 0723001.D
Sampled: 07/23/13 09:55 Prepared: 07/29/13 13:48 Analyzed: 07/29/13 13:48
Solids: Preparation: 5030B Dilution: 1
Batch: 3G29003 Sequence: 3G21104 Calibration: 3197002 Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene	**0.340**	0.250	0.500	1.00	J
156-59-2	cis-1,2-Dichloroethene	**1.04**	0.250	0.500	1.00	
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene	**1.32**	0.250	0.500	1.00	
79-01-6	Trichloroethene	**71.0**	0.100	0.200	0.500	
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.71	99.0	75 - 120	
Dibromofluoromethane	30.00	30.08	100	85 - 115	
1,2-Dichloroethane-d4	30.00	31.20	104	70 - 120	
Toluene-d8	30.00	29.25	97.5	85 - 120	

1/12/13

ANALYSIS DATA SHEET

VEP4-EB01-072313

Laboratory: Empirical Laboratories, LLC SDG: 1307230
Client: CH2M Hill, Inc. Project: Vieques East SWMU 20
Matrix: Water Laboratory ID: 1307230-02 File ID: 0723002.D
Sampled: 07/23/13 10:50 Prepared: 07/29/13 11:01 Analyzed: 07/29/13 11:01
Solids: Preparation: 5030B Dilution: 1
Batch: 3G29003 Sequence: 3G21104 Calibration: 3197002 Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.59	95.3	75 - 120	
Dibromofluoromethane	30.00	29.43	98.1	85 - 115	
1,2-Dichloroethane-d4	30.00	29.79	99.3	70 - 120	
Toluene-d8	30.00	29.76	99.2	85 - 120	

1/12/13

ANALYSIS DATA SHEET

VEP4-TB01-072313

Laboratory: Empirical Laboratories, LLC SDG: 1307230
Client: CH2M Hill, Inc. Project: Vieques East SWMU 20
Matrix: Water Laboratory ID: 1307230-03 File ID: 0723003.D
Sampled: 07/23/13 10:55 Prepared: 07/29/13 10:05 Analyzed: 07/29/13 10:05
Solids: Preparation: 5030B Dilution: 1
Batch: 3G29003 Sequence: 3G21104 Calibration: 3197002 Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.03	100	75 - 120	
Dibromofluoromethane	30.00	28.82	96.1	85 - 115	
1,2-Dichloroethane-d4	30.00	30.31	101	70 - 120	
Toluene-d8	30.00	30.27	101	85 - 120	

1/12/13

ANALYSIS DATA SHEET

VEP4-GW23-0713

Laboratory:	Empirical Laboratories, LLC		SDG:	1307230	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1307230-01	File ID:	0723001.D
Sampled:	07/23/13 09:55	Prepared:	07/30/13 13:04	Analyzed:	08/04/13 20:26
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3G29019	Sequence:	3H21804	Calibration:	3217001
Instrument:	MS-BNA4				

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.245	0.490	0.980	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	49.02	42.13	85.9	50 - 110	
Terphenyl-d14	49.02	38.14	77.8	50 - 135	
2,4,6-Tribromophenol	98.04	72.40	73.9	40 - 125	

011

ANALYSIS DATA SHEET

VEP4-EB01-072313

Laboratory:	Empirical Laboratories, LLC		SDG:	1307230	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1307230-02	File ID:	0723002.D
Sampled:	07/23/13 10:50	Prepared:	07/30/13 13:04	Analyzed:	08/04/13 20:56
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3G29019	Sequence:	3H21804	Calibration:	3217001
Instrument:	MS-BNA4				

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.240	0.481	0.962	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	48.08	42.36	88.1	50 - 110	
Terphenyl-d14	48.08	38.34	79.8	50 - 135	
2,4,6-Tribromophenol	96.15	77.05	80.1	40 - 125	

012

ELECTRONIC CHAIN OF CUSTODY RECORD

C.O.C. 20130723-GW-EMP-01

EMPIRICAL
621 Mainstream Dr.
Suite 270
Nashville, TN 37228
phone: 615-345-1115

1307230

Report to: PLEASE PRINT
Company Name: CH2MHILL Phone: 703.376.5301
Address: 15010 Conference Dr. ; 200 Fax: 703.376.5801
Chantilly, VA 20151
Attn: Mike Zamboni

Invoice to: PLEASE PRINT
Company Name: See Contact Phone:
Address: Fax:
Attn:

Project Name/Number: Sampler (Print): not required
Sampler (Signature): not required
Purchase Order Number: 943380
Date Shipped: 07/23/13
Carrier: FedEx
Waybill No.: 7962902 2374
Comments:

Sample Identification	Location	Date Collected	Time Collected	Time Zone	No. of Containers	Air	Soil	Sed.	Aq.	Oil	Analysis Requested/Method Number	
VEP4-GW23-0713		7/23/13	09:55	AST	5					✓		MW-23
VEP4-EB01-072313		7/23/13	10:50	AST	5					✓		equipment blank
VEP4-TB01-072313		7/23/13	10:55	AST	2					✓		trip blank

Shuttle Temperature:
Sample Disposal: Return to client / Dispose of by Lab (after 60 days) / Archive for ___ months
Turnaround Requested: Standard 2-3 wk / Rush (One week) / 24/48 Hrs. / Other
not applicable

Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date 7/23/13	Time 12:25	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time

White: Return to client with report; Yellow: Laboratory Copy; Pink: Sampler

Note: The first sampled date of the ARF will be used as the COC number unless indicated otherwise.

EMPIRICAL LABORATORIES COOLER RECEIPT FORM

Cooler Received/Opened On: 07/24/13 @ 0820 Workorder# 1307230

1. Tracking # 2374 (last 4 digits, FedEx)
   Courier: FED-EX
2. Temperature of rep. sample or temp blank when opened: 0.7 °C + correction factor (0.0) = 0.7 °C
3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA
4. Were custody seals on outside of cooler? YES NO NA
   If yes, how many and where: 2-FRONT BACK
5. Were the seals intact, signed, and dated correctly? YES NO NA
6. Were custody papers inside cooler? YES NO NA
   I certify that I opened the cooler and answered questions 1-6 (initial) [illegible]
7. Were custody seals on containers: YES NO and intact YES NO NA
   Were these signed and dated correctly? YES NO NA
8. Packing material used: Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry ice Other None
10. Did all containers arrive in good condition (unbroken)? YES NO NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES NO NA
12. Did all container labels and tags agree with custody papers? YES NO NA
13. a. Were VOA vials received? YES NO NA
    b. Was there any observable headspace present in any VOA vial? YES NO NA
14. Was there a Trip Blank in this cooler? YES NO NA If multiple coolers, sequence # ___
    I certify that I unloaded the cooler and answered questions 7-14 (initial) [illegible]
15. a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES NO NA
    b. Did the bottle labels indicate that the correct preservatives were used YES NO NA
16. Was residual chlorine present? YES NO NA
    I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial) [illegible]
17. Were custody papers properly filled out (ink, signed, etc)? YES NO NA
18. Did you sign the custody papers in the appropriate place? YES NO NA
19. Were correct containers used for the analysis requested? YES NO NA
20. Was sufficient amount of sample sent in each container? YES NO NA
    I certify that I entered this project into LIMS and answered questions 17-20 (initial) [illegible]
    I certify that I attached a label with the unique LIMS number to each container (initial) [illegible]
    I certify that I have performed a second check of the LIMS information against the COC to confirm accuracy (initial) [illegible]
21. Were there Non-Conformance issues at login? YES NO Was a NCR generated? YES NO #___

Additional Details:

Page 1 of 1

Sample Delivery Group Case Narrative

Receipt Information
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Changes to the Revision
Revision 01: The package was revised to replace the raw data that was not dark enough to be read in the original package.

Analytical Information
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:
The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

015

SW8260B:
No anomalies or deviations are noted.

SW8270D BNA:
No anomalies or deviations are noted.

016

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 1307230 LAB: Empirical

SITE NAME: Vieques SWMU 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. VOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓ ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓ ___ ___

1.3 Sample Conditions/Problems

017

- 6 VOA -

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

A 7/23/13 a 7/29
R 7/24 t 0.7

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ ✓ ___

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

018

- 7 VOA -

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water [✓] ___ ___

b. Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water [✓] ___ ___

b. Soil [ ] ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. lab [✓] ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ [✓]

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] [✓] ___

If yes, were samples reanalyzed? [ ] ___ [✓]

Were method blanks reanalyzed? [ ] ___ [✓]

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] [✓] ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ [✓]

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] [✓] ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent)

No MS/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] ___ ✓

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] ___ ✓

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month [page 8000C, section 9.5.])

a. Water [ ] ___ ✓

b. Waste [ ] ___ ✓

c. Soil/Solid [ ] ___ ✓

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [ ] ___ ✓

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ ✓

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? [✓] ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? [✓] ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? [✓] ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject @ all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromstographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? [✓] ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. [ ] ___ ✓

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone
** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 8.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates [ ] ___ [✓]

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) [ ] ___ [✓]

c. Blanks [✓] ___ ___

d. Laboratory Control Samples [✓] ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? [✓] ___ ___

YES NO N/A

Resolution? [✓] ___ ___

Peak shape? [✓] ___ ___

Full-scale graph (attenuation)? [✓] ___ ___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

No TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ [✓]

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ [✓]

b. Blanks [ ] ___ [✓]

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ [✓]

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ [✓]

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ [✓]

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] [✓] ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ ✓

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [M] ✓ ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? [M] ✓ ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39)qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? [M] ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. [M] ✓ ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? [M] ✓ ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) [ ] ✓ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? [M] ✓ ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? [M] ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? [M] ✓ ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). [ ] ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,2-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds in section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? ✓ ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:
1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.
2. Do not qualify non-detects when the associated IS are counts area > + 100%.
3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (0-values) "J".
4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ___ ✓ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

YES NO N/A

E - The concentration of this analyte exceeds the calibration range of the instrument.

A - Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 1307230 LAB: Empirical

SITE NAME: Vieques Summary

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the data assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative or cover letter present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

YES NO N/A

II. **SEMIVOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? ✓ ___ ___

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, all non-detects data are qualified as unusable (R), and detects are flagged "J".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (10°C), flag all positive results "J" and all non-detects "UJ". t = 0.7

2.0 Holding Times A 7/23/13 e 7/30 A 7/24 a 8/4

2.1 Have any semivolatile technical holding times, determined from date of collection to date of extraction, been exceeded? ___ ✓ ___

Continuous extraction of water samples for semivolatile analysis must be started within 7 days of the date of collection. Soil/sediment samples must be extracted within 14 days of collection. Extracts must be analyzed within

YES NO N/A

40 days of the date of extraction.

Table of Holding Time Violations

Sample ID	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted (See Traffic Report)	Date Analyzed

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

YES NO N/A

3.0 Surrogate Recovery (Form II/Equivalent)

3.1 Have the semi volatile surrogate recoveries been listed on CLP Surrogate Recovery forms (Form II) for each of the following matrices:

a. Low Water ✓ ___ ___

b. Low/Med Soil ___ ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery Summary forms for each matrix:

a. Low Water ✓ ___ ___

b. Low/Med Soil ___ ___ ___

ACTION: If CLP deliverables are unavailable, document the effect(s) in data assessments. In some cases the lab may have to be contacted to obtain the data necessary to complete the validation.

3.3 Were outliers marked correctly with an asterisk? ___ ___ ✓

ACTION: Circle all outliers in red.

3.4 Were two or more base neutral OR acid surrogate recoveries out of specification for any sample or method blank (Reviewer should use lab in house recovery limits. Use surrogate recovery limits from USEPA National Functional Guidlines January 2005 page 130, if in house limits are not available. See Method 8000B-43 or 8000C-24). ___ ✓ ___

Note: Examine lab in house limits for reasonableness.

If yes, were samples re-analyzed? ___ ___ ✓

YES NO N/A

Were method blanks re-analyzed? ___ ___ ✓

ACTION: If all surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet method specifications, for the affected fraction only (i.e. either base-neutral or acid compounds):

1. Flag all positive results as estimated ("J").

2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.

3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Positive results for the fraction with < 10% surrogate recovery are qualified with "J".

2. Non-detects for that fraction should be qualified as unusable (R) .

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ ✓ ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document

YES NO N/A

effect in data assessments.

4.0 Matrix Spikes (Form III/Equivalent)

no MS/MSD

4.1 Have the semivolatile Matrix Spike and Matrix Spike Duplicate/or duplicate unspiked Sample recoveries been listed on the Recovery Form (Form III)? [ ] ___ ✓

NOTE: Method 3500B/page 4 states the spiking compounds:

Base/neutrals	Acids
1,2,4-Trichlorobenzene	Pentachlorophenol
Acenaphthene	Phenol
2,4-Dinitrotoluene	2-Chlorophenol
Pyrene	4-Chloro-3-methylphenol
N-Nitroso-di-n-propylamine	4-Nitrophenol
1,4-Dichlorobenzene	

Note: Some projects may require the spiking of specific compounds of interest.

Note: See Method 8270D-sec 8.4.2 for deciding on whether to prepare and analyze duplicate samples or a martix spike/matrix spike duplicate. If samples are expected to contain target analytes, then laboratory may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratory should use a matrix spike and matrix spike duplicate pair.

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water [ ] ___ ✓

b. Low Solid [ ] ___ ✓

c. Med Solid [ ] ___ ✓

YES NO N/A

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. It may be necessary to contact the lab to obtain the required data.

NOTE: If the data has not been reported on CLP equivalent form, then the laboratory must provide the information necessary to evaluate the spike recoveries in the MS and MSD. The required data which should have been provided by the lab include the analytes and concentrations used for spiking, background concentrations of the spiked analytes (i.e., concentrations in unspiked sample), methods and equations used to calculate the QC acceptance criteria for the spiked analytes, percent recovery data for all spiked analytes.

The data reviewer must verify that all reported equations and percent recoveries are correct before proceeding to the next section.

4.3 Were matrix spikes performed at concentration equal to 100ug/L for acid compounds, and 200ug/l for base compounds (Method 3500B-4), or those specified in project plan. [ ] ___ ✓

4.4 How many semivolatile spike recoveries are outside Laboratory in house MS/MSD recovery limits (use recovery limits values in Method 8270D-43&44 Table 6 if in house values not available).

Water	Solids
___ out of ___	___ out of ___

YES NO N/A

4.5 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water	Solids
___ out of ___	___ out of ___

ACTION: Circle all outliers with red pencil.

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria to determine the need for some qualification of the data.

4.6 Was a Laboratory Control Sample (LCS) analyzed with each analytical batch? [✓] ___ ___

NOTE: When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

5.0 Blanks (Form IV/Equivalent)

5.1 Is the Method Blank Summary (Form IV) present? [✓] ___ ___

5.2 Frequency of Analysis:

Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? [✓] ___ ___

5.3 Has a method blank been analyzed either after

YES NO N/A

the calibration standard or at any other time during the analytical shift for each GC/MS system used ? [✓] ___ ___

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, use professional judgement to determine if the associated sample data should be qualified.

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for the semivolatiles? [✓] ___ ___

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ [✓] ___

6.2 Do any field/rinse/ blanks have positive results for target analytes and/or TICs (if required, see section 10 below)? ___ [✓] ___

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field Blanks must be qualified for outlying surrogates, poor spectra, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify sample results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

YES NO N/A

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

NOTE: If the laboratory did not report TIC analyses, check the project plans to verify whether or not it was required.

6.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

6.4 Was a instrument blank analyzed after each sample/dilution which contained a target compound

YES NO N/A

that exceeded the initial calibration range. ___ ___ ✓

6.5 Does the instrument blank have positive results for target analytes and/or TICs? ___ ✓ ___

Note: Use professional judgement to determine if carryover occurred and qualify analytes accordingly.

7.0 GC/MS Apparatus and Materials

7.1 Did the lab use the proper gas chromatographic column for analysis of semivolatiles by Method 8270D? Check raw data, instrument logs or contact the lab to determine what type of column was used. The method requires the use of 30 m x 0.25 mm ID (or 0.32 mm ID), silicone-coated, fused silica, capillary column. ✓ ___ ___

ACTION: If the specified column, or equivalent, was not used, document the effects in the data assessment. Use professional judgement to determine the acceptability of the data.

8.0 GC/MS Instrument Performance Check (Form V/Equivalent)

8.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)? ✓ ___ ___

NOTE: The performance solution should also contain 4,4-DDT, pentachlorophenol, and benzidine to verify injection port inertness and column performance. The degradation of DDT to DDE and DDD must be less than 20% total and the response of pentachlorophenol and benzidine should be within normal ranges for these compounds (based upon lab experience) and show no peak degradation or tailing before samples are analyzed. (see section 5.5

YES NO N/A

page 8270D-12).

8.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? ✓ ___ ___

8.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

8.4 Have the ion abundances been normalized to m/z 198? ✓ ___ ___

8.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

	YES	NO	N/A
ACTION: If ion abundance criteria are not met, take action specified in section 3.2			
8.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.)		✓	
8.7 Have the appropriate number of significant figures (two) been reported?	✓		
ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.			
8.8 Are the spectra of the mass calibration compound acceptable?	✓		
ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.			
9.0 Target Analytes			
9.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate	✓		
b. Matrix spikes and matrix spike duplicates			✓
c. Blanks	✓		
9.2 Has any special cleanup, such as GPC, been performed on all soil/sediment sample extracts (see section 7.2, page 8270D-14)?			✓

	YES	NO	N/A
ACTION: If data suggests that extract cleanup was not performed, use professional judgement. Make note in the data assessment narrative.			
9.3 Are the Reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?			
a. Samples and/or fractions as appropriate	✓		
b. Matrix spikes and matrix spike duplicates (Mass spectra not required)			✓
c. Blanks	✓		
ACTION: If any data are missing, take action specified in 3.2 above.			
9.4 Are the response factors shown in the Quant Report?	✓		
9.5 Is chromatographic performance acceptable with respect to:			
Baseline stability?	✓		
Resolution?	✓		
Peak shape?	✓		
Full-scale graph (attenuation)?	✓		
Other:_____			
ACTION: Use professional judgement to determine the acceptability of the data.			
9.6 Are the lab-generated standard mass spectra of identified semivolatile compounds present for			

	YES	NO	N/A
each sample?	✓		
ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the data assessment narrative. If spectra are missing, reject all positive data.			
9.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	✓		
9.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum?	✓		
9.9 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum?	✓		
ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 9.7, 9.8, and 9.9.			
ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.			

	YES	NO	N/A
10.0 Tentatively Identified Compounds (TIC)			
10.1 If Tentatively Identified Compounds were required for this project, are all Form Is, Part B present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier?			
NOTE: Review sampling reports to determine if the lab was required to identify non target analytes (refer to section 7.6.2, page 8270D-21).			
10.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:			✓
a. Samples and/or fractions as appropriate			✓
b. Blanks			✓
ACTION: If any TIC data are missing, take action specified in 3.2 above.			
ACTION: Add "JN" qualifier only to analytes identified by CAS #.			
10.3 Are any target compounds from one fraction listed as TIC compounds in another (e.g., an acid compound listed as a base neutral TIC)?			✓
ACTION: i. Flag with "R" any target compound listed as a TIC.			
ii. Make sure all rejected compounds are properly reported in the other fraction.			
10.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the			

YES NO N/A

sample mass spectrum? [ ] [ ] [✓]

10.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] [ ] [✓]

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate and remove "JN". Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R."

11.0 Compound Quantitation and Reported Detection Limits

11.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found? [ ] [✓] [ ]

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

11.2 Are the method detection limits adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] [ ] [✓]

YES NO N/A

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I (if present) and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red " X" across the entire page of all Form I's that should not be used, including any in the summary package.

12.0 Standards Data (GC/MS)

12.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration? [✓] [ ] [ ]

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

13.0 GC/MS Initial Calibration (Form VI/Equivalent)

13.1 Is the Initial Calibration Form (Form VI/ Equivalent) present and complete for the semivolatile fraction? [✓] [ ] [ ]

ACTION: If any calibration forms or standard row data are missing, take action specified in 3.2 above.

13.2 Are all base neutral or acid RRFs > 0.050? [✓] [ ] [ ]

YES NO N/A

Check the **average RRFs** of the four System Performance Check Compounds (SPCCs): N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. These compounds must have **average RRFs** greater than or equal to 0.05 before running samples and should not show any peak tailing.

ACTION: Circle all outliers in red.

ACTION: For any target analyte with **average RRF <0.05**

1. "R" all non-detects;

2. "J" all positive results.

13.3 Are response factors for base neutral or acid target analytes stable over the concentration range of the calibration (% Relative standard deviation (%RSD) < 20.0%)? [ ] [✓] [ ]

NOTE: The % RSD for each individual Calibration Check Compound (CCC, Method 8270D-40 see Table 4) must be less than 30% before analysis can begin. If grater 30%, the lab must clean and recalibrate the instrument.

CALIBRATION CHECK COMPOUNDS

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol

YES NO N/A

Benzo(a)pyrene

ACTION: If the %RSD for any CCC >30% and no corrective action taken, then "J" qualify all positive hits and "UJ" qualify all non-detects.

ACTION: Circle all outliers in red.

ACTION: If the % RSD is ≥ 20.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non- detect results for that analyte "R," unusable. Alternatively, the lab should calculate first or second order regression fit of the calibration curve and select the fit which introduces the least amount of error.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

13.4 Did the laboratory calculate the calibration curve by the least squares regression fit? [ ] [✓] [ ]

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) [ ] [✓] [ ]

ACTION: Circle Errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

13.5 Do the target compounds for this SDG include Pesticides? [ ] [✓] [ ]

YES NO N/A

13.6 If the pesticide compounds include DDT, was the percent breakdown of DDT to DDD and DDE greater than 20%? ___ ___ ✓

ACTION: If DDT percent breakdown exceeds 20%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE results are positive, qualify the quantitation limit for DDT as unusable, "R".

ii. Qualify all positive results for DDD and DDE as presumptively present at an approximate concentration "JN".

14.0 GC/MS Calibration Verification (Form VII/Equivalent)

14.1 Are the Calibration Verification Forms (Form VII) present and complete for all compounds of interest? ✓ ___ ___

14.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

_____

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed within twelve hours of every sample analysis,

YES NO N/A

call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

14.3 Do any of the SPCCs have an RRF <0.05? ___ ✓ ___

If YES, make a note in data assessment if the lab did not take corrective action specified in section 7.4.4, page 8270D-18. ✓ ___ ___

14.4 Do any of the CCCs have a %D between the initial and continuing RRF which exceeds 20.0%?

ACTION: If yes, make a note in data assessment.

14.5 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds 20.0%? ___ ✓ ___

ACTION: Circle all outliers in red.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is above 90%, qualify all non-detects for that analyte as "R", unusable.

14.6 Do any semivolatile compounds have a RRF < 0.05? ___ ✓ ___

ACTION: Circle all outliers in red.

ACTION: If RRF < 0.05, qualify as unusable ("R") associated non-detects and "J" associated positive values.

14.7 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or percent difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more). ___ ✓ ___

YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect(s) in the data assessments.

15.0 Internal Standards (Form VIII)

15.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to + 100%) for each continuing calibration? ✓ ___ ___

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area	LowerLimit	Upper Limit

(Attach additional sheets if necessary.)

Note: Check Table 5, 8270D-41 for associated analytes.

ACTION: i. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

ii. Non-detects associated with IS > 100% should not be qualified.

YES NO N/A

iii. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

15.2 Are the retention times of all internal standards within 30 seconds of the associated calibration standard? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

16.0 Laboratory Control Samples (LCS)

16.1 Were any LCS samples run in order to verify analytes which failed criteria for spike recovery? ___ ✓ ___

16.2 Did the lab spike LCS sample spiked with the same analytes and the same concentrations as the matrix spike? ___ ___ ✓

16.3 Were the mean and standard deviation of all analytes within the QC acceptance ranges as shown in Table 6, 8270D-43? ✓ ___ ___

ACTION: If the recovery of any analyte falls out of the designated range, the analytical results for that compound is suspect and should be qualified "J" in the unspiked samples.

17.0 Field Duplicates

17.1 Were any field duplicates submitted for semivolatile analysis? ___ ✓ ___

YES NO N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

DataQual
Environmental Services, LLC

CH2M HILL-VBO
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

December 11, 2013
SDG# 1307244, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1307244. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24 and 8270D-Rev 4, August 2008-SOP #HW-22,), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA	SVOA
VEP4-GW24-0713	1307244-01	water	X	X
VEP4-EB01-072413	1307244-02	water	X	X
VEP4-TB01-072413	1307244-03	water	X	

The following quality control samples were provided with this SDG: sample VEP4-EB01-072413- equipment blank and sample VEP4-TB01-072413- trip blank.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Field Duplicates NA
- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

5830 Amberway Drive • St. Louis, MO 63128 • 314-330-1327 • Fax 314-849-6264

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

No qualifications were required to the data.

SVOA

No qualifications were required to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to chain of custody records, sampling was performed on 7/24/13 and samples were received at the laboratory 7/25/13. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

SVOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.
U*	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.
RL**	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action -	The sample result is greater than the RL and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1307244

004

Glossary of Qualification Flags and Abbreviations, continued

R -	Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.
J -	Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.
J/UJ -	Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.
Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action -	The sample result is greater than the RL and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.
R -	Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.
J -	Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL	reporting limit
PQL	practical quantitation limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1307244

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QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BO	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Reanalysis or Reextraction
DI	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1307244

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ANALYSIS DATA SHEET

VEP4-GW24-0713

Laboratory:	Empirical Laboratories, LLC		SDG:	1307244	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1307244-01	File ID:	0724401D.D
Sampled:	07/24/13 10:13	Prepared:	07/31/13 10:26	Analyzed:	07/31/13 10:26
Solids:		Preparation:	5030B	Dilution:	2
Batch:	3G31007	Sequence:	3G21207	Calibration:	3205001

Instrument: MS-VOA5

CAS NO:	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene	1.06	0.500	1.00	2.00	~~U~~ J
156-59-2	cis-1,2-Dichloroethene		0.500	1.00	2.00	U
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene	5.14	0.500	1.00	2.00	~~U~~ J
79-01-6	Trichloroethene	246	0.200	0.400	1.00	~~U~~ J
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.61	95.4	75 - 120	
Dibromofluoromethane	30.00	28.91	96.4	85 - 115	
1,2-Dichloroethane-d4	30.00	29.77	99.2	70 - 120	
Toluene-d8	30.00	30.39	101	85 - 120	

ANALYSIS DATA SHEET

VEP4-EB01-072413

Laboratory:	Empirical Laboratories, LLC		SDG:	1307244	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID: 1307244-02		File ID:	0724402.D
Sampled:	07/24/13 11:20	Prepared:	07/31/13 10:54	Analyzed:	07/31/13 10:54
Solids:		Preparation:	5030B	Dilution:	1
Batch:	3G31007	Sequence: 3G21207	Calibration:	3505001	Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.20	97.3	75 - 120	
Dibromofluoromethane	30.00	29.54	98.5	85 - 115	
1,2-Dichloroethane-d4	30.00	29.21	97.4	70 - 120	
Toluene-d8	30.00	29.98	99.9	85 - 120	

WM 11/20/13

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ANALYSIS DATA SHEET

VEP4-TB01-072413

Laboratory:	Empirical Laboratories, LLC		SDG:	1307244	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID: 1307244-03		File ID:	0724403.D
Sampled:	07/24/13 11:25	Prepared:	07/31/13 11:21	Analyzed:	07/31/13 11:21
Solids:		Preparation:	5030B	Dilution:	1
Batch:	3G31007	Sequence: 3G21207	Calibration:	3505001	Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.03	96.8	75 - 120	
Dibromofluoromethane	30.00	29.42	98.1	85 - 115	
1,2-Dichloroethane-d4	30.00	28.65	95.5	70 - 120	
Toluene-d8	30.00	30.21	101	85 - 120	

WM 11/20/13

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ANALYSIS DATA SHEET

VEP4-GW24-0713

Laboratory:	Empirical Laboratories, LLC		SDG:	1307244	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID: 1307244-01		File ID:	0724401.D
Sampled:	07/24/13 10:15	Prepared:	07/31/13 16:30	Analyzed:	08/05/13 18:54
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3G31011	Sequence: 3H21904	Calibration:	3217001	Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.240	0.481	0.960	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	48.08	37.62	78.3	50 - 110	
Terphenyl-d14	48.08	40.61	84.5	50 - 135	
2,4,6-Tribromophenol	96.15	77.44	80.5	40 - 125	

WM 11/20/13

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ANALYSIS DATA SHEET

VEP4-EB01-072413

Laboratory:	Empirical Laboratories, LLC		SDG:	1307244	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID: 1307244-02		File ID:	0724402.D
Sampled:	07/24/13 11:20	Prepared:	07/31/13 16:30	Analyzed:	08/05/13 19:24
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3G31011	Sequence: 3H21904	Calibration:	3217001	Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.245	0.490	0.980	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	49.02	39.78	81.1	50 - 110	
Terphenyl-d14	49.02	41.33	84.1	50 - 135	
2,4,6-Tribromophenol	98.04	81.75	83.4	40 - 125	

WM 11/20/13

011

ELECTRONIC CHAIN OF CUSTODY RECORD

1307244

EMPIRICAL
621 Mainstream Dr.
Suite 270
Nashville, TN 37228

phone: 615-345-1115

C.O.C. 20130724-GW-EMP-01

Report to: (PLEASE PRINT)	Invoice to: (PLEASE PRINT)
Company Name: CH2MHILL	Company Name: See Contact
Address: 15010 Conference Dr. ; 200, Chantilly, VA 20151	Address:
Phone: 703.376.5301	Phone:
Fax: 703.376.5801	Fax:
Attn: Mike Zamboni	Attn:

Project Name/Number: [illegible]
Sampler (Print): not required
Sampler (Signature): not required
Purchase Order Number: 943380

	Sample Identification	Location	Date Collected	Time Collected	Time Zone	No. of Containers	Aq	Sed.	Soil	GW	Analysis 1	Analysis 2	Comments
01	VEP4-GW24-0713		7/24/13	10:15	AST	5				✓	X	X	(7 day TAT) MW-24
02	VEP4-EB01-072413		7/24/13	11:20	AST	5				✓	X	X	(normal TAT) equipment blank
03	VEP4-TB01-072413		7/24/13	11:25	AST	2				✓	X		(normal TAT) trip blank

Date Shipped: 07/24/13
Carrier: FedEx
Waybill No.: 796303061417

Shuttle Temperature:
Turnaround Requested: Check one ☐ Standard 2-3 wk ☒ One week ☐ 24/48 Hrs ☐ Other
Sample Disposal: ☐ Return to client ☐ Disposal by Lab
not applicable

Relinquished by	Date	Time	Received by	Relinquished by	Date	Time	Received by
[signature]	7/24/13	1200					
					7/25/13	0825	Received at lab by: [signature]

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

Note: The first sampled date of the ARF will be used as the COC number unless indicated otherwise.

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EMPIRICAL LABORATORIES
COOLER RECEIPT FORM

Cooler Received/Opened On: 07/25/13 @ 0825 Workorder# 1307244

1. Tracking # 1417 (last 4 digits, FedEx)
   Courier: FEDEX
2. Temperature of rep. sample or temp blank when opened: 1.6 °C + correction factor (0.0) = 1.6 °C
3. If item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO (NA)
4. Were custody seals on outside of cooler? (YES) NO NA
   If yes, how many and where: 2, 1 on front + 1 on back
5. Were the seals intact, signed, and dated correctly? (YES) NO NA
6. Were custody papers inside cooler? (YES) NO NA

I certify that I opened the cooler and answered questions 1-6 (initial) JG

7. Were custody seals on containers: YES (NO) and Intact YES NO (NA)
   Were these signed and dated correctly? YES NO (NA)
8. Packing material used? (Bubblewrap) (Plastic bag) Peanuts Vermiculite Foam Insert Paper Other None
9. Cooling process: (Ice) Ice-pack Ice (direct contact) Dry ice Other None
10. Did all containers arrive in good condition (unbroken)? (YES) NO NA
11. Were all container labels complete (#, date, signed, pres., etc)? (YES) NO NA
12. Did all container labels and tags agree with custody papers? (YES) NO NA
13. a. Were VOA vials received? (YES) NO NA
    b. Was there any observable headspace present in any VOA vial? YES (NO) NA
14. Was there a Trip Blank in this cooler? (YES) NO NA If multiple coolers, sequence # —

I certify that I unloaded the cooler and answered questions 7-14 (initial) JG

15. a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES NO (NA)
    b. Did the bottle labels indicate that the correct preservatives were used YES NO (NA)
16. Was residual chlorine present? YES NO (NA)

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial) JG

17. Were custody papers properly filled out (ink, signed, etc)? (YES) NO NA
18. Did you sign the custody papers in the appropriate place? (YES) NO NA
19. Were correct containers used for the analysis requested? (YES) NO NA
20. Was sufficient amount of sample sent in each container? (YES) NO NA

I certify that I entered this project into LIMS and answered questions 17-20 (initial) JG

I certify that I attached a label with the unique LIMS number to each container (initial) JG

I certify that I have performed a second check of the LIMS information against the COC to confirm accuracy (initial) [initials] 7/26/13

21. Were there Non-Conformance issues at login? YES (NO) Was a NCR generated? YES (NO) #

Additional Details:

013

Sample Delivery Group Case Narrative

Receipt Information

The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Changes to the Revision

This is an original submittal of the final report package

Analytical Information

All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:

The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

014

SW8260B:
Note – Sample 1307244-01 was analyzed at a 2x due to high concentrations of target analytes detected during screening. No lower analysis was able to be performed.

No additional anomalies or deviations are noted.

SW8270D BNA:
No anomalies or deviations are noted.

015

YES NO N/A

I. PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 180744 LAB: Empirical

SITE NAME: Vieques Sound 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ☑ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ☑ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ☑ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. VOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ☑ ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ☑ ___ ___

1.3 Sample Conditions/Problems

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ☑ ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

A 7/24/13 A 7/31
N 7/25 A 1/62

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ ☑ ___

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water ☑ ___ ___

b. Soil ☐ ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water ☑ ___ ___

b. Soil ☐ ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. ☑ ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? ☐ ___ ✓

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. ☐ ✓ ___

If yes, were samples reanalyzed? ☐ ___ ✓

Were method blanks reanalyzed? ☐ ___ ✓

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications;

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] [✓] ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ [✓]

C. Med Soil [ ] ___ [✓]

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ ___

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] [✓] ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent) NO MS/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] ___ [✓]

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] ___ [✓]

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month [page 8000C, section 9.5.])

a. Water [ ] ___ [✓]

b. Waste [ ] ___ [✓]

c. Soil/Solid [ ] ___ [✓]

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [ ] ___ [✓]

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ [✓]

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? ✓ ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? ✓ ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? ✓ ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? ✓ ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ✓ ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

VEP4-TB01-012413
VEP4-EB01-012413

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates ___ ___ ✓

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ___ ___ ✓

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? ✓ ___ ___

YES NO N/A

Resolution? ✓ ___ ___

Peak shape? ✓ ___ ___

Full-scale graph (attenuation)? ✓ ___ ___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? ✓ ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? ✓ ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ✓ ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ___ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

No TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ ✓

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ ✓

b. Blanks [ ] ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ ✓

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ ✓

11.5 Do TIC and "best match" standard relative ion intensitiss agree within ± 20%? [ ] ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2 (M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] ___ ✓

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? ✓ ___ ___

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? ✓ ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? ✓ ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39) qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. ✓ ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) [ ] [✓] ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? [✓] ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? [✓] ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). [ ] [✓] ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? [ ] [✓] ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds in section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? [✓] ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION: 1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.

2. Do not qualify non-detects when the associated IS area counts area > + 100%.

3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".

4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? [✓] ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ___ ✓ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

Sample VBPH-GW24-0713 run @ 1:2 dilution only

YES NO N/A

E - The concentration of this analyte exceeds the calibration range of the instrument.

A - Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: B07244 LAB: Empirical

SITE NAME: Vieques Sonnuze

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the data assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative or cover letter present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

YES NO N/A

II. **SEMIVOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? ✓ ___ ___

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, all non-detects data are qualified as unusable (R), and detects are flagged "J".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (10°C), flag all positive results "J" and all non-detects "UJ". t = 1.6°C

2.0 Holding Times

2.1 Have any semivolatile technical holding times, determined from date of collection to date of extraction, been exceeded? ___ ✓ ___

Continuous extraction of water samples for semivolatile analysis must be started within 7 days of the date of collection. Soil/sediment samples must be extracted within 14 days of collection. Extracts must be analyzed within

YES NO N/A

40 days of the date of extraction.

Table of Holding Time Violations

(See Traffic Report)

Sample ID	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted	Date Analyzed

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

YES NO N/A

3.0 Surrogate Recovery (Form II/Equivalent)

3.1 Have the semi volatile surrogate recoveries been listed on CLP Surrogate Recovery forms (Form II) for each of the following matrices:

a. Low Water [✓] ___ ___

b. Low/Med Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery Summary forms for each matrix:

a. Low Water [✓] ___ ___

b. Low/Med Soil [ ] ___ ___

ACTION: If CLP deliverables are unavailable, document the effect(s) in data assessments. In some cases the lab may have to be contacted to obtain the data necessary to complete the validation.

3.3 Were outliers marked correctly with an asterisk? [ ] ___ [✓]

ACTION: Circle all outliers in red.

3.4 Were two or more base neutral OR acid surrogate recoveries out of specification for any sample or method blank (Reviewer should use lab in house recovery limits. Use surrogate recovery limits from USEPA National Functional Guidlines January 2005 page 130, if in house limits are not available. See Method 8000B-43 or 8000C-24). [ ] [✓] ___

Note: Examine lab in house limits for reasonableness.

If yes, were samples re-analyzed? [ ] ___ [✓]

YES NO N/A

Were method blanks re-analyzed? [ ] ___ [✓]

ACTION: If all surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet method specifications, for the affected fraction only (i.e. either base-neutral or acid compounds):

1. Flag all positive results as estimated ("J").

2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.

3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Positive results for the fraction with < 10% surrogate recovery are qualified with "J".

2. Non-detects for that fraction should be qualified as unusable (R) .

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ [✓] ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document

YES NO N/A

effect in data assessments.

4.0 Matrix Spikes (Form III/Equivalent)

NO MS/MSD

4.1 Have the semivolatile Matrix Spike and Matrix Spike Duplicate/or duplicate unspiked Sample recoveries been listed on the Recovery Form (Form III)? [ ] ___ [✓]

NOTE: Method 3500B/page 4 states the spiking compounds:

Base/neutrals	Acids
1,2,4-Trichlorobenzene	Pentachlorophenol
Acenaphthene	Phenol
2,4-Dinitrotoluene	2-Chlorophenol
Pyrene	4-Chloro-3-methylphenol
N-Nitroso-di-n-propylamine	4-Nitrophenol
1,4-Dichlorobenzene	

Note: Some projects may require the spiking of specific compounds of interest.

Note: See Method 8270D-sec 8.4.2 for deciding on whether to prepare and analyze duplicate samples or a martix spike/matrix spike duplicate. If samples are expected to contain target analytes, then laboratory may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratory should use a matrix spike and matrix spike duplicate pair.

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water [ ] ___ [✓]

b. Low Solid [ ] ___ [✓]

c. Med Solid [ ] ___ [✓]

YES NO N/A

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. It may be necessary to contact the lab to obtain the required data.

NOTE: If the data has not been reported on CLP equivalent form, then the laboratory must provide the information necessary to evaluate the spike recoveries in the MS and MSD. The required data which should have been provided by the lab include the analytes and concentrations used for spiking, background concentrations of the spiked analytes (i.e., concentrations in unspiked sample), methods and equations used to calculate the QC acceptance criteria for the spiked analytes, percent recovery data for all spiked analytes.

The data reviewer must verify that all reported equations and percent recoveries are correct before proceeding to the next section.

4.3 Were matrix spikes performed at concentration equal to 100ug/L for Acid compounds, and 200ug/l for base compounds (Method 3500B-4), or those specified in project plan. [ ] ___ [✓]

4.4 How many semivolatile spike recoveries are outside Laboratory in house MS/MSD recovery limits (use recovery limits values in Method 8270D-43&44 Table 6 if in house values not available).

Water	Solids
____ out of ____	____ out of ____

YES NO N/A

4.5 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water ____ out of ____

Solids ____ out of ____

ACTION: Circle all outliers with red pencil.

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria to determine the need for some qualification of the data.

4.6 Was a Laboratory Control Sample (LCS) analyzed with each analytical batch? ✓ ___ ___

NOTE: When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

5.0 Blanks (Form IV/Equivalent)

5.1 Is the Method Blank Summary (Form IV) present? ✓ ___ ___

5.2 Frequency of Analysis:

Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? ✓ ___ ___

5.3 Has a method blank been analyzed either after

YES NO N/A

the calibration standard or at any other time during the analytical shift for each GC/MS system used ? ✓ ___ ___

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, use professional judgement to determine if the associated sample data should be qualified.

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for the semivolatiles? ✓ ___ ___

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ✓ ___

6.2 Do any field/rinse/ blanks have positive results for target analytes and/or TICs (if required, see section 10 below)? ___ ✓ ___

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field Blanks must be qualified for outlying surrogates, poor spectra, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify sample results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

YES NO N/A

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	≥ CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

NOTE: If the laboratory did not report TIC analyses, check the project plans to verify whether or not it was required.

6.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

6.4 Was a instrument blank analyzed after each sample/dilution which contained a target compound

	YES	NO	N/A
that exceeded the initial calibration range.	[ ]		✓
6.5 Does the instrument blank have positive results for target analytes and/or TICs?		✓	

Note: Use professional judgement to determine if carryover occurred and qualify analytes accordingly.

7.0 GC/MS Apparatus and Materials

	YES	NO	N/A
7.1 Did the lab use the proper gas chromatographic column for analysis of semivolatiles by Method 8270D? Check raw data, instrument logs or contact the lab to determine what type of column was used. The method requires the use of 30 m x 0.25 mm ID (or 0.32 mm ID), silicone-coated, fused silica, capillary column.	✓		

ACTION: If the specified column, or equivalent, was not used, document the effects in the data assessment. Use professional judgement to determine the acceptability of the data.

8.0 GC/MS Instrument Performance Check (Form V/Equivalent)

	YES	NO	N/A
8.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)?	✓		

NOTE: The performance solution should also contain 4,4-DDT, pentachlorophenol, and benzidine to verify injection port inertness and column performance. The degradation of DDT to DDE and DDD must be less than 20% total and the response of pentachlorophenol and benzidine should be within normal ranges for these compounds (based upon lab experience) and show no peak degradation or tailing before samples are analyzed. (see section 5.5

	YES	NO	N/A
page 8270D-12).			
8.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift?	✓		
8.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument?	✓		

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

	YES	NO	N/A
8.4 Have the ion abundances been normalized to m/z 198?	✓		
8.5 Have the ion abundance criteria been met for each instrument used?	✓		

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action specified in section 3.2

	YES	NO	N/A
8.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.)		✓	
8.7 Have the appropriate number of significant figures (two) been reported?	✓		

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.

	YES	NO	N/A
8.8 Are the spectra of the mass calibration compound acceptable?	✓		

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

9.0 Target Analytes

	YES	NO	N/A
9.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate	✓		
b. Matrix spikes and matrix spike duplicates	[ ]		✓
c. Blanks	✓		
9.2 Has any special cleanup, such as GPC, been performed on all soil/sediment sample extracts (see section 7.2, page 8270D-14)?	[ ]		✓

ACTION: If data suggests that extract cleanup was not performed, use professional judgement. Make note in the data assessment narrative.

	YES	NO	N/A
9.3 Are the Reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?			
a. Samples and/or fractions as appropriate	✓		
b. Matrix spikes and matrix spike duplicates (Mass spectra not required)	[ ]		✓
c. Blanks	✓		

ACTION: If any data are missing, take action specified in 3.2 above.

	YES	NO	N/A
9.4 Are the response factors shown in the Quant Report?	✓		
9.5 Is chromatographic performance acceptable with respect to:			
Baseline stability?	✓		
Resolution?	✓		
Peak shape?	✓		
Full-scale graph (attenuation)?	✓		
Other:_____	[ ]		

ACTION: Use professional judgement to determine the acceptability of the data.

9.6 Are the lab-generated standard mass spectra of identified semivolatile compounds present for

YES NO N/A

each sample? ✓ ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the data assessment narrative. If spectra are missing, reject all positive data.

9.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? ✓ ___ ___

9.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ✓ ___ ___

9.9 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ✓ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 9.7, 9.8, and 9.9.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

YES NO N/A

10.0 Tentatively Identified Compounds (TIC)

10.1 If Tentatively Identified Compounds were required for this project, are all Form Is, Part B present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier? No TICs

NOTE: Review sampling reports to determine if the lab was required to identify non target analytes (refer to section 7.6.2, page 8270D-21).

10.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following: [ ] ___ ✓

a. Samples and/or fractions as appropriate [ ] ___ ✓

b. Blanks [ ] ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by CAS #.

10.3 Are any target compounds from one fraction listed as TIC compounds in another (e.g., an acid compound listed as a base neutral TIC)? ___ [ ] ✓

ACTION: i. Flag with "R" any target compound listed as a TIC.

ii. Make sure all rejected compounds are properly reported in the other fraction.

10.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the

YES NO N/A

sample mass spectrum? [ ] ___ ✓

10.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate and remove "JN". Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R."

11.0 Compound Quantitation and Reported Detection Limits

11.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found? ___ ✓ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

11.2 Are the method detection limits adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ ✓

YES NO N/A

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I (if present) and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's that should not be used, including any in the summary package.

12.0 Standards Data (GC/MS)

12.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration? ✓ ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

13.0 GC/MS Initial Calibration (Form VI/Equivalent)

13.1 Is the Initial Calibration Form (Form VI/Equivalent) present and complete for the semivolatile fraction? ✓ ___ ___

ACTION: If any calibration forms or standard row data are missing, take action specified in 3.2 above.

13.2 Are all base neutral or acid RRFs > 0.050? ✓ ___ ___

YES NO N/A

Check the **average RRFs** of the four System Performance Check Compounds (SPCCs): N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. These compounds must have **average RRFs** greater than or equal to 0.05 before running samples and should not show any peak tailing.

ACTION: Circle all outliers in red.

ACTION: For any target analyte with **average RRF <0.05**

1. "R" all non-detects;
2. "J" all positive results.

13.3 Are response factors for base neutral or acid target analytes stable over the concentration range of the calibration (% Relative standard deviation [%RSD] < 20.0%)? ___ ✓ ___

NOTE: The % RSD for each individual Calibration Check Compound (CCC, Method 8270D-40 see Table 4) must be less than 30% before analysis can begin. If grater 30%, the lab must clean and recalibrate the instrument.

CALIBRATION CHECK COMPOUNDS

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol

YES NO N/A

Benzo(a)pyrene

ACTION: If the %RSD for any CCC >30% and no corrective action taken, then "J" qualify all positive hits and "UJ" qualify all non-detects.

ACTION: Circle all outliers in red.

ACTION: If the % RSD is ≥ 20.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non- detect results for that analyte "R," unusable. Alternatively, the lab should calculate first or second order regression fit of the calibration curve and select the fit which introduces the least amount of error.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

13.4 Did the laboratory calculate the calibration curve by the least squares regression fit? ___ ✓ ___

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) ___ ✓ ___

ACTION: Circle Errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

13.5 Do the target compounds for this SDG include Pesticides? ___ ✓ ___

YES NO N/A

13.6 If the pesticide compounds include DDT, was the percent breakdown of DDT to DDD and DDE greater than 20%? ___ ✓ ___

ACTION: If DDT percent breakdown exceeds 20%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE results are positive, qualify the quantitation limit for DDT as unusable, "R".

ii. Qualify all positive results for DDD and DDE as presumptively present at an approximate concentration "JN".

14.0 GC/MS Calibration Verification (Form VII/Equivalent)

14.1 Are the Calibration Verification Forms (Form VII) present and complete for all compounds of interest? ✓ ___ ___

14.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

ACTION: If any forms are missing or no calibration verification standard has been analyzed within twelve hours of every sample analysis,

YES NO N/A

call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

14.3 Do any of the SPCCs have an RRF <0.05? ___ ✓ ___

If YES, make a note in data assessment if the lab did not take corrective action specified in section 7.4.4, page 8270D-18. ✓ ___ ___

14.4 Do any of the CCCs have a %D between the initial and continuing RRF which exceeds 20.0%?

ACTION: If yes, make a note in data assessment.

14.5 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds 20.0%? ___ ✓ ___

ACTION: Circle all outliers in red.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is above 90%, qualify all non-detects for that analyte as "R", unusable.

14.6 Do any semivolatile compounds have a RRF < 0.05? ___ ✓ ___

ACTION: Circle all outliers in red.

ACTION: If RRF < 0.05, qualify as unusable ("R") associated non-detects and "J" associated positive values.

14.7 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or percent difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more). ___ ✓ ___

YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect(s) in the data assessments.

15.0 Internal Standards (Form VIII)

15.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to + 100%) for each continuing calibration? ✓ ___ ___

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area	LowerLimit	Upper Limit

(Attach additional sheets if necessary.)

Note: Check Table 5, 8270D-41 for associated analytes.

ACTION: i. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

ii. Non-detects associated with IS > 100% should not be qualified.

YES NO N/A

iii. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

15.2 Are the retention times of all internal standards within 30 seconds of the associated calibration standard? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

16.0 Laboratory Control Samples (LCS)

16.1 Were any LCS samples run in order to verify analytes which failed criteria for spike recovery? ___ ✓ ___

16.2 Did the lab spike LCS sample spiked with the same analytes and the same concentrations as the matrix spike? ___ ___ ✓

16.3 Were the mean and standard deviation of all analytes within the QC acceptance ranges as shown in Table 6, 8270D-43? ✓ ___ ___

ACTION: If the recovery of any analyte falls out of the designated range, the analytical results for that compound is suspect and should be qualified "J" in the unspiked samples.

17.0 Field Duplicates

17.1 Were any field duplicates submitted for semivolatile analysis? ___ ✓ ___

YES NO N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

DataQual
Environmental Services, LLC

CH2M HILL-VBO
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

December 11, 2013
SDG# 1309210, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1309210. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24 and 8270D-Rev 4, August 2008-SOP #HW-22.), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA	SVOA
VEP4-GW30-0913	1309210-01	water	X	X
VEP4-GW26-0913	1309210-02	water	X	X
VEP4-TB01-092413	1309210-03	water	X	
VEP4-EB01-092413-GW	1309210-04	water	X	X

The following quality control samples were provided with this SDG: sample VEP4-EB01-092413-GW- equipment blank and sample VEP4-TB01-092413- trip blank.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Field Duplicates NA
- Identification/Quantitation *
- Reporting Limits *

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- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

No qualifications were required to the data.

SVOA

No qualifications were required to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to chain of custody records, sampling was performed on 9/24/13 and samples were received at the laboratory 9/26/13. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

SVOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U not detected above the reported sample quantitation limit
J estimated value
UJ reported quantitation limit is qualified as estimated
N analyte has been tentatively identified
JN analyte has been tentatively identified, estimated value
R result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.

U* The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.

RL** The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.

J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.

Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL	reporting limit
PQL	practical quantitation limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

ANALYSIS DATA SHEET

VEP4-GW30-0913

Laboratory: Empirical Laboratories, LLC SDG: 1309210
Client: CH2M Hill, Inc Project: Vieques East SWMU 20
Matrix: Water Laboratory ID: 1309210-01 File ID: 0921001.D
Sampled: 09/24/13 09:55 Prepared: 10/03/13 16:22 Analyzed: 10/03/13 16:22
Solids: Preparation: 5030B Dilution: 1
Batch: 3J03017 Sequence: 3J27715 Calibration: 3268003 Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene	**1.88**	0.100	0.200	0.500	
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.94	99.8	75 - 120	
Dibromofluoromethane	30.00	30.10	100	85 - 115	
1,2-Dichloroethane-d4	30.00	30.00	100	70 - 120	
Toluene-d8	30.00	30.37	101	85 - 120	

MM 11/19/13

ANALYSIS DATA SHEET

VEP4-GW26-0913

Laboratory: Empirical Laboratories, LLC SDG: 1309210
Client: CH2M Hill, Inc Project: Vieques East SWMU 20
Matrix: Water Laboratory ID: 1309210-02 File ID: 0921002.D
Sampled: 09/24/13 12:10 Prepared: 10/03/13 16:50 Analyzed: 10/03/13 18:50
Solids: Preparation: 5030B Dilution: 1
Batch: 3J03017 Sequence: 3J27715 Calibration: 3268003 Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene	**0.730**	0.250	0.500	1.00	J
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene	**12.6**	0.100	0.200	0.500	
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.70	99.0	75 - 120	
Dibromofluoromethane	30.00	29.61	98.7	85 - 115	
1,2-Dichloroethane-d4	30.00	31.05	104	70 - 120	
Toluene-d8	30.00	30.46	102	85 - 120	

MM 11/19/13

ANALYSIS DATA SHEET

VEP4-TB01-092413

Laboratory: Empirical Laboratories, LLC | SDG: 1309210
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1309210-03 | File ID: 0921003.D
Sampled: 09/24/13 13:15 | Prepared: 10/03/13 13:08 | Analyzed: 10/03/13 13:08
Solids: | Preparation: 5030B | Dilution: 1
Batch: 3103017 | Sequence: 3127715 | Calibration: 3268003 | Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.96	99.9	75 - 120	
Dibromofluoromethane	30.00	29.76	99.2	85 - 115	
1,2-Dichloroethane-d4	30.00	29.49	98.3	70 - 120	
Toluene-d8	30.00	30.17	101	85 - 120	

MM 11/19/13

010

ANALYSIS DATA SHEET

VEP4-EB01-092413-GW

Laboratory: Empirical Laboratories, LLC | SDG: 1309210
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1309210-04 | File ID: 0921004.D
Sampled: 09/24/13 14:35 | Prepared: 10/03/13 14:31 | Analyzed: 10/03/13 14:31
Solids: | Preparation: 5030B | Dilution: 1
Batch: 3103017 | Sequence: 3127715 | Calibration: 3268003 | Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.71	99.0	75 - 120	
Dibromofluoromethane	30.00	30.25	101	85 - 115	
1,2-Dichloroethane-d4	30.00	31.48	105	70 - 120	
Toluene-d8	30.00	29.34	97.8	85 - 120	

MM 11/19/13

011

ANALYSIS DATA SHEET

VEP4-GW36-0913

Laboratory: Empirical Laboratories, LLC | SDG: 1309210
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1309210-01 | File ID: 0921001.D
Sampled: 09/24/13 09:55 | Prepared: 10/01/13 18:26 | Analyzed: 10/18/13 18:26
Solids: | Preparation: EXT_3510 | Dilution: 1
Batch: 3101013 | Sequence: 3129414 | Calibration: 3217001 | Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.231	0.463	0.926	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	46.30	42.57	92.0	50 - 110	
Terphenyl-d14	46.30	39.06	84.4	50 - 135	
2,4,6-Tribromophenol	92.59	87.54	94.5	40 - 125	

MM 11/19/13

012

ANALYSIS DATA SHEET

VEP4-GW26-0913

Laboratory: Empirical Laboratories, LLC | SDG: 1309210
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1309210-02 | File ID: 0921002.D
Sampled: 09/24/13 12:10 | Prepared: 10/01/13 18:26 | Analyzed: 10/18/13 18:54
Solids: | Preparation: EXT_3510 | Dilution: 1
Batch: 3101013 | Sequence: 3129414 | Calibration: 3217001 | Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.231	0.463	0.926	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	46.30	45.23	97.7	50 - 110	
Terphenyl-d14	46.30	31.68	68.4	50 - 135	
2,4,6-Tribromophenol	92.59	91.19	98.5	40 - 125	

MM 11/19/13

013

ANALYSIS DATA SHEET

VEP4-EB01-092413-GW

Laboratory:	Empirical Laboratories, LLC		SDG:	1309210	
Client:	CH2M Hill, Inc.		Project:	Niagara East SWMU 20	
Matrix:	Water	Laboratory ID:	1309210-04	File ID:	0921004.D
Sampled:	09/24/13 14:35	Prepared:	10/01/13 18:26	Analyzed:	10/18/13 19:22
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3B0103	Sequence:	3D0414	Calibration:	3217003	Instrument:	MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.240	0.481	0.962	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	48.08	47.64	99.1	50 - 110	
Terphenyl-d14	48.08	40.94	85.2	58 - 135	
2,4,6-Tribromophenol	96.15	98.04	102	40 - 125	

EMPIRICAL LABORATORIES, LLC - CHAIN OF CUSTODY RECORD
SHIP TO: 621 Mainstream Drive, Suite 270 • Nashville, TN 37228 • 615-345-1115 • (fax) 615-846-5426

Send Results to: Name Julianna Dean; Company CH2M Hill; Address 5701 Cleveland St.; City VA Beach; State, Zip VA 23462; Phone (757) 671-6232; Fax; E-mail julianna.dean@ch2m.com

Send Invoice to: Name Julianna Dean; Company CH2M Hill; Address 5701 Cleveland St.; City VA Beach; State, Zip VA 23462; Phone (757) 671-6232; Fax; E-mail julianna.dean@ch2m.com

Project No./Name: 473343.FS.PK.20 / Niagara 20

Sampler's (Signature): [signature]

Analysis Requirements: 8260C and 8260C-low; 8270C and 8270C-low

Lab Use Only: VOA Headspace Y N NA; Field Filtered Y N NA; Correct Containers Y N NA; Discrepancies Y N NA; Cust. Seals Intact Y N NA; Containers Intact Y N NA; Airbill #: ; CAR #:

Lab Use Only Lab #	Date/Time Sampled	Sample Description	Sample Matrix	8260C and 8260C-low	8270C and 8270C-low	Comments	No. of Bottles	Lab Use Only Containers/Pres.
01	9/24/13 0955	VEP4-GW030-0913	GW	3	2		5	
02	1210	VEP4-GW36-0913		3	2		5	
03	1315	VEP4-TB01-092413		2			2	
04	1435	VEP4-EB01-092413-GW		3	2		5	

Sample Kd Prep'd by: (Signature) Date/Time; Received By: (Signature)
Relinquished by: (Signature) Date/Time 9/25/13 1700; Received By: (Signature)
Relinquished by: (Signature) Date/Time; Received By: (Signature)
Received for Laboratory by: (Signature) Date/Time 9/26/13 0930; Temperature 0.3 int.

REMARKS: P.O. 943380

Details: Page 1 of 1; Cooler No. 1 of 1; Date Shipped 9/25/13; Shipped by Jackson; Turnaround

Original and yellow copies accompany sample shipment to laboratory. Pink retained by samplers.

1309210 Summ Package

EMPIRICAL LABORATORIES
COOLER RECEIPT FORM

Cooler Received/Opened On: 09/26/13 @ 0830 Workorder# 1309210

1. Tracking # 2064 (last 4 digits, FedEx)
   Courier: FedEx
2. Temperature of rep. sample or temp blank when opened: 0.3 °C + correction factor (0.0) = 0.3 °C
3. If item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA
4. Were custody seals on outside of cooler? YES NO NA
   If yes, how many and where: 2. Front + back
5. Were the seals intact, signed, and dated correctly? YES NO NA
6. Were custody papers inside cooler? YES NO NA
   I certify that I opened the cooler and answered questions 1-6 (initial) JG
7. Were custody seals on containers: YES NO and intact YES NO NA
   Were these signed and dated correctly? YES NO NA
8. Packing material used: Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry Ice Other None
10. Did all containers arrive in good condition (unbroken)? YES NO NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES NO NA
12. Did all container labels and tags agree with custody papers? YES NO NA
13. a. Were VOA vials received? YES NO NA
    b. Was there any observable headspace present in any VOA vial? YES NO NA
14. Was there a Trip Blank in this cooler? YES NO NA If multiple coolers, sequence # ____
    I certify that I unloaded the cooler and answered questions 7-14 (initial) JG
15. a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES NO NA
    b. Did the bottle labels indicate that the correct preservatives were used YES NO NA
16. Was residual chlorine present? YES NO NA
    I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial) JG
17. Were custody papers properly filled out (ink, signed, etc)? YES NO NA
18. Did you sign the custody papers in the appropriate place? YES NO NA
19. Were correct containers used for the analysis requested? YES NO NA
20. Was sufficient amount of sample sent in each container? YES NO NA
    I certify that I entered this project into LIMS and answered questions 17-20 (initial) JG
    I certify that I attached a label with the unique LIMS number to each container (initial) JG
    I certify that I have performed a second check of the LIMS information against the COC to confirm accuracy (initial) ____
21. Were there Non-Conformance issues at login? YES NO Was a NCR generated? YES NO #____

Additional Details:

Sample Delivery Group Case Narrative

Receipt Information
The samples were r eceived within the preservation guidelines for the associat ed methods. The information associated with sa mple receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Changes to the Revision
Revision 01: The package was revised to change the compound list for the SW8260B samples to 1,1-Dichloroethene, trans-1,2-Dichloroethene, cis-1,2-Dichloroethene, Trichloroethene, Tetrachloroethene, and Vinyl Chloride.
Revision 02: The package was revised to remove unnecessary pages left after revision 01.

Analytical Information
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the progr am and method guidelines. Sample prep a nd dilution information is provided within the final resu lts report and at the beginning of each for m set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:
The following letters are used to denote m anual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not inte grated in the original chromatogram.
B: The peak was manually integr ated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the origina l chromatogram.
D: The peak was manually integrated to i dentify the correct peak as the wrong pea k was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

SW8260B:
The following batch spikes exceeded criteria:
3J03017-BS1 with a positive bias for Acetone

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

SW8270D LLBNA:
No anomalies or deviations are noted.

018

YES NO N/A

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 1309210 LAB: Empirical

SITE NAME: Vieques SWMU 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. **VOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓ ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓ ___ ___

1.3 Sample Conditions/Problems

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ ✓ ___

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water ✓ ___ ___

b. Soil ___ ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water ✓ ___ ___

b. Soil ___ ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. [✓] ___ ___

lab

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ [✓]

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] [✓] ___

If yes, were samples reanalyzed? [ ] ___ [✓]

Were method blanks reanalyzed? [ ] ___ [✓]

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] [✓] ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ [✓]

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] [✓] ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent)

NW MS/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] ___ [✓]

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] ___ [✓]

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month (page 8000C, section 9.5.1)

a. Water ___ ___ ✓

b. Waste ___ ___ ✓

c. Soil/Solid ___ ___ ✓

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. ___ ___ ✓

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. ___ ___ ✓

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

025

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? ✓ ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? ✓ ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? ✓ ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? ✓ ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ✓ ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

VEPH-TB01-092413
VEPH-EB01-092413-GW) > MDL

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone
** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ✓ ___ ___
b. Matrix spikes and matrix spike duplicates ___ ___ ✓
c. Blanks ✓ ___ ___
d. Laboratory Control Samples ✓ ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ✓ ___ ___
b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ___ ___ ✓
c. Blanks ✓ ___ ___
d. Laboratory Control Samples ✓ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? ✓ ___ ___

YES NO N/A

Resolution? [✓] ___ ___

Peak shape? [✓] ___ ___

Full-scale graph (attenuation)? [✓] ___ ___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

no TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ [✓]

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ [✓]

b. Blanks [ ] ___ [✓]

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ [✓]

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ [✓]

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ [✓]

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] [✓] ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ [✓]

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? ✓ ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39)qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. ✓ ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) ___ ✓ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? ✓ ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). ___ ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds in section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? ✓ ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION: 1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.

2. Do not qualify non-detects when the associated IS are counts area > + 100%.

3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".

4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ___ ✓ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

DataQual

VOA

Initial Calibration Date: 9/24/2013
RRF and %RSD Calculations:
Compound Name: vinyl chloride
Lab Value: 0.1851

Area of Compound	1542663
Area of Internal STD	1250292
Conc. of Internal STD	30
Conc. of Compound	200
Calculated RRF	0.185

Compound Name: 1,1-dichloroethene
Lab Value: 5.1

RRF of STD 1	0.2574
RRF of STD 2	0.2519
RRF of STD 3	0.2377
RRF of STD 4	0.2710
RRF of STD 5	0.2411
RRF of STD 6	0.2742
RRF of STD 7	0.2637
RRF of STD 8	0.2715
RRF of STD 9	0.2630
Calculated % RSD	5.1

Continuing Calibration File ID: 10/3/2013
RRF and %D Calculations:
Compound Name: cis-1,2-dichloroethene
Lab Value: 0.283

Area of Compound	1116264
Area of Internal STD	1185073
Conc. of Internal STD	30
Conc. of Compound	100
Calculated RRF	0.283

Compound Name: trichloroethene
Lab Value: 3.1

Average RRF	0.265
Calibration Check RRF	0.257
Calculated % D	3.1

YES NO N/A

E - The concentration of this analyte exceeds the calibration range of the instrument.

A - Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 1309210 LAB: Emperical

SITE NAME: Vieques SWMU 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the data assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative or cover letter present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

YES NO N/A

II. SEMIVOLATILE ANALYSES

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? ✓ ___ ___

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, all non-detects data are qualified as unusable (R), and detects are flagged "J".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (10°C), flag all positive results "J" and all non-detects "UJ". t 0.5°C

2.0 Holding Times

2.1 Have any semivolatile technical holding times, determined from date of collection to date of extraction, been exceeded? ___ ✓ ___

Continuous extraction of water samples for semivolatile analysis must be started within 7 days of the date of collection. Soil/sediment samples must be extracted within **14** days of collection. Extracts must be analyzed within

YES NO N/A

40 days of the date of extraction.

Table of Holding Time Violations

Sample ID	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted (See Traffic Report)	Date Analyzed

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

YES NO N/A

3.0 Surrogate Recovery (Form II/Equivalent)

3.1 Have the semi volatile surrogate recoveries been listed on CLP Surrogate Recovery forms (Form II) for each of the following matrices:

a. Low Water ✓ ___ ___

b. Low/Med Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery Summary forms for each matrix:

a. Low Water ✓ ___ ___

b. Low/Med Soil [ ] ___ ___

ACTION: If CLP deliverables are unavailable, document the effect(s) in data assessments. In some cases the lab may have to be contacted to obtain the data necessary to complete the validation.

3.3 Were outliers marked correctly with an asterisk? [ ] ___ ✓

ACTION: Circle all outliers in red.

3.4 Were two or more base neutral OR acid surrogate recoveries out of specification for any sample or method blank (Reviewer should use lab in house recovery limits. Use surrogate recovery limits from USEPA National Functional Guidlines January 2005 page 130, if in house limits are not available. See Method 8000B-43 or 8000C-24). [ ] ✓ ___

Note: Examine lab in house limits for reasonableness.

If yes, were samples re-analyzed? [ ] ___ ✓

YES NO N/A

Were method blanks re-analyzed? [ ] ___ ✓

ACTION: If all surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet method specifications, for the affected fraction only (i.e. either base-neutral or acid compounds):

1. Flag all positive results as estimated ("J").

2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.

3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Positive results for the fraction with < 10% surrogate recovery are qualified with "J".

2. Non-detects for that fraction should be qualified as unusable (R) .

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ ✓ ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document

YES NO N/A

effect in data assessments.

4.0 Matrix Spikes (Form III/Equivalent)

No MS/MSD

4.1 Have the semivolatile Matrix Spike and Matrix Spike Duplicate/or duplicate unspiked Sample recoveries been listed on the Recovery Form (Form III)? ___ ___ ✓

NOTE: Method 3500B/page 4 states the spiking compounds:

Base/neutrals	Acids
1,2,4-Trichlorobenzene	Pentachlorophenol
Acenaphthene	Phenol
2,4-Dinitrotoluene	2-Chlorophenol
Pyrene	4-Chloro-3-methylphenol
N-Nitroso-di-n-propylamine	4-Nitrophenol
1,4-Dichlorobenzene	

Note: Some projects may require the spiking of specific compounds of interest.

Note: See Method 8270D-sec 8.4.2 for deciding on whether to prepare and analyze duplicate samples or a martix spike/matrix spike duplicate. If samples are expected to contain target analytes, then laboratory may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratory should use a matrix spike and matrix spike duplicate pair.

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water ___ ___ ✓

b. Low Solid ___ ___ ✓

c. Med Solid ___ ___ ✓

YES NO N/A

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. It may be necessary to contact the lab to obtain the required data.

NOTE: If the data has not been reported on CLP equivalent form, then the laboratory must provide the information necessary to evaluate the spike recoveries in the MS and MSD. The required data which should have been provided by the lab include the analytes and concentrations used for spiking, background concentrations of the spiked analytes (i.e., concentrations in unspiked sample), methods and equations used to calculate the QC acceptance criteria for the spiked analytes, percent recovery data for all spiked analytes.

The data reviewer must verify that all reported equations and percent recoveries are correct before proceeding to the next section.

4.3 Were matrix spikes performed at concentration equal to 100ug/L for acid compounds, and 200ug/l for base compounds (Method 3500B-4), or those specified in project plan. ___ ___ ✓

4.4 How many semivolatile spike recoveries are outside Laboratory in house MS/MSD recovery limits (use recovery limits values in Method 8270D-43&44 Table 6 if in house values not available).

Water	Solids
___ out of ___	___ out of ___

YES NO N/A

4.5 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water	Solids
___ out of ___	___ out of ___

ACTION: Circle all outliers with red pencil.

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria to determine the need for some qualification of the data.

4.6 Was a Laboratory Control Sample (LCS) analyzed with each analytical batch? ✓ ___ ___

NOTE: When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

5.0 Blanks (Form IV/Equivalent)

5.1 Is the Method Blank Summary (Form IV) present? ✓ ___ ___

5.2 Frequency of Analysis:

Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? ___ ✓ ___

5.3 Has a method blank been analyzed either after

YES NO N/A

the calibration standard or at any other time during the analytical shift for each GC/MS system used ? ✓ ___ ___

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, use professional judgement to determine if the associated sample data should be qualified.

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for the semivolatiles? ✓ ___ ___

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ✓ ___

6.2 Do any field/rinse/ blanks have positive results for target analytes and/or TICs (if required, see section 10 below)? ___ ✓ ___

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field Blanks must be qualified for outlying surrogates, poor spectra, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify sample results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

YES NO N/A

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

NOTE: If the laboratory did not report TIC analyses, check the project plans to verify whether or not it was required.

6.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

6.4 Was a instrument blank analyzed after each sample/dilution which contained a target compound

YES NO N/A

that exceeded the initial calibration range. ___ ___ ✓

6.6 Does the instrument blank have positive results for target analytes and/or TICs? ___ ✓ ___

Note: Use professional judgement to determine if carryover occurred and qualify analytes accordingly.

7.0 GC/MS Apparatus and Materials

7.1 Did the lab use the proper gas chromatographic column for analysis of semivolatiles by Method 8270D? Check raw data, instrument logs or contact the lab to determine what type of column was used. The method requires the use of 30 m x 0.25 mm ID (or 0.32 mm ID), silicone-coated, fused silica, capillary column. ✓ ___ ___

ACTION: If the specified column, or equivalent, was not used, document the effects in the data assessment. Use professional judgement to determine the acceptability of the data.

8.0 GC/MS Instrument Performance Check (Form V/Equivalent)

8.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)? ✓ ___ ___

NOTE: The performance solution should also contain 4,4-DDT, pentachlorophenol, and benzidine to verify injection port inertness and column performance. The degradation of DDT to DDE and DDD must be less than 20% total and the response of pentachlorophenol and benzidine should be within normal ranges for these compounds (based upon lab experience) and show no peak degradation or tailing before samples are analyzed. (see section 5.5

YES NO N/A

page 8270D-12).

8.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? ✓ ___ ___

8.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

8.4 Have the ion abundances been normalized to m/z 198? ✓ ___ ___

8.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

YES NO N/A

ACTION: If ion abundance criteria are not met, take action specified in section 3.2

8.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.) ___ ✓ ___

8.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.

8.8 Are the spectra of the mass calibration compound acceptable? ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

9.0 Target Analytes

9.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates ___ ___ ✓

c. Blanks ✓ ___ ___

9.2 Has any special cleanup, such as GPC, been performed on all soil/sediment sample extracts (see section 7.2, page 8270D-14)? ___ ___ ✓

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YES NO N/A

ACTION: If data suggests that extract cleanup was not performed, use professional judgement. Make note in the data assessment narrative.

9.3 Are the Reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ___ ___ ✓

c. Blanks ✓ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

9.4 Are the response factors shown in the Quant Report? ✓ ___ ___

9.5 Is chromatographic performance acceptable with respect to:

Baseline stability? ✓ ___ ___

Resolution? ✓ ___ ___

Peak shape? ✓ ___ ___

Full-scale graph (attenuation)? ✓ ___ ___

Other:_____ ___ ___ ___

ACTION: Use professional judgement to determine the acceptability of the data.

9.6 Are the lab-generated standard mass spectra of identified semivolatile compounds present for

058

YES NO N/A

each sample? ✓ ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the data assessment narrative. If spectra are missing, reject all positive data.

9.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? ✓ ___ ___

9.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ✓ ___ ___

9.9 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ✓ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 9.7, 9.8, and 9.9.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

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YES NO N/A

10.0 Tentatively Identified Compounds (TIC)

10.1 If Tentatively Identified Compounds were required for this project, are all Form Is, Part B present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier? NW TICs

NOTE: Review sampling reports to determine if the lab was required to identify non target analytes (refer to section 7.6.2,page 8270D-21).

10.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following: ___ ___ ✓

a. Samples and/or fractions as appropriate ___ ___ ✓

b. Blanks ___ ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by CAS #.

10.3 Are any target compounds from one fraction listed as TIC compounds in another (e.g., an acid compound listed as a base neutral TIC)? ___ ___ ✓

ACTION: i. Flag with "R" any target compound listed as a TIC.

ii. Make sure all rejected compounds are properly reported in the other fraction.

10.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the

060

YES NO N/A

sample mass spectrum? [ ] ___ ✓

10.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate and remove "JN". Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R."

11.0 Compound Quantitation and Reported Detection Limits

11.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found? ___ [✓] ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

11.2 Are the method detection limits adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ ✓

YES NO N/A

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I (if present) and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red " X" across the entire page of all Form I's that should not be used, including any in the summary package.

12.0 Standards Data (GC/MS)

12.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

13.0 GC/MS Initial Calibration (Form VI/Equivalent)

13.1 Is the Initial Calibration Form (Form VI/ Equivalent) present and complete for the semivolatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard row data are missing, take action specified in 3.2 above.

13.2 Are all base neutral or acid RRFs > 0.050? [✓] ___ ___

YES NO N/A

Check the **average RRFs** of the four System Performance Check Compounds (SPCCs): N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. These compounds must have **average RRFs** greater than or equal to 0.05 before running samples and should not show any peak tailing.

ACTION: Circle all outliers in red.

ACTION: For any target analyte with **average RRF <0.05**

1. "R" all non-detects;
2. "J" all positive results.

13.3 Are response factors for base neutral or acid target analytes stable over the concentration range of the calibration (% Relative standard deviation [%RSD] < 20.0%)? [✓] ___ ___

NOTE: The % RSD for each individual Calibration Check Compound (CCC, Method 8270D-40 see Table 4) must be less than 30% before analysis can begin. If grater 30%, the lab must clean and recalibrate the instrument.

CALIBRATION CHECK COMPOUNDS

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol

YES NO N/A

Benzo(a)pyrene

ACTION: If the %RSD for any CCC >30% and no corrective action taken, then "J" qualify all positive hits and "UJ" qualify all non-detects.

ACTION: Circle all outliers in red.

ACTION: If the % RSD is ≥ 20.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non- detect results for that analyte "R," unusable. Alternatively, the lab should calculate first or second order regression fit of the calibration curve and select the fit which introduces the least amount of error.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

13.4 Did the laboratory calculate the calibration curve by the least squares regression fit? ___ [✓] ___

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) ___ [✓] ___

ACTION: Circle Errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

13.5 Do the target compounds for this SDG include Pesticides? [ ] ___ ___

YES NO N/A

13.6 If the pesticide compounds include DDT, was the percent breakdown of DDT to DDD and DDE greater than 20%? ___ [ ] [✓]

ACTION: If DDT percent breakdown exceeds 20%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE results are positive, qualify the quantitation limit for DDT as unusable, "R".

ii. Qualify all positive results for DDD and DDE as presumptively present at an approximate concentration "JN".

14.0 GC/MS Calibration Verification (Form VII/Equivalent)

14.1 Are the Calibration Verification Forms (Form VII) present and complete for all compounds of interest? [✓] ___ ___

14.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? [✓] ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

_____

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed within twelve hours of every sample analysis,

YES NO N/A

call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

14.3 Do any of the SPCCs have an RRF <0.05? ___ [✓] ___

If YES, make a note in data assessment if the lab did not take corrective action specified in section 7.4.4, page 8270D-18. [ ] [✓] ___

14.4 Do any of the CCCs have a %D between the initial and continuing RRF which exceeds 20.0%?

ACTION: If yes, make a note in data assessment.

14.5 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds 20.0%? ___ [✓] ___

ACTION: Circle all outliers in red.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is above 90%, qualify all non-detects for that analyte as "R", unusable.

14.6 Do any semivolatile compounds have a RRF < 0.05? ___ [✓] ___

ACTION: Circle all outliers in red.

ACTION: If RRF < 0.05, qualify as unusable ("R") associated non-detects and "J" associated positive values.

14.7 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or percent difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more). ___ [✓] ___

YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect(s) in the data assessments.

15.0 Internal Standards (Form VIII)

15.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to + 100%) for each continuing calibration? [✓] ___ ___

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area	LowerLimit	Upper Limit

(Attach additional sheets if necessary.)

Note: Check Table 5, 8270D-41 for associated analytes.

ACTION: i. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

ii. Non-detects associated with IS > 100% should not be qualified.

YES NO N/A

iii. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

15.2 Are the retention times of all internal standards within 30 seconds of the associated calibration standard? [✓] ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

16.0 Laboratory Control Samples (LCS)

16.1 Were any LCS samples run in order to verify analytes which failed criteria for spike recovery? [ ] [✓] ___

16.2 Did the lab spike LCS sample spiked with the same analytes and the same concentrations as the matrix spike? [ ] ___ [✓]

16.3 Were the mean and standard deviation of all analytes within the QC acceptance ranges as shown in Table 6, 8270D-43? [✓] ___ ___

ACTION: If the recovery of any analyte falls out of the designated range, the analytical results for that compound is suspect and should be qualified "J" in the unspiked samples.

17.0 Field Duplicates

17.1 Were any field duplicates submitted for semivolatile analysis? [ ] [✓] ___

YES NO N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

Initial Calibration Date: 8/1/2013
RRF and %RSD Calculations:

Compound Name: 1,4-dioxane
Lab Value: 0.140

Area of Compound	646174
Area of Internal STD	368433
Conc. of Internal STD	4
Conc. of Compound	50
Calculated RRF	0.140

Compound Name: 1,4-dioxane
Lab Value: 10.1

RRF of STD 1	0.155
RRF of STD 2	0.1638533
RRF of STD 3	0.1517197
RRF of STD 4	0.1310898
RRF of STD 5	0.1518212
RRF of STD 6	0.133365
RRF of STD 7	0.119142
RRF of STD 8	0.1324017
RRF of STD 9	0.1403075
Calculated % RSD	10.1

Continuing Calibration File ID: 10/18/2013
RRF and %D Calculations:

Compound Name: 1,4-dioxane
Lab Value: 0.122

Area of Compound	125278
Area of Internal STD	410398
Conc. of Internal STD	4
Conc. of Compound	10
Calculated RRF	0.122

Compound Name: 1,4-dioxane
Lab Value: 14.100

Average RRF	0.142
Calibration Check RRF	0.1221039
Calculated % D	14.1

DataQual

Environmental Services, LLC

CH2M HILL-VBO
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

December 9, 2013
SDG# 1309227, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1309227. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24 and 8270D-Rev 4, August 2008-SOP #HW-22,), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA	SVOA
VEP4-GW27-0913	1309227-01	water	X	X
VEP4-TB01-092613	1309227-02	water	X	
VEP4-GW25-0913	1309227-03	water	X	X
VEP4-EB01-092613-GW	1309227-04	water	X	X

The following quality control samples were provided with this SDG: sample VEP4-EB01-092613-GW - equipment blank and sample VEP4-TB01-092613- trip blank.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Field Duplicates NA
- Identification/Quantitation *
- Reporting Limits *

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- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

No qualifications were required to the data.

SVOA

The associated LCS exhibited high %RPD which resulted in qualifications to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to chain of custody records, sampling was performed on 9/26/13 and samples were received at the laboratory 9/28/13. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

Laboratory Control Sample

SVOA

The LCS associated with the samples listed exhibited high RPD which resulted in qualifications as stated in the table below.

Associated Samples	Compound	%RPD	QC limit	Q Flag	Qual Code
VEP4-GW27-0913, VEP4-GW25-0913, VEP4-EB01-092613-GW	1,4-dioxane	58.0	30	J/UJ	BD

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

SVOA

Sample ID	Compound	Results	Q flag	Q Code
VEP4-GW27-0913, VEP4-GW25-0913, VEP4-EB01-092613-GW	1,4-dioxane	+/-	J/UJ	BD

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.
U*	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.
RL**	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action -	The sample result is greater than the RL and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R -	Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.
J -	Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.
J/UJ -	Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.
Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action -	The sample result is greater than the RL and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.
R -	Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.
J -	Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL	reporting limit
PQL	practical quantitation limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DI	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1309227

007

ANALYSIS DATA SHEET

VEP4-GW27-0913

Laboratory: Empirical Laboratories, LLC — SDG: 1309227
Client: CH2M Hill, Inc. — Project: Vieques East SWMU 20
Matrix: Water — Laboratory ID: 1309227-01 — File ID: 0922701.D
Sampled: 09/26/13 09:05 — Prepared: 10/03/13 17:17 — Analyzed: 10/03/13 17:17
Solids: — Preparation: 5030B — Dilution: 1
Batch: 3303017 — Sequence: 3J27715 — Calibration: 3268003 — Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene	1.43	0.250	0.500	1.00	
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene	7.45	0.100	0.200	0.500	
75-01-4	Vinyl chloride	0.230	0.140	0.200	0.500	J

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.08	100	75 - 120	
Dibromofluoromethane	30.00	30.14	100	85 - 115	
1,2-Dichloroethane-d4	30.00	30.60	102	70 - 120	
Toluene-d8	30.00	30.44	101	85 - 120	

1309227 Summ Package

008

ANALYSIS DATA SHEET

VEP4-TB01-092613

Laboratory: Empirical Laboratories, LLC — SDG: 1309227
Client: CH2M Hill, Inc. — Project: Vieques East SWMU 20
Matrix: Water — Laboratory ID: 1309227-02 — File ID: 0922702.D
Sampled: 09/26/13 12:30 — Prepared: 10/03/13 13:36 — Analyzed: 10/03/13 13:36
Solids: — Preparation: 5030B — Dilution: 1
Batch: 3303017 — Sequence: 3J27715 — Calibration: 3268003 — Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.10	100	75 - 120	
Dibromofluoromethane	30.00	29.94	99.8	85 - 115	
1,2-Dichloroethane-d4	30.00	29.60	98.7	70 - 120	
Toluene-d8	30.00	30.67	102	85 - 120	

1309227 Summ Package

009

ANALYSIS DATA SHEET

VEP4-GW25-0913

Laboratory: Empirical Laboratories, LLC — SDG: 1309227
Client: CH2M Hill, Inc. — Project: Vieques East SWMU 20
Matrix: Water — Laboratory ID: 1309227-03 — File ID: 0922703.D
Sampled: 09/26/13 10:50 — Prepared: 10/03/13 19:08 — Analyzed: 10/03/13 19:08
Solids: — Preparation: 5030B — Dilution: 2
Batch: 3303017 — Sequence: 3J27715 — Calibration: 3268003 — Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.500	1.00	2.00	U
156-59-2	cis-1,2-Dichloroethene		0.500	1.00	2.00	U
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene	2.84	0.500	1.00	2.00	~~U~~
79-01-6	Trichloroethene	143	0.200	0.400	1.00	~~U~~
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.82	103	75 - 120	
Dibromofluoromethane	30.00	30.48	102	85 - 115	
1,2-Dichloroethane-d4	30.00	29.12	97.1	70 - 120	
Toluene-d8	30.00	29.11	97.0	85 - 120	

1309227 Summ Package

010

ANALYSIS DATA SHEET

VEP4-EB01-092613-GW

Laboratory:	Empirical Laboratories, LLC		SDG:	1309227	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1309227-04	File ID:	0922704.D
Sampled:	09/26/13 12:25	Prepared:	10/03/13 14:59	Analyzed:	10/03/13 14:59
Solids:		Preparation:	5030B	Dilution:	1

Batch: 3103017 Sequence: 3/27719 Calibration: 3268003 Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.20	97.3	75 - 120	
Dibromofluoromethane	30.00	30.06	100	85 - 115	
1,2-Dichloroethane-d4	30.00	29.79	99.3	70 - 120	
Toluene-d8	30.00	29.96	99.9	85 - 120	

011

ANALYSIS DATA SHEET

VEP4-GW27-0913

Laboratory:	Empirical Laboratories, LLC		SDG:	1309227	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1309227-01	File ID:	0922701.D
Sampled:	09/26/13 09:05	Prepared:	10/03/13 15:07	Analyzed:	10/05/13 14:47
Solids:		Preparation:	EXT_3510	Dilution:	1

Batch: 3103031 Sequence: 3/28019 Calibration: 3217001 Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.231	0.463	0.926	~~UJ~~ UJ,BD

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	46.30	32.87	70.9	50 - 110	
Terphenyl-d14	46.30	36.22	78.2	50 - 135	
2,4,6-Tribromophenol	92.59	73.34	79.4	40 - 125	

011414

ANALYSIS DATA SHEET

VEP4-GW25-0913

Laboratory:	Empirical Laboratories, LLC		SDG:	1309227	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1309227-03	File ID:	0922703.D
Sampled:	09/26/13 10:50	Prepared:	10/03/13 15:07	Analyzed:	10/05/13 15:16
Solids:		Preparation:	EXT_3510	Dilution:	1

Batch: 3103031 Sequence: 3/28019 Calibration: 3217001 Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.231	0.463	0.926	~~UJ~~ UJ,BD

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	46.30	33.04	71.4	50 - 110	
Terphenyl-d14	46.30	36.02	77.8	50 - 135	
2,4,6-Tribromophenol	92.59	72.61	78.4	40 - 125	

011414

ANALYSIS DATA SHEET

VEP4-EB01-092613-GW

Laboratory:	Empirical Laboratories, LLC		SDG:	1309227	
Client:	CH2M Hill, Inc.		Project:	Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1309227-04	File ID:	0922704.D
Sampled:	09/26/13 12:25	Prepared:	10/03/13 15:07	Analyzed:	10/05/13 15:45
Solids:		Preparation:	EXT_3510	Dilution:	1

Batch: 3103031 Sequence: 3/28019 Calibration: 3217001 Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.236	0.472	0.943	~~UJ~~ UJ,BD

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	47.17	36.83	77.5	50 - 110	
Terphenyl-d14	47.17	33.28	70.6	50 - 135	
2,4,6-Tribromophenol	94.34	73.68	79.2	40 - 125	

011414

EMPIRICAL LABORATORIES, LLC - CHAIN OF CUSTODY RECORD

SHIP TO: 621 Mainstream Drive, Suite 270 • Nashville, TN 37228 • 615-345-1115 • (fax) 615-846-5426

Send Results to:
Name: Sultana Dean
Company: Chas Hill
Address: 5711 Cleveland St Suite 200
City: VA Beach
State, Zip: VA, 23462
Phone: (757) 671-6232
Fax
E-mail: julian.dean@chas.com

Send Invoice to:
Name: Sultana Dean
Company: Chas Hill
Address: 5711 Cleveland St Suite 200
City: VA Beach
State, Zip: VA, 23462
Phone: (757) 671-6232
Fax
E-mail: julian.dean@chas.com

Project No./Name: 433193 Ft. Fk. 20 Lawn 20

Sampler's (Signature): [signature]

Analysis Requirements: 8260B and 8270D-LLW; 8270D-LLW

Lab Use Only:
VOA Headspace: Y Y Y Y Y Y
Field Filtered: Y Y Y Y Y Y
Correct Containers: Y Y Y Y Y Y
Discrepancies: Y Y Y Y Y Y
Cust. Seals Intact: Y Y Y Y Y Y
Containers Intact: Y Y Y Y Y Y
Airbill #:
CAR #:

Lab Use Only Lab #	Date/Time Sampled	Sample Description	Sample Matrix	Comments	No. of Bottles	Lab Use Only Containers/Pres.
01	9/26/13 0905	VEP4-GW01-092613	GW	3 2	5	NA
02	1030	VEP4-TRN-092613	AQ	2	2	NA
03	1050	VEP4-GW05-048	GW	3 2	5	NA
04	1225	VEP4-EB01-092613	AQ	3 2	5	NA

REMARKS: P.O. 943380

Sample Kit Prep'd by: (Signature) | Date/Time | Received By: (Signature)
Relinquished by: (Signature) | Date/Time 9/26/13 | Received By: (Signature)
Relinquished by: (Signature) | Date/Time | Received By: (Signature)
Received for Laboratory by: (Signature) | Date/Time 9/26/13 0830 | Temperature 0.8 iN

Details: Page 1 of 1; Cooler No. 1 of 1; Date Shipped 9/26/13; Shipped By Rexy Ercan; Turnaround

1309227 Summ Package

Distribution: Original and yellow copies accompany sample shipment to laboratory; Pink retained by samplers.

EMPIRICAL LABORATORIES
COOLER RECEIPT FORM

Cooler Received/Opened On: 09/26/13 @ 0830 Workorder# 1309227

1. Tracking # 5130 (last 4 digits, FedEx)
   Courier: Fedex
2. Temperature of rep. sample or temp blank when opened: 0.8 °C + correction factor (0.0) = 0.8 °C
3. If item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA
4. Were custody seals on outside of cooler? YES NO NA
   If yes, how many and where: 2 front + back
5. Were the seals intact, signed, and dated correctly? YES NO NA
6. Were custody papers inside cooler? YES NO NA

I certify that I opened the cooler and answered questions 1-6 (initial) JG

7. Were custody seals on containers: YES NO and intact YES NO NA
   Were these signed and dated correctly? YES NO NA
8. Packing material used? Bubblewrap Plastic bag Peanuts Vermiculite Foam insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry ice Other None
10. Did all containers arrive in good condition (unbroken)? YES NO NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES NO NA
12. Did all container labels and tags agree with custody papers? YES NO NA
13. a. Were VOA vials received? YES NO NA
    b. Was there any observable headspace present in any VOA vial? YES NO NA
14. Was there a Trip Blank in this cooler? YES NO NA If multiple coolers, sequence # ____

I certify that I unloaded the cooler and answered questions 7-14 (initial) JG

15. a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES NO NA
    b. Did the bottle labels indicate that the correct preservatives were used YES NO NA
16. Was residual chlorine present? YES NO NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial) JG

17. Were custody papers properly filled out (ink, signed, etc)? YES NO NA
18. Did you sign the custody papers in the appropriate place? YES NO NA
19. Were correct containers used for the analysis requested? YES NO NA
20. Was sufficient amount of sample sent in each container? YES NO NA

I certify that I entered this project into LIMS and answered questions 17-20 (initial) JG

I certify that I attached a label with the unique LIMS number to each container (initial) JG

I certify that I have performed a second check of the LIMS information against the COC to confirm accuracy (initial)

21. Were there Non-Conformance issues at login? YES NO Was a NCR generated? YES NO #____

Additional Details:

Sample Delivery Group Case Narrative

Receipt Information

The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

As per the client, the sample listed on the COC as VEP4-EB01-092613 should have the client ID of VEP4-EB01-092613-GW.

Changes to the Revision

Revision 01: The package was revised to change the compound list for the SW8260B samples to 1,1-Dichloroethene, trans-1,2-Dichloroethene, cis-1,2-Dichloroethene, Trichloroethene, Tetrachloroethene, and Vinyl Chloride.
Revision 02: The package was revised to remove unnecessary pages left after revision 01.

Analytical Information

All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:

The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

017

SW8260B:
Note – Sample 1309227-03 was analyzed at a 2x due to high concentrations of target analytes detected during screening. No lower analysis was able to be performed.

No additional anomalies or deviations are noted.

SW8270D LLBNA:
The following batch spikes exceeded criteria:
3J03031-BS2/BSD2 exceeded relative percent difference criteria for 1,4-Dioxane

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

018

MEMORANDUM **CH2MHILL**

Corrections to COCs

TO: Sonya Gordon, Empirical

COPIES: File
Data Validation Package
Laboratory Package SDG: 1309227

FROM: Juliana Dean
Project Chemist

DATE: October 2, 2013

This memo is to document corrections made to entries on the Chains of Custody (COC) for Vieques East, SWMU20, CTO-0013.

The corrections include changes to the sample IDs on the COC:

Sample ID on COC	Correct Sample ID	Date Collected	Time Collected	SDG
VEP4-EB01-092613	VEP4-EB01-092613-GW	9/26/13	12:25	1309227

019

YES NO N/A

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 1309227 LAB: Empirical

SITE NAME: Vieques SWMU20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ☑ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ☑ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ☑ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. **VOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ☑ ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ☑ ___ ___

1.3 Sample Conditions/Problems

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ☑ ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ ☑ ___

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water ☑ ___ ___

b. Soil ☐ ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water ☑ ___ ___

b. Soil ☐ ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. lab ☑ ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? ☐ ___ ✓

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. ☐ ✓ ___

If yes, were samples reanalyzed? ☐ ___ ✓

Were method blanks reanalyzed? ☐ ___ ✓

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? ☐ ✓ ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. ☑ ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water ☑ ___ ___

B. Soil ☐ ___ ___

C. Med Soil ☐ ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). ☑ ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? ☐ ___ ✓

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. ☐ ✓ ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent) NA MS/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? ☐ ___ ✓

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? ☐ ___ ✓

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month (page 8000C, section 9.5.1)

a. Water [ ] ___ ✓

b. Waste [ ] ___ ✓

c. Soil/Solid [ ] ___ ✓

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [ ] ___ ✓

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ ___ ✓

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? ✓ ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? [ ] ___ ___ ✓

6.3 Has a method blank been analyzed for each GC/MS system used ? ✓ ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? ✓ ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. [ ] ___ ___ ✓

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone
** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ✓ ___ ___
b. Matrix spikes and matrix spike duplicates ___ ___ ✓
c. Blanks ✓ ___ ___
d. Laboratory Control Samples ✓ ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ✓ ___ ___
b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ___ ___ ✓
c. Blanks ✓ ___ ___
d. Laboratory Control Samples ✓ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? ✓ ___ ___

YES NO N/A

Resolution? [✓] ___ ___

Peak shape? [✓] ___ ___

Full-scale graph (attenuation)? [✓] ___ ___

Other: _____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

no TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ ___ ✓

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ ___ ✓

b. Blanks [ ] ___ ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ ✓

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ ___ ✓

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] ___ ___ ✓

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [✓] ___ ___

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? ✓ ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39)qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. ✓ ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) ___ ✓ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? ✓ ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). ___ ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds in section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? ✓ ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION: 1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.

2. Do not qualify non-detects when the associated IS are counts area > + 100%.

3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".

4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ☑ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

043

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ___ ✓ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

044

DataQual **VOA**

Initial Calibration Date: 9/24/2013
RRF and %RSD Calculations:

Compound Name: vinyl chloride
Lab Value: 0.1851

Area of Compound	1542663
Area of Internal STD	1250292
Conc. of Internal STD	30
Conc. of Compound	200
Calculated RRF	0.185

Compound Name: 1,1-dichloroethene
Lab Value: 5.1

RRF of STD 1	0.2574
RRF of STD 2	0.2519
RRF of STD 3	0.2377
RRF of STD 4	0.2710
RRF of STD 5	0.2411
RRF of STD 6	0.2742
RRF of STD 7	0.2637
RRF of STD 8	0.2715
RRF of STD 9	0.2630
Calculated % RSD	5.1

Continuing Calibration File ID: 10/3/2013
RRF and %D Calculations:

Compound Name: cis-1,2-dichloroethene
Lab Value: 0.283

Area of Compound	1116264
Area of Internal STD	1185073
Conc. of Internal STD	30
Conc. of Compound	100
Calculated RRF	0.283

Compound Name: trichloroethene
Lab Value: 3.1

Average RRF	0.265
Calibration Check RRF	0.257
Calculated % D	3.1

045

YES NO N/A

E - The concentration of this analyte exceeds the calibration range of the instrument.

A - Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 1309227 LAB: Empirical

SITE NAME: Niagara Gawne 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the data assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative or cover letter present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

046

YES NO N/A

II. **SEMIVOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? ✓

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ✓

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, all non-detects data are qualified as unusable (R), and detects are flagged "J".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (10°C), flag all positive results "J" and all non-detects "UJ". t = 0.8

9/26/13 10/3
9/28 10/5

2.0 Holding Times

2.1 Have any semivolatile technical holding times, determined from date of collection to date of extraction, been exceeded? ✓

Continuous extraction of water samples for semivolatile analysis must be started within 7 days of the date of collection. Soil/sediment samples must be extracted within **14** days of collection. Extracts must be analyzed within

YES NO N/A

40 days of the date of extraction.

Table of Holding Time Violations

Sample ID	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted (See Traffic Report)	Date Analyzed

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

YES NO N/A

3.0 Surrogate Recovery (Form II/Equivalent)

3.1 Have the semi volatile surrogate recoveries been listed on CLP Surrogate Recovery forms (Form II) for each of the following matrices:

a. Low Water ✓

b. Low/Med Soil

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery Summary forms for each matrix:

a. Low Water ✓

b. Low/Med Soil

ACTION: If CLP deliverables are unavailable, document the effect(s) in data assessments. In some cases the lab may have to be contacted to obtain the data necessary to complete the validation.

3.3 Were outliers marked correctly with an asterisk? ✓

ACTION: Circle all outliers in red.

3.4 Were two or more base neutral OR acid surrogate recoveries out of specification for any sample or method blank (Reviewer should use lab in house recovery limits. Use surrogate recovery limits from USEPA National Functional Guidlines January 2005 page 130, if in house limits are not available. See Method 8000B-43 or 8000C-24). ✓

Note: Examine lab in house limits for reasonableness.

If yes, were samples re-analyzed? ✓

YES NO N/A

Were method blanks re-analyzed? ✓

ACTION: If all surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet method specifications, for the affected fraction only (i.e. either base-neutral or acid compounds):

1. Flag all positive results as estimated ("J").

2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.

3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Positive results for the fraction with < 10% surrogate recovery are qualified with "J".

2. Non-detects for that fraction should be qualified as unusable (R) .

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II? ✓

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document

YES NO N/A

effect in data assessments.

4.0 Matrix Spikes (Form III/Equivalent)

4.1 Have the semivolatile Matrix Spike and Matrix Spike Duplicate/or duplicate unspiked Sample recoveries been listed on the Recovery Form (Form III)? [ ] ___ ___

NOTE: Method 3500B/page 4 states the spiking compounds:

Base/neutrals	Acids
1,2,4-Trichlorobenzene	Pentachlorophenol
Acenaphthene	Phenol
2,4-Dinitrotoluene	2-Chlorophenol
Pyrene	4-Chloro-3-methylphenol
N-Nitroso-di-n-propylamine	4-Nitrophenol
1,4-Dichlorobenzene	

Note: Some projects may require the spiking of specific compounds of interest.

Note: See Method 8270D-sec 8.4.2 for deciding on whether to prepare and analyze duplicate samples or a martix spike/matrix spike duplicate. If samples are expected to contain target analytes, then laboratory may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratory should use a matrix spike and matrix spike duplicate pair.

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water [ ] ___ ___

b. Low Solid [ ] ___ ___

c. Med Solid [ ] ___ ___

YES NO N/A

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. It may be necessary to contact the lab to obtain the required data.

NOTE: If the data has not been reported on CLP equivalent form, then the laboratory must provide the information necessary to evaluate the spike recoveries in the MS and MSD. The required data which should have been provided by the lab include the analytes and concentrations used for spiking, background concentrations of the spiked analytes (i.e., concentrations in unspiked sample), methods and equations used to calculate the QC acceptance criteria for the spiked analytes, percent recovery data for all spiked analytes.

The data reviewer must verify that all reported equations and percent recoveries are correct before proceeding to the next section.

4.3 Were matrix spikes performed at concentration equal to 100ug/L for acid compounds, and 200ug/l for base compounds (Method 3500B-4), or those specified in project plan. [ ] ___ ___

4.4 How many semivolatile spike recoveries are outside Laboratory in house MS/MSD recovery limits (use recovery limits values in Method 8270D-43&44 Table 6 if in house values not available).

Water	Solids
____ out of ____	____ out of ____

YES NO N/A

4.5 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water	Solids
____ out of ____	____ out of ____

ACTION: Circle all outliers with red pencil.

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria to determine the need for some qualification of the data.

4.6 Was a Laboratory Control Sample (LCS) analyzed with each analytical batch? [✓] ___ ___

NOTE: When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

5.0 Blanks (Form IV/Equivalent)

5.1 Is the Method Blank Summary (Form IV) present? [ ] ___ ___

5.2 Frequency of Analysis:

Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? [ ] ___ ___

5.3 Has a method blank been analyzed either after

YES NO N/A

the calibration standard or at any other time during the analytical shift for each GC/MS system used ? [✓] ___ ___

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, use professional judgement to determine if the associated sample data should be qualified.

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for the semivolatiles? [✓] ___ ___

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ [✓] ___

6.2 Do any field/rinse/ blanks have positive results for target analytes and/or TICs (if required, see section 10 below)? ___ [✓] ___

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field Blanks must be qualified for outlying surrogates, poor spectra, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify sample results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

YES NO N/A

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL +	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

NOTE: If the laboratory did not report TIC analyses, check the project plans to verify whether or not it was required.

6.3 Are there field/rinse/equipment blanks associated with every sample? ☑ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

6.4 Was a instrument blank analyzed after each sample/dilution which contained a target compound

YES NO N/A

that exceeded the initial calibration range. ☐ ___ ☑

6.5 Does the instrument blank have positive results for target analytes and/or TICs? ___ ☑ ___

Note: Use professional judgement to determine if carryover occurred and qualify analytes accordingly.

7.0 GC/MS Apparatus and Materials

7.1 Did the lab use the proper gas chromatographic column for analysis of semivolatiles by Method 8270D? Check raw data, instrument logs or contact the lab to determine what type of column was used. The method requires the use of 30 m x 0.25 mm ID (or 0.32 mm ID), silicone-coated, fused silica, capillary column. ☑ ___ ___

ACTION: If the specified column, or equivalent, was not used, document the effects in the data assessment. Use professional judgement to determine the acceptability of the data.

8.0 GC/MS Instrument Performance Check (Form V/Equivalent)

8.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)? ☑ ___ ___

NOTE: The performance solution should also contain 4,4-DDT, pentachlorophenol, and benzidine to verify injection port inertness and column performance. The degradation of DDT to DDE and DDD must be less than 20% total and the response of pentachlorophenol and benzidine should be within normal ranges for these compounds (based upon lab experience) and show no peak degradation or tailing before samples are analyzed. (see section 5.5

YES NO N/A

page 8270D-12).

8.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? ☑ ___ ___

8.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument? ☑ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

8.4 Have the ion abundances been normalized to m/z 198? ☑ ___ ___

8.5 Have the ion abundance criteria been met for each instrument used? ☑ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

YES NO N/A

ACTION: If ion abundance criteria are not met, take action specified in section 3.2

8.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.) ___ [✓] ___

8.7 Have the appropriate number of significant figures (two) been reported? [✓] ___ ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.

8.8 Are the spectra of the mass calibration compound acceptable? [ ] ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

9.0 Target Analytes

9.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates [ ] ___ [✓]

c. Blanks [✓] ___ ___

9.2 Has any special cleanup, such as GPC, been performed on all soil/sediment sample extracts (see section 7.2, page 8270D-14)? [ ] ___ [✓]

YES NO N/A

ACTION: If data suggests that extract cleanup was not performed, use professional judgement. Make note in the data assessment narrative.

9.3 Are the Reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) [ ] ___ [✓]

c. Blanks [✓] ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

9.4 Are the response factors shown in the Quant Report? [✓] ___ ___

9.5 Is chromatographic performance acceptable with respect to:

Baseline stability? [✓] ___ ___

Resolution? [✓] ___ ___

Peak shape? [✓] ___ ___

Full-scale graph (attenuation)? [✓] ___ ___

Other:_____ [ ] ___ ___

ACTION: Use professional judgement to determine the acceptability of the data.

9.6 Are the lab-generated standard mass spectra of identified semivolatile compounds present for

YES NO N/A

each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the data assessment narrative. If spectra are missing, reject all positive data.

9.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

9.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

9.9 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 9.7, 9.8, and 9.9.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

YES NO N/A

10.0 Tentatively Identified Compounds (TIC)

10.1 If Tentatively Identified Compounds were required for this project, are all Form Is, Part B present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier? No TICs

NOTE: Review sampling reports to determine if the lab was required to identify non target analytes (refer to section 7.6.2,page 8270D-21).

10.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following: [ ] ___ [✓]

a. Samples and/or fractions as appropriate [ ] ___ [✓]

b. Blanks [ ] ___ [✓]

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by CAS #.

10.3 Are any target compounds from one fraction listed as TIC compounds in another (e.g., an acid compound listed as a base neutral TIC)? ___ [ ] [✓]

ACTION: i. Flag with "R" any target compound listed as a TIC.

ii. Make sure all rejected compounds are properly reported in the other fraction.

10.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the

YES NO N/A

sample mass spectrum? [ ] ___ [✓]

10.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ [✓]

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate and remove "JN". Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R."

11.0 Compound Quantitation and Reported Detection Limits

11.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found? ___ [✓] ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

11.2 Are the method detection limits adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ [✓]

YES NO N/A

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I (if present) and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red " X" across the entire page of all Form I's that should not be used, including any in the summary package.

12.0 Standards Data (GC/MS)

12.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

13.0 GC/MS Initial Calibration (Form VI/Equivalent)

13.1 Is the Initial Calibration Form (Form VI/ Equivalent) present and complete for the semivolatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard row data are missing, take action specified in 3.2 above.

13.2 Are all base neutral or acid RRFs > 0.050? [✓] ___ ___

YES NO N/A

Check the **average RRFs** of the four System Performance Check Compounds (SPCCs): N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. These compounds must have **average RRFs** greater than or equal to 0.05 before running samples and should not show any peak tailing.

ACTION: Circle all outliers in red.

ACTION: For any target analyte with **average RRF <0.05**

1. "R" all non-detects;
2. "J" all positive results.

13.3 Are response factors for base neutral or acid target analytes stable over the concentration range of the calibration (% Relative standard deviation [%RSD] < 20.0%)? [✓] ___ ___

NOTE: The % RSD for each individual Calibration Check Compound (CCC, Method 8270D-40 see Table 4) must be less than 30% before analysis can begin. If grater 30%, the lab must clean and recalibrate the instrument.

CALIBRATION CHECK COMPOUNDS

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol

YES NO N/A

Benzo(a)pyrene

ACTION: If the %RSD for any CCC >30% and no corrective action taken, then "J" qualify all positive hits and "UJ" qualify all non-detects.

ACTION: Circle all outliers in red.

ACTION: If the % RSD is ≥ 20.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non- detect results for that analyte "R," unusable. Alternatively, the lab should calculate first or second order regression fit of the calibration curve and select the fit which introduces the least amount of error.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

13.4 Did the laboratory calculate the calibration curve by the least squares regression fit? ___ [✓] ___

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) ___ [✓] ___

ACTION: Circle Errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

13.6 Do the target compounds for this SDG include Pesticides? [ ] [✓] ___

YES NO N/A

13.6 If the pesticide compounds include DDT, was the percent breakdown of DDT to DDD and DDE greater than 20%? ___ [1] ✓

ACTION: If DDT percent breakdown exceeds 20%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE results are positive, qualify the quantitation limit for DDT as unusable, "R".

ii. Qualify all positive results for DDD and DDE as presumptively present at an approximate concentration "JN".

14.0 GC/MS Calibration Verification (Form VII/Equivalent)

14.1 Are the Calibration Verification Forms (Form VII) present and complete for all compounds of interest? ✓ [1] ___ ___

14.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ [1] ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

ACTION: If any forms are missing or no calibration verification standard has been analyzed within twelve hours of every sample analysis,

YES NO N/A

call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

14.3 Do any of the SPCCs have an RRF <0.05? ___ [1] ✓ ___

If YES, make a note in data assessment if the lab did not take corrective action specified in section 7.4.4, page 8270D-18. [1] ✓ ___ ___

14.4 Do any of the CCCs have a %D between the initial and continuing RRF which exceeds 20.0%?

ACTION: If yes, make a note in data assessment.

14.5 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds 20.0%? ___ [1] ✓ ___

ACTION: Circle all outliers in red.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is above 90%, qualify all non-detects for that analyte as "R", unusable.

14.6 Do any semivolatile compounds have a RRF < 0.05? ___ [1] ✓ ___

ACTION: Circle all outliers in red.

ACTION: If RRF < 0.05, qualify as unusable ("R") associated non-detects and "J" associated positive values.

14.7 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or percent difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more). ___ [1] ✓ ___

YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect(s) in the data assessments.

15.0 Internal Standards (Form VIII)

15.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to + 100%) for each continuing calibration? ✓ [1] ___ ___

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area	LowerLimit	Upper Limit

(Attach additional sheets if necessary.)

Note: Check Table 5, 8270D-41 for associated analytes.

ACTION: i. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

ii. Non-detects associated with IS > 100% should not be qualified.

YES NO N/A

iii. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

15.2 Are the retention times of all internal standards within 30 seconds of the associated calibration standard? ✓ [1] ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

16.0 Laboratory Control Samples (LCS)

16.1 Were any LCS samples run in order to verify analytes which failed criteria for spike recovery? [1] ✓ ___

16.2 Did the lab spike LCS sample spiked with the same analytes and the same concentrations as the matrix spike? [1] ___ ✓ no MS

16.3 Were the mean and standard deviation of all analytes within the QC acceptance ranges as shown in Table 6, 8270D-43? [1] ✓ ___

ACTION: If the recovery of any analyte falls out of the designated range, the analytical results for that compound is suspect and should be qualified "J" in the unspiked samples. See attached form

17.0 Field Duplicates

17.1 Were any field duplicates submitted for semivolatile analysis? [1] ✓ ___

PREPARATION BATCH SUMMARY
SW8270D

Laboratory: Empirical Laboratories, LLC SDG: 1309227
Client: CH2M Hill, Inc. Project: Vieques East SWMU 20
Batch: 3303031 Batch Matrix: Water Preparation: EXT_3510

SAMPLE NAME	LAB SAMPLE ID	DATE PREPARED	INITIAL VOL./WEIGHT	FINAL VOL.
VEP4-GW27-0913	1309227-01	10/03/13 15:07	1,000.00	1.00
VEP4-GW25-0913	1309227-03	10/03/13 15:07	1,000.00	1.00
VEP4-EB01-092613-GW	1309227-04	10/03/13 15:07	1,000.00	1.00
Blank	3303031-BLK2	10/03/13 15:07	1,000.00	1.00
LCS	3303031-BS2	10/03/13 15:07	1,000.00	1.00
LCS Dup	3303031-BSD2	10/03/13 15:07	1,000.00	1.00

071

LCS / LCS DUPLICATE RECOVERY
SW8270D

Laboratory: Empirical Laboratories, LLC SDG: 1309227
Client: CH2M Hill, Inc. Project: Vieques East SWMU 20
Matrix: Water
Batch: 3303031 Laboratory ID: 3303031-BS2
Preparation: EXT_3510 Initial/Final: 1000 mL / 1 mL

ANALYTE	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	LCS % REC	QC LIMITS REC.
1,4-Dioxane	0.7143	0.08292	11.6	5 - 110

ANALYTE	SPIKE ADDED (ug/L)	LCSD CONCENTRATION (ug/L)	LCSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
1,4-Dioxane	0.7143	0.1507	21.1	58.0 *	30	5 - 110

J/UJ

072

USEPA Region II Date: August, 2008
SW846 Method 8270D (Rev.4, January 1998) SOP HW-22 Rev.4

YES NO N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

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DataQual
Environmental Services, LLC

CH2M HILL-VBO
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

December 11, 2013
SDG# 1310048, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1310048. The data validation was performed in accordance with the SW-846 methods utilized by the laboratory, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24 and 8270D-Rev 4, August 2008-SOP #HW-22,), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA	SVOA
VEP4-GW29-1013	1310048-01	water	X	X
VEP4-GW28-1013	1310048-02	water	X	X
VEP4-TB01-100213	1310048-03	water	X	
VEP4-EB01-100213-GW	1310048-04	water	X	X

The following quality control samples were provided with this SDG: sample VEP4-EB01-100213-GW- equipment blank and sample VEP4-TB01-100213- trip blank.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Field Duplicates NA
- Identification/Quantitation *
- Reporting Limits *

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001

- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

No qualifications were required to the data.

SVOA

No qualifications were required to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to chain of custody records, sampling was performed on 10/2/13 and samples were received at the laboratory 10/4/13. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

SVOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U not detected above the reported sample quantitation limit
J estimated value
UJ reported quantitation limit is qualified as estimated
N analyte has been tentatively identified
JN analyte has been tentatively identified, estimated value
R result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.

U* The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.

RL** The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.

J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.

Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL	reporting limit
PQL	practical quantitation limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Prior Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

ANALYSIS DATA SHEET

VEP4-GW29-1013

Laboratory: Empirical Laboratories, LLC SDG: 1310048
Client: CH2M Hill, Inc. Project: Vieques East SWMU 20
Matrix: Water Laboratory ID: 1310048-01 File ID: 1004801.D
Sampled: 10/02/13 09:25 Prepared: 10/08/13 18:02 Analyzed: 10/08/13 18:03
Solids: Preparation: 5030B Dilution: 1
Batch: 3308011 Sequence: 3128202 Calibration: 3268003 Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene	**0.360**	0.250	0.500	1.00	J
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene	**4.15**	0.100	0.200	0.500	
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.55	95.2	75 - 120	
Dibromofluoromethane	30.00	30.06	100	85 - 115	
1,2-Dichloroethane-d4	30.00	30.23	101	70 - 120	
Toluene-d8	30.00	29.86	99.5	85 - 120	

LM 11/19/13

ANALYSIS DATA SHEET

VEP4-GW28-1013

Laboratory: Empirical Laboratories, LLC SDG: 1310048
Client: CH2M Hill, Inc. Project: Vieques East SWMU 20
Matrix: Water Laboratory ID: 1310048-02 File ID: 1004802.D
Sampled: 10/02/13 11:30 Prepared: 10/08/13 18:31 Analyzed: 10/08/13 18:31
Solids: Preparation: 5030B Dilution: 1
Batch: 3308011 Sequence: 3128202 Calibration: 3268003 Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene	**0.780**	0.250	0.500	1.00	J
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene	**20.5**	0.100	0.200	0.500	
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.48	98.3	75 - 120	
Dibromofluoromethane	30.00	30.52	102	85 - 115	
1,2-Dichloroethane-d4	30.00	29.21	97.4	70 - 120	
Toluene-d8	30.00	30.45	102	85 - 120	

LM 11/19/13

ANALYSIS DATA SHEET

VEP4-TB01-100213

Laboratory: Empirical Laboratories, LLC | SDG: 1310048
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1310048-03 | File ID: 1004803.D
Sampled: 10/02/13 14:30 | Prepared: 10/08/13 13:27 | Analyzed: 10/08/13 13:27
Solids: | Preparation: 5030B | Dilution: 1
Batch: 3308011 | Sequence: 3128202 | Calibration: 3268003 | Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.39	98.0	75 - 120	
Dibromofluoromethane	30.00	30.74	102	85 - 115	
1,2-Dichloroethane-d4	30.00	29.98	99.9	70 - 120	
Toluene-d8	30.00	30.49	102	85 - 120	

WM 111913

010

ANALYSIS DATA SHEET

VEP4-EB01-100213-GW

Laboratory: Empirical Laboratories, LLC | SDG: 1310048
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1310048-04 | File ID: 1004804.D
Sampled: 10/02/13 15:00 | Prepared: 10/08/13 14:22 | Analyzed: 10/08/13 14:22
Solids: | Preparation: 5030B | Dilution: 1
Batch: 3308011 | Sequence: 3128202 | Calibration: 3268003 | Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.58	98.6	75 - 120	
Dibromofluoromethane	30.00	30.41	101	85 - 115	
1,2-Dichloroethane-d4	30.00	30.72	102	70 - 120	
Toluene-d8	30.00	30.56	102	85 - 120	

WM 111913

011

ANALYSIS DATA SHEET

VEP4-GW29-1013

Laboratory: Empirical Laboratories, LLC | SDG: 1310048
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1310048-01 | File ID: 1004801.D
Sampled: 10/02/13 09:25 | Prepared: 10/08/13 11:35 | Analyzed: 10/21/13 19:25
Solids: | Preparation: EXT_3510 | Dilution: 1
Batch: 3308008 | Sequence: 3129611 | Calibration: 3217001 | Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.240	0.481	0.962	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	48.08	27.15	56.5	50 - 110	
Terphenyl-d14	48.08	38.59	80.3	50 - 135	
2,4,6-Tribromophenol	96.15	82.53	85.8	40 - 125	

WM 111913

01

ANALYSIS DATA SHEET

VEP4-GW28-1013

Laboratory: Empirical Laboratories, LLC | SDG: 1310048
Client: CH2M Hill, Inc. | Project: Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1310048-02 | File ID: 1004802.D
Sampled: 10/02/13 11:30 | Prepared: 10/08/13 11:35 | Analyzed: 10/21/13 20:03
Solids: | Preparation: EXT_3510 | Dilution: 1
Batch: 3308008 | Sequence: 3129611 | Calibration: 3217001 | Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.231	0.463	0.926	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	46.30	31.72	68.5	50 - 110	
Terphenyl-d14	46.30	37.88	81.8	50 - 135	
2,4,6-Tribromophenol	92.59	85.58	92.4	40 - 125	

WM 111913

01

ANALYSIS DATA SHEET

VEP4-EB01-100213-GW

Laboratory:	Empirical Laboratories, LLC	SDG:	1310048		
Client:	CH2M Hill, Inc.	Project:	Vicquer East SWMU 20		
Matrix:	Water	Laboratory ID:	1310048-04	File ID:	1004804.D
Sampled:	10/02/13 15:00	Prepared:	10/08/13 11:35	Analyzed:	10/21/13 20:37
Solids:		Preparation:	EXT_3510	Dilution:	1
Batch:	3308008	Sequence:	3329611	Calibration:	3217001	Instrument:	MS-RNA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
123-91-1	1,4-Dioxane		0.236	0.472	0.943	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	47.17	34.07	72.2	50 - 110	
Terphenyl-d14	47.17	38.34	81.3	50 - 135	
2,4,6-Tribromophenol	94.34	86.15	91.3	40 - 125	

WM 11/19/13

EMPIRICAL LABORATORIES, LLC - CHAIN OF CUSTODY RECORD

SHIP TO: 527 Mainstream Drive, Suite 270 • Nashville, TN 37228 • 615-345-1115 • (fax) 615-346-5426

1310048

Send Results to:
Name: Juliana Dixon
Company: CH2M HILL
Address: 5301 Cleveland ST. Suite 320
City: VA Beach
State, Zip: VA 23462
Phone: 757-671-6232
Fax:
E-mail: juliana.dixon@aecom.com
Project No./Name:

Send Invoice to:
Name: Juliana Dixon
Company: CH2M HILL
Address: 5301 Cleveland ST. Suite 320
City: VA Beach
State, Zip: VA 23462
Phone: 757-671-6232
Fax:
E-mail: juliana.dixon@aecom.com
Sampler's (Signature):

Analysis Requirements: 8260 - 10/02/13 @ 1500; 8260 - 10/02/13 @ 1500

Lab Use Only Lab #	Date/Time Sampled	Sample Description	Sample Matrix	Coolers/Preservatives	No. of Bottles	Lab Use Only: Containers/Pres
01	10/02/13 0925	VEP4-GW29-1013	GW	3 2	5	
02	10/02/13 1130	VEP4-GW28-1013	GW	3 2	5	
03	10/02/13 1430	VEP4-TB01-100213	GW	2	2	
04	10/02/13 1500	VEP4-EB01-100213-GW	GW	3 2	5	

Lab Use Only:

VOA Headspace	Y	N
Field Filtered	Y	N
Correct Containers	Y	N
Discrepancies	Y	N
Cust. Seals Intact	Y	N
Containers Intact	Y	N
Airbill #: 7768 1261 7896 FedEx		
CAR #:		

NA NA NA NA NA NA

Sample Kit Prepd by: (Signature) Date/Time
Relinquished by: (Signature) Date/Time 10/02/13 1530
Received by: (Signature)
Relinquished by: (Signature) Date/Time
Received by: (Signature) Date/Time
Received for Laboratory by: (Signature) Date/Time 10/4/13 0820
Temperature 1.8 MT

REMARKS:

Distribution: White copies accompany sample shipment to laboratory; Pink retained by sampler.

Dates: Page 1 of 1; Cooler No. 1 of 1; Date Shipped: 10/03/13; Shipped By: N. Price; Turnaround

1310048 Summ Package

EMPIRICAL LABORATORIES COOLER RECEIPT FORM

Cooler Received/Opened On: 10/04/13 @ 0820

Workorder# 1310048

1. Tracking # 7896 (last 4 digits, FedEx)
   Courier: FEDEX
2. Temperature of rep. sample or temp blank when opened: 1.8 °C + correction factor (0.0) = 1.8 °C
3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA
4. Were custody seals on outside of cooler? YES NO NA
   If yes, how many and where: 2-FRONT & BACK
5. Were the seals intact, signed, and dated correctly? YES NO NA
6. Were custody papers inside cooler? YES NO NA
   I certify that I opened the cooler and answered questions 1-6 (initial) ✓
7. Were custody seals on containers: YES NO and intact YES NO NA
   Were these signed and dated correctly? YES NO NA
8. Packing material used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry Ice Other None
10. Did all containers arrive in good condition (unbroken)? YES NO NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES NO NA
12. Did all container labels and tags agree with custody papers? YES NO NA
13. a. Were VOA vials received? YES NO NA
    b. Was there any observable headspace present in any VOA vial? YES NO NA
14. Was there a Trip Blank in this cooler? YES NO NA If multiple coolers, sequence #
    I certify that I unloaded the cooler and answered questions 7-14 (initial) ✓
15. a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES NO NA
    b. Did the bottle labels indicate that the correct preservatives were used YES NO NA
16. Was residual chlorine present? YES NO NA
    I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial) ✓
17. Were custody papers properly filled out (ink, signed, etc)? YES NO NA
18. Did you sign the custody papers in the appropriate place? YES NO NA
19. Were correct containers used for the analysis requested? YES NO NA
20. Was sufficient amount of sample sent in each container? YES NO NA
    I certify that I entered this project into LIMS and answered questions 17-20 (initial) ✓
    I certify that I attached a label with the unique LIMS number to each container (initial) ✓
    I certify that I have performed a second check of the LIMS information against the COC to confirm accuracy (initial) ✓
21. Were there Non-Conformance issues at login? YES NO Was a NCR generated? YES NO #

Additional Details:

...ns/Sandy Enright/Desktop/New CRF.doc1.doc Page 1 of 1

015

Sample Delivery Group Case Narrative

Receipt Information
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Changes to the Revision
This is an original submittal of the final report package.

Analytical Information
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample prep and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:
The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

017

SW8260B:
No anomalies or deviations are noted.

SW8270D LLBNA:
No anomalies or deviations are noted.

018

YES NO N/A

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 1310048 LAB: Empirical

SITE NAME: Vieques Summit

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. **VOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓ ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓ ___ ___

1.3 Sample Conditions/Problems

019

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"0J".

Sampled 10/2/13 Analy 10/8
Recd 10/4 Temp 1.8°C

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ ✓ ___

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

020

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water ✓ ___ ___

b. Soil ___ ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water ✓ ___ ___

b. Soil ___ ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

021

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. [✓] ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ [✓]

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] [✓] ___

If yes, were samples reanalyzed? [ ] ___ [✓]

Were method blanks reanalyzed? [ ] ___ [✓]

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] [✓] ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ [✓]

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] [✓] ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent) No MS/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] ___ [✓]

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] ___ [✓]

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month [page 8000C, section 9.5.])

a. Water [ ] ___ ✓

b. Waste [ ] ___ ✓

c. Soil/Solid [ ] ___ ✓

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [ ] ___ ✓

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ ___ ✓

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? ✓ ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? ✓ ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? ✓ ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? ✓ ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. [ ] ✓ ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

VEF4-TB01-100213
VEF4-EB01-100213-GW

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	≥ CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contamination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone
** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ✓ ___ ___
b. Matrix spikes and matrix spike duplicates ___ ___ ✓
c. Blanks ✓ ___ ___
d. Laboratory Control Samples ✓ ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ✓ ___ ___
b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ✓ ___ ✓
c. Blanks ✓ ___ ___
d. Laboratory Control Samples ✓ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? ✓ ___ ___

YES NO N/A

Resolution? [✓] ___ ___

Peak shape? [✓] ___ ___

Full-scale graph (attenuation)? [✓] ___ ___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

NOTICE

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ [✓]

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ [✓]

b. Blanks [ ] ___ [✓]

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ [✓]

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ [✓]

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ [✓]

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] [✓] ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [ ] ___ [✓]

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? ✓ ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39)qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. ✓ ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) [ ] ✓ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 <u>GC/MS Calibration Verification (CLP Form VII Equivalent)</u>

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? ✓ ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). [ ] ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? [ ] ✓ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 <u>Internal Standards (CLP Form VIII Equivalent)</u>

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? ✓ ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION: 1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.

2. Do not qualify non-detects when the associated IS are counts area > + 100%.

3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".

4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ✓

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ✓

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

YES NO N/A

E - The concentration of this analyte exceeds the calibration range of the instrument.

A - Indicates a Tentatively Identified Compound (TIC) is a suspected adol-condensation product.

X,Y,Z- Laboratory defined flags. The data reviewer must change these qualifiers during validation so that the data user may understand their impact on the data.

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 131004B LAB: Empirical

SITE NAME: Vieques Guanica

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format? ✓

ACTION: If not, note the effect on review of the data in the data assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative or cover letter present? ✓

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓

YES NO N/A

II. **SEMIVOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Report Forms present for all samples? ✓

ACTION: If no, contact lab for replacement of missing or illegible copies.

1.2 Do the Traffic Reports or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ✓

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, all non-detects data are qualified as unusable (R), and detects are flagged "J".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (10°C), flag all positive results "J" and all non-detects "UJ". temp 1.8

2.0 Holding Times 10/2/13 10/14 10/18 10/21

2.1 Have any semivolatile technical holding times, determined from date of collection to date of extraction, been exceeded? ✓

Continuous extraction of water samples for semivolatile analysis must be started within 7 days of the date of collection. Soil/sediment samples must be extracted within 14 days of collection. Extracts must be analyzed within

YES NO N/A

40 days of the date of extraction.

Table of Holding Time Violations

(See Traffic Report)

Sample ID	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted	Date Analyzed

NA

ACTION: If technical holding times are exceeded, flag all positive results as estimated ("J") and sample quantitation limits as estimated ("UJ"), and document in the narrative that holding times were exceeded.

If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable ("R"). If holding times are exceeded by more than 28 days, all non-detect data are unusable (R).

YES NO N/A

3.0 Surrogate Recovery (Form II/Equivalent)

3.1 Have the semi volatile surrogate recoveries been listed on CLP Surrogate Recovery forms (Form II) for each of the following matrices:

a. Low Water [✓] ___ ___

b. Low/Med Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery Summary forms for each matrix:

a. Low Water [✓] ___ ___

b. Low/Med Soil [ ] ___ ___

ACTION: If CLP deliverables are unavailable, document the effect(s) in data assessments. In some cases the lab may have to be contacted to obtain the data necessary to complete the validation.

3.3 Were outliers marked correctly with an asterisk? [ ] [✓] ___

ACTION: Circle all outliers in red.

3.4 Were two or more base neutral OR acid surrogate recoveries out of specification for any sample or method blank (Reviewer should use lab in house recovery limits. Use surrogate recovery limits from USEPA National Functional Guidlines January 2005 page 130, if in house limits are not available. See Method 8000B-43 or 8000C-24). [ ] [✓] ___

Note: Examine lab in house limits for reasonableness.

If yes, were samples re-analyzed? [ ] ___ [✓]

YES NO N/A

Were method blanks re-analyzed? [ ] ___ [✓]

ACTION: If all surrogate recoveries are > 10% but two within the base-neutral or acid fraction do not meet method specifications, for the affected fraction only (i.e. either base-neutral or acid compounds):

1. Flag all positive results as estimated ("J").

2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.

3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Positive results for the fraction with < 10% surrogate recovery are qualified with "J".

2. Non-detects for that fraction should be qualified as unusable (R) .

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ [✓] ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make any necessary corrections and document

YES NO N/A

effect in data assessments.

4.0 Matrix Spikes (Form III/Equivalent)

NA MS/MSD

4.1 Have the semivolatile Matrix Spike and Matrix Spike Duplicate/or duplicate unspiked Sample recoveries been listed on the Recovery Form (Form III)? [ ] ___ [✓]

NOTE: Method 3500B/page 4 states the spiking compounds:

Base/neutrals	Acids
1,2,4-Trichlorobenzene	Pentachlorophenol
Acenaphthene	Phenol
2,4-Dinitrotoluene	2-Chlorophenol
Pyrene	4-Chloro-3-methylphenol
N-Nitroso-di-n-propylamine	4-Nitrophenol
1,4-Dichlorobenzene	

Note: Some projects may require the spiking of specific compounds of interest.

Note: See Method 8270D-sec 8.4.2 for deciding on whether to prepare and analyze duplicate samples or a martix spike/matrix spike duplicate. If samples are expected to contain target analytes, then laboratory may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratory should use a matrix spike and matrix spike duplicate pair.

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water [ ] ___ [✓]

b. Low Solid [ ] ___ [✓]

c. Med Solid [ ] ___ [✓]

YES NO N/A

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. It may be necessary to contact the lab to obtain the required data.

NOTE: If the data has not been reported on CLP equivalent form, then the laboratory must provide the information necessary to evaluate the spike recoveries in the MS and MSD. The required data which should have been provided by the lab include the analytes and concentrations used for spiking, background concentrations of the spiked analytes (i.e., concentrations in unspiked sample), methods and equations used to calculate the QC acceptance criteria for the spiked analytes, percent recovery data for all spiked analytes.

The data reviewer must verify that all reported equations and percent recoveries are correct before proceeding to the next section.

4.3 Were matrix spikes performed at concentration equal to 100ug/L for acid compounds, and 200ug/l for base compounds (Method 3500B-4), or those specified in project plan. ___ ___ ✓

4.4 How many semivolatile spike recoveries are outside Laboratory in house MS/MSD recovery limits (use recovery limits values in Method 8270D-43&44 Table 6 if in house values not available).

Water ___ out of ___ Solids ___ out of ___

YES NO N/A

4.5 How many RPD's for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water ___ out of ___ Solids ___ out of ___

ACTION: Circle all outliers with red pencil.

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria to determine the need for some qualification of the data.

4.6 Was a Laboratory Control Sample (LCS) analyzed with each analytical batch? ✓ ___ ___

NOTE: When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

5.0 Blanks (Form IV/Equivalent)

5.1 Is the Method Blank Summary (Form IV) present? ✓ ___ ___

5.2 Frequency of Analysis:

Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? ✓ ___ ___

5.3 Has a method blank been analyzed either after

YES NO N/A

the calibration standard or at any other time during the analytical shift for each GC/MS system used ? ✓ ___ ___

ACTION: If any method blank data are missing, call lab for explanation/resubmittal. If not available, use professional judgement to determine if the associated sample data should be qualified.

5.4 Chromatography: review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra.

Is the chromatographic performance (baseline stability) for each instrument acceptable for the semivolatiles? ✓ ___ ___

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ✓ ___

6.2 Do any field/rinse/ blanks have positive results for target analytes and/or TICs (if required, see section 10 below)? ___ ✓ ___

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field Blanks must be qualified for outlying surrogates, poor spectra, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify sample results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

VEPH-EB01-100213-GW - MC

YES NO N/A

Blank Action for Semivolatile Analyses

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Field	Detects	Not detected	No qualification required
	< CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	= CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL	No qualification required
	> CRQL *	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report concentration of sample with a U
		≥ CRQL and ≥ blank contamination	No qualification required

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

NOTE: If the laboratory did not report TIC analyses, check the project plans to verify whether or not it was required.

6.3 Are there field/rinse/equipment blanks associated with every sample? ☑ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

6.4 Was a instrument blank analyzed after each sample/dilution which contained a target compound

YES NO N/A

that exceeded the initial calibration range. ☐ ___ ☑

6.5 Does the instrument blank have positive results for target analytes and/or TICs? ___ ☑ ___

Note: Use professional judgement to determine if carryover occurred and qualify analytes accordingly.

7.0 GC/MS Apparatus and Materials

7.1 Did the lab use the proper gas chromatographic column for analysis of semivolatiles by Method 8270D? Check raw data, instrument logs or contact the lab to determine what type of column was used. The method requires the use of 30 m x 0.25 mm ID (or 0.32 mm ID), silicone-coated, fused silica, capillary column. ☑ ___ ___

ACTION: If the specified column, or equivalent, was not used, document the effects in the data assessment. Use professional judgement to determine the acceptability of the data.

8.0 GC/MS Instrument Performance Check (Form V/Equivalent)

8.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for decafluorotriphenylphosphine (DFTPP)? ☑ ___ ___

NOTE: The performance solution should also contain 4,4-DDT, pentachlorophenol, and benzidine to verify injection port inertness and column performance. The degradation of DDT to DDE and DDD must be less than 20% total and the response of pentachlorophenol and benzidine should be within normal ranges for these compounds (based upon lab experience) and show no peak degradation or tailing before samples are analyzed. (see section 5.5

YES NO N/A

page 8270D-12).

8.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? ☑ ___ ___

8.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument? ☑ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS tuning data are available.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: If lab cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

8.4 Have the ion abundances been normalized to m/z 198? ☑ ___ ___

8.5 Have the ion abundance criteria been met for each instrument used? ☑ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

YES NO N/A

ACTION: If ion abundance criteria are not met, take action specified in section 3.2

8.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.) ___ ☑ ___

8.7 Have the appropriate number of significant figures (two) been reported? ☑ ___ ___

ACTION: If large errors exist, call lab for explanation/resubmittal, make necessary corrections and document effect in data assessments.

8.8 Are the spectra of the mass calibration compound acceptable? ☑ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

9.0 Target Analytes

9.1 Are the Organic Analysis Data Sheets (Form I) present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ☑ ___ ___

b. Matrix spikes and matrix spike duplicates ☐ ___ ☑

c. Blanks ☑ ___ ___

9.2 Has any special cleanup, such as GPC, been performed on all soil/sediment sample extracts (see section 7.2, page 8270D-14)? ☐ ___ ☑

YES NO N/A

ACTION: If data suggests that extract cleanup was not performed, use professional judgement. Make note in the data assessment narrative.

9.3 Are the Reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ___ ___ ✓

c. Blanks ✓ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

9.4 Are the response factors shown in the Quant Report? ✓ ___ ___

9.5 Is chromatographic performance acceptable with respect to:

Baseline stability? ✓ ___ ___

Resolution? ✓ ___ ___

Peak shape? ✓ ___ ___

Full-scale graph (attenuation)? ✓ ___ ___

Other:_____ ___ ___ ___

ACTION: Use professional judgement to determine the acceptability of the data.

9.6 Are the lab-generated standard mass spectra of identified semivolatile compounds present for

YES NO N/A

each sample? ✓ ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the data assessment narrative. If spectra are missing, reject all positive data.

9.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? ✓ ___ ___

9.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ✓ ___ ___

9.9 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ✓ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R), flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 9.7, 9.8, and 9.9.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

YES NO N/A

10.0 Tentatively Identified Compounds (TIC)

10.1 If Tentatively Identified Compounds were required for this project, are all Form Is, Part B present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier?

NOTE: Review sampling reports to determine if the lab was required to identify non target analytes (refer to section 7.6.2,page 8270D-21).

10.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following: ___ ___ ✓

a. Samples and/or fractions as appropriate ___ ___ ✓

b. Blanks ___ ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by CAS #.

10.3 Are any target compounds from one fraction listed as TIC compounds in another (e.g., an acid compound listed as a base neutral TIC)? ___ ___ ✓

ACTION: i. Flag with "R" any target compound listed as a TIC.

ii. Make sure all rejected compounds are properly reported in the other fraction.

10.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the

YES NO N/A

sample mass spectrum? ___ ___ ✓

10.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? ___ ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C2 substituted benzene") as appropriate and remove "JN". Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R."

11.0 Compound Quantitation and Reported Detection Limits

11.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found? ___ ✓ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

11.2 Are the method detection limits adjusted to reflect sample dilutions and, for soils, sample moisture? ___ ___ ✓

YES NO N/A

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC exceedance dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I (if present) and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red " X" across the entire page of all Form I's that should not be used, including any in the summary package.

12.0 Standards Data (GC/MS)

12.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration? ✓ ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

13.0 GC/MS Initial Calibration (Form VI/Equivalent)

13.1 Is the Initial Calibration Form (Form VI/ Equivalent) present and complete for the semivolatile fraction? ✓ ___ ___

ACTION: If any calibration forms or standard row data are missing, take action specified in 3.2 above.

13.2 Are all base neutral or acid RRFs > 0.050? ✓ ___ ___

YES NO N/A

Check the **average RRFs** of the four System Performance Check Compounds (SPCCs): N-nitroso-di-n-propylamine, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 4-nitrophenol. These compounds must have **average RRFs** greater than or equal to 0.05 before running samples and should not show any peak tailing.

ACTION: Circle all outliers in red.

ACTION: For any target analyte with **average RRF <0.05**

1. "R" all non-detects;

2. "J" all positive results.

13.3 Are response factors for base neutral or acid target analytes stable over the concentration range of the calibration (% Relative standard deviation [%RSD] < 20.0%)? ✓ ___ ___

NOTE: The % RSD for each individual Calibration Check Compound (CCC, Method 8270D-40 see Table 4) must be less than 30% before analysis can begin. If grater 30%, the lab must clean and recalibrate the instrument.

CALIBRATION CHECK COMPOUNDS

Base/Neutral Fraction	Acid Fraction
Acenaphthene	4-Chloro-3-methylphenol
1,4-Dichlorobenzene	2,4-Dichlorophenol
Hexachlorobutadiene	2-Nitrophenol
Diphenylamine	Phenol
Di-n-octyl phthalate	Pentachlorophenol
Fluoranthene	2,4,6-Trichlorophenol

YES NO N/A

Benzo(a)pyrene

ACTION: If the %RSD for any CCC >30% and no corrective action taken, then "J" qualify all positive hits and "UJ" qualify all non-detects.

ACTION: Circle all outliers in red.

ACTION: If the % RSD is ≥ 20.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, flag all non- detect results for that analyte "R," unusable. Alternatively, the lab should calculate first or second order regression fit of the calibration curve and select the fit which introduces the least amount of error.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

13.4 Did the laboratory calculate the calibration curve by the least squares regression fit? ___ ✓ ___

13.5 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or % RSD? (Check at least two values but if errors are found, check more.) ___ ✓ ___

ACTION: Circle Errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and note errors in data assessments.

13.5 Do the target compounds for this SDG include Pesticides? ___ ✓ ___

YES NO N/A

13.6 If the pesticide compounds include DDT, was the percent breakdown of DDT to DDD and DDE greater than 20%? ___ ___ ✓

ACTION: If DDT percent breakdown exceeds 20%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE results are positive, qualify the quantitation limit for DDT as unusable, "R".

ii. Qualify all positive results for DDD and DDE as presumptively present at an approximate concentration "JN".

14.0 GC/MS Calibration Verification (Form VII/Equivalent)

14.1 Are the Calibration Verification Forms (Form VII) present and complete for all compounds of interest? ✓ ___ ___

14.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

_____

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed within twelve hours of every sample analysis,

YES NO N/A

call lab for explanation/resubmittal. If continuing calibration data are not available, flag all associated sample data as unusable ("R").

14.3 Do any of the SPCCs have an RRF <0.05? ___ ✓ ___

If YES, make a note in data assessment if the lab did not take corrective action specified in section 7.4.4, page 8270D-18. ✓ ___ ___

14.4 Do any of the CCCs have a %D between the initial and continuing RRF which exceeds 20.0%?

ACTION: If yes, make a note in data assessment.

14.5 Do any semivolatile compounds have a % Difference (% D) between the initial and continuing RRF which exceeds 20.0%? ___ ✓ ___

ACTION: Circle all outliers in red.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is above 90%, qualify all non-detects for that analyte as "R", unusable.

14.6 Do any semivolatile compounds have a RRF < 0.05? ___ ✓ ___

ACTION: Circle all outliers in red.

ACTION: If RRF < 0.05, qualify as unusable ("R") associated non-detects and "J" associated positive values.

14.7 Are there any transcription/calculation errors in the reporting of average response factors (RRF) or percent difference (%D) between initial and continuing RRFs? (Check at least two values but if errors are found, check more). ___ ✓ ___

YES NO N/A

ACTION: Circle errors in red.

ACTION: If errors are large, call lab for explanation/resubmittal, make any necessary corrections and document effect(s) in the data assessments.

15.0 Internal Standards (Form VIII)

15.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to + 100%) for each continuing calibration? ✓ ___ ___

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area	LowerLimit	Upper Limit

(Attach additional sheets if necessary.)

Note: Check Table 5, 8270D-41 for associated analytes.

ACTION: i. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results and non-detects (U values) quantitated with this internal standard.

ii. Non-detects associated with IS > 100% should not be qualified.

YES NO N/A

iii. If the IS area is below the lower limit (<50%), qualify all associated non-detects (U-values) "J". If extremely low area counts are reported (<25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable (R).

15.2 Are the retention times of all internal standards within 30 seconds of the associated calibration standard? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

16.0 Laboratory Control Samples (LCS)

16.1 Were any LCS samples run in order to verify analytes which failed criteria for spike recovery? ___ ✓ ___

16.2 Did the lab spike LCS sample spiked with the same analytes and the same concentrations as the matrix spike? ___ ___ ✓
no MS/MSD

16.3 Were the mean and standard deviation of all analytes within the QC acceptance ranges as shown in Table 6, 8270D-43? ✓ ___ ___

ACTION: If the recovery of any analyte falls out of the designated range, the analytical results for that compound is suspect and should be qualified "J" in the unspiked samples.

17.0 Field Duplicates

17.1 Were any field duplicates submitted for semivolatile analysis? ___ ✓ ___

YES NO N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

DataQual
Environmental Services, LLC

CH2M HILL
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

November 11, 2014
SDG# 1409066, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1409066. The data validation was performed in accordance with SW846 methods 8260B for volatiles, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA
VEP4-GW28-0914	1409066-01	water	X
VEP4-GW30-0914	1409066-02	water	X
VEP4-GW29-0914	1409066-03	water	X
VEP4-GW27-0914	1409066-04	water	X
VEP4-EB01-090914-GW	1409066-05	water	X
VEP4-EB01-091114-GW	1409066-06	water	X
VEP4-TB01-091114	1409066-07	water	X
VEP4-GW28-0914 MS	1409066-01MS	water	X
VEP4-GW28-0914 MSD	1409066-01MSD	water	X

The following quality control samples were provided with this SDG: sample VEP4-TB01-091114- trip blank, VEP4-EB01-090914-GW and VEP4-EB01-091114-GW- equipment blanks.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries *

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001

- Matrix Duplicate RPDs *
- Field Duplicates NA
- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on inner quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

No qualifications were required to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to chain of custody records, sampling was performed on 9/9-11/14 and samples were received at the laboratory 9/12/14. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff
President

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1409066

002

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

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SDG# 1409066

003

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U not detected above the reported sample quantitation limit
J estimated value
UJ reported quantitation limit is qualified as estimated
N analyte has been tentatively identified
JN analyte has been tentatively identified, estimated value
R result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.

U* The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.

RL** The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL

Inorganic Methods

ICB/CCB/PB Action:

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

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SWMU 20- Vieques, Puerto Rico
SDG# 1409066

004

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.

J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.

Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL	reporting limit
PQL	practical quantitation limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

ANALYSIS DATA SHEET

VEP4-GW28-0914

Laboratory: Empirical Laboratories, LLC SDG: 1409066
Client: CH2M Hill, Inc. Project: NTR Vieques East SWMU 20
Matrix: Water Laboratory ID: 1409066-01 File ID: 0906601B.D
Sampled: 09/09/14 15:00 Prepared: 09/16/14 17:49 Analyzed: 09/16/14 17:49
Solids: Preparation: 5030B Dilution: 2
Batch: 4116008 Sequence: 4126008 Calibration: 4205002 Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.500	1.00	2.00	U
156-59-2	cis-1,2-Dichloroethene		0.500	1.00	2.00	U
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.500	1.00	2.00	U
79-01-6	Trichloroethene	**11.9**	0.200	0.400	1.00	D
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.78	92.6	75 - 120	
Dibromofluoromethane	30.00	30.43	101	85 - 115	
1,2-Dichloroethane-d4	30.00	30.13	100	70 - 120	
Toluene-d8	30.00	30.05	100	85 - 120	

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ANALYSIS DATA SHEET

VEP4-GW30-0914

Laboratory: Empirical Laboratories, LLC SDG: 1409066
Client: CH2M Hill, Inc. Project: NTR Vieques East SWMU 20
Matrix: Water Laboratory ID: 1409066-02 File ID: 0906602B.D
Sampled: 09/10/14 10:50 Prepared: 09/17/14 21:53 Analyzed: 09/17/14 21:53
Solids: Preparation: 5030B Dilution: 2
Batch: 4117012 Sequence: 4126105 Calibration: 4205002 Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.500	1.00	2.00	U
156-59-2	cis-1,2-Dichloroethene		0.500	1.00	2.00	U
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.500	1.00	2.00	U
79-01-6	Trichloroethene	**1.32**	0.200	0.400	1.00	D
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.58	98.6	75 - 120	
Dibromofluoromethane	30.00	31.32	104	85 - 115	
1,2-Dichloroethane-d4	30.00	29.64	98.8	70 - 120	
Toluene-d8	30.00	29.04	96.8	85 - 120	

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ANALYSIS DATA SHEET

VEP4-GW29-0914

Laboratory: Empirical Laboratories, LLC | SDG: 1409066
Client: CH2M Hill, Inc. | Project: NTR Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1409066-03 | File ID: 0906603B.D
Sampled: 09/10/14 13:10 | Prepared: 09/17/14 22:21 | Analyzed: 09/17/14 22:21
Solids: | Preparation: 5030B | Dilution: 2
Batch: 4117012 | Sequence: 4126105 | Calibration: 4205002 | Instrument: MS-VOA4

CAS NO	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.500	1.00	2.00	U
156-59-2	cis-1,2-Dichloroethene		0.500	1.00	2.00	U
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.500	1.00	2.00	U
79-01-6	Trichloroethene	2.56	0.200	0.400	1.00	~~U~~
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	24.19	80.6	75 - 120	
Dibromofluoromethane	30.00	31.48	105	85 - 115	
1,2-Dichloroethane-d4	30.00	30.02	100	70 - 120	
Toluene-d8	30.00	27.67	92.2	85 - 120	

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ANALYSIS DATA SHEET

VEP4-GW27-0914

Laboratory: Empirical Laboratories, LLC | SDG: 1409066
Client: CH2M Hill, Inc. | Project: NTR Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1409066-04 | File ID: 0906604B.D
Sampled: 09/10/14 15:15 | Prepared: 09/17/14 22:48 | Analyzed: 09/17/14 22:48
Solids: | Preparation: 5030B | Dilution: 2
Batch: 4117012 | Sequence: 4126105 | Calibration: 4205002 | Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.500	1.00	2.00	U
156-59-2	cis-1,2-Dichloroethene	0.666	0.500	1.00	2.00	~~U~~ J
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.500	1.00	2.00	U
79-01-6	Trichloroethene	2.81	0.200	0.400	1.00	~~U~~
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	25.91	86.4	75 - 120	
Dibromofluoromethane	30.00	30.97	103	85 - 115	
1,2-Dichloroethane-d4	30.00	29.92	99.7	70 - 120	
Toluene-d8	30.00	28.04	93.5	85 - 120	

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ANALYSIS DATA SHEET

VEP4-EB01-090914-GW

Laboratory: Empirical Laboratories, LLC | SDG: 1409066
Client: CH2M Hill, Inc. | Project: NTR Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1409066-05 | File ID: 0906605A.D
Sampled: 09/09/14 16:25 | Prepared: 09/17/14 16:46 | Analyzed: 09/17/14 16:46
Solids: | Preparation: 5030B | Dilution: 1
Batch: 4117012 | Sequence: 4126105 | Calibration: 4205002 | Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	26.73	89.1	75 - 120	
Dibromofluoromethane	30.00	30.74	102	85 - 115	
1,2-Dichloroethane-d4	30.00	30.32	101	70 - 120	
Toluene-d8	30.00	28.63	95.4	85 - 120	

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ANALYSIS DATA SHEET

VEP4-EB01-091114-GW

Laboratory: Empirical Laboratories, LLC | SDG: 1409066
Client: CH2M Hill, Inc. | Project: NTR Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1409066-06 | File ID: 0906606A.D
Sampled: 09/11/14 07:30 | Prepared: 09/17/14 17:14 | Analyzed: 09/17/14 17:14
Solids: | Preparation: 5030B | Dilution: 1
Batch: 4117012 | Sequence: 4126105 | Calibration: 4205002 | Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.47	91.6	75 - 120	
Dibromofluoromethane	30.00	30.09	100	85 - 115	
1,2-Dichloroethane-d4	30.00	30.40	101	70 - 120	
Toluene-d8	30.00	28.94	96.5	85 - 120	

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ANALYSIS DATA SHEET

VEPA-TD01-091114

Laboratory:	Empirical Laboratories, LLC		SDG:	1409066	
Client:	CH2M Hill, Inc.		Project:	NTB Yorktown East SWMU 20	
Matrix:	Water	Laboratory ID:	1409066-07	File ID:	0906007A.D
Sampled:	09/11/14 07:35	Prepared:	09/17/14 16:18	Analyzed:	09/17/14 16:18
Solids:		Preparation:	5030B	Dilution:	1
Batch:	4117312	Sequence:	4176105	Calibration:	4205/02	Instrument:	MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	QL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	25.66	85.5	75 - 120	
Dibromofluoromethane	30.00	30.49	102	85 - 115	
1,2-Dichloroethane-d4	30.00	29.82	99.4	70 - 120	
Toluene-d8	30.00	27.79	92.6	85 - 120	

WM 11/14

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 1409066 LAB: Empirical

SITE NAME: Yorktown SWMU 20 CTO-0013

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. **VOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓

1.3 Sample Conditions/Problems

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SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ✓

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ✓

a. 9/9-11/14 b. 9/12 c. 9/16-17/14

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

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SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water ✓

b. Soil

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water ✓

b. Soil

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. Lab [✓] ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ [✓]

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] [✓] ___

If yes, were samples reanalyzed? [ ] ___ [✓]

Were method blanks reanalyzed? [ ] ___ [✓]

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] [✓] ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SOP. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [✓] ___ ___

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] ___ [✓]

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent) VEPA-GW028-0914

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [✓] ___ ___

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [✓] ___ ___

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month [page 8000C, section 9.5.])

a. Water [✓] ___ ___

b. Waste [ ] ___ ___

c. Soil/Solid [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [✓] ___ ___

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ [✓]

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? [✓] ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? [✓] ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? [✓] ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? [✓] ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. [ ] [✓] ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ [✓] ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

VEP4-TB01-091114 MeCl
VEP4-EB01-091114-GW MeCl
VEP4-EB01-090914-GW MeCl

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ☑ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ☑ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ☑ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ☑ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ☑ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ☑ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ☑ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ☑ ___

9.7 Have the appropriate number of significant figures (two) been reported? ☑ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ☑ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ☑ ___ ___

b. Matrix spikes and matrix spike dupilcates ☑ ___ ___

c. Blanks ☑ ___ ___

d. Laboratory Control Samples ☑ ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ☑ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ☑ ___ ___

c. Blanks ☑ ___ ___

d. Laboratory Control Samples ☑ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? ☑ ___ ___

YES NO N/A

Resolution? ☑ ___ ___

Peak shape? ☑ ___ ___

Full-scale graph (attenuation)? ☑ ___ ___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? ☑ ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reportec compound within 0.06 RRT units of the standard RRT in the continuing calibration? ☑ ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ☑ ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ☑ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

NO TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? ☐ ___ ___

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate ☐ ___ ___

b. Blanks ☐ ___ ___

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? ☐ ___ ___

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ☐ ___ ___

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? ☐ ___ ___

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? ☐ ___ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? ☑ ___ ___

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? ☑ ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? ✓ ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39) qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? ___ ✓ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. ✓ ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) ✓ ___ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? ✓ ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). ___ ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? ___ ✓ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? ✓ ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:
1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.
2. Do not qualify non-detects when the associated IS are counts area > + 100%.
3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".
4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ✓ ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

Sample Delivery Group Case Narrative

Receipt Information:
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

The following issues were discovered with the COC and/or samples upon log-in:
1. At the requests of the client, the sample listed on the COC as VEP4-EB01-091014-GW had the client ID changed to VEP4-EB01-091114-GW and the sample listed on the COC as VEP4-TB01-091014 was changed to VEP4-TB01-091114.

Changes to the Revision:
This is an original submittal of the final report package.

Analytical Information:
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample preparation and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

SW8260B:
Note – Samples 1409066-01, -02, -03, and -04 were analyzed at a 2x due to the samples foaming during screening. No lower analyses were able to be performed.

No additional anomalies or deviations are noted.

ELECTRONIC CHAIN OF CUSTODY RECORD

EMPIRICAL

phone: 615-345-1115

C.O.C. 20140811-GW-EMP-01

PLEASE PRINT

Report to: CH2MHILL
Company Name: CH2MHILL
Address: 15010 Conference Dr. ; 200
Chantilly, VA 20151
Attn: Mike Zamboni
Phone: 703.376.5301
Fax: 703.376.5801

Purchase Order Number: 955530
Project Name/Number: not required
Sampler (Print): not required
Sampler (Signature): not required

Invoice to:
Company Name: See Contact
Address:
Attn:
Phone:
Fax:

Date Shipped: 8/11/14
Carrier: FedEx
Waybill No. 771122477
Comments:

Sample Identification	Location	Date Collected	Time Collected	Time Zone	Matrix: Air	Soil	Soil	Water	Analysis Requested/Method Number
VEP4-GW28-0914	01 MW-28	9/9/14	15:00	AST 3				✓	x
VEP4-GW28-0914-MS	QA/QC	9/9/14	15:00	AST 3				✓	x
VEP4-GW28-0914-SD	QA/QC	9/9/14	15:00	AST 3				✓	x
VEP4-GW30-0914	02 MW-30	9/10/14	10:50	AST 3				✓	x
VEP4-GW29-0914	03 MW-29	9/10/14	13:10	AST 3				✓	x
VEP4-GW27-0914	04 MW-27	9/10/14	15:15	AST 3				✓	x
VEP4-EB01-090914-GW	05 QC	9/9/14	16:25	AST 3				✓	x
VEP4-EB01-091014-GW	06 QC	9/11/14	07:30	AST 3				✓	x
VEP4-TB01-091014	07 QC	9/11/14	07:35	AST 3				✓	x

MW-2B
matrix spike
matrix spike duplica
MW-3O
MW-29
MW-27
equipment blan
equipment blan
trip blank

Shuttle Temperature:
Turnaround Requested: Check one ☐ Std 28 days ☐ One week ☐ 24/48 Hrs. ☐ Other
Sample Disposal: ☐ Disposed by Lab ☐ Return to client
not applicable

Relinquished by sampler: Date 8/11/14 Time 7:30
Received by: Date Time
Relinquished by: Date Time
Received by: Date Time
Relinquished by: Date 8/12/14 Time 8:40
Received by: Received at lab by

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler
Note: The first sampled date of the ARF will be used as the COC number unless indicated otherwise.

II. EMPIRICAL LABORATORIES COOLER RECEIPT FORM

Cooler Received/Opened On: 09/12/14 @ 0840 Workorder# 1409066

1. Tracking # 7321 (last 4 digits, FedEx)

   Courier: FedEx

2. Temperature of rep. sample or temp blank when opened: 4.8 °C + correction factor(-0.3) = 4.5 °C
3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO...NA
4. Were custody seals on outside of cooler? YES...NO...NA

   If yes, how many and where: 1 front

5. Were the seals intact, signed, and dated correctly? YES...NO...NA
6. Were custody papers inside cooler? YES...NO...NA

   I certify that I opened the cooler and answered questions 1-6 (initial/date) TH 9/12/14

7. Were custody seals on containers: YES NO and intact YES...NO...NA

   Were these signed and dated correctly? YES...NO...NA

8. Packing material used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry Ice Other None
10. Did all containers arrive in good condition (unbroken)? YES...NO...NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES...NO...NA
12. Did all container labels and tags agree with custody papers? YES...NO...NA
13. a. Were VOA vials received? YES...NO...NA

    b. Was there observable headspace present in any VOA vial (>5mm-6mm)? YES...NO...NA

14. Was there a Trip Blank in this cooler (custody seals present/intact)? YES...NO...NA...Comments_____
    If multiple coolers, sequence #_____

    I certify that I unloaded the cooler and answered questions 7-14 (initial/date) TH 9/12/14

15. a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES...NO...NA

    b. Did the bottle labels indicate that the correct preservatives were used? YES...NO...NA

16. Was residual chlorine present? YES...NO...NA

    I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial/date) TH 9/12/14

17. Were custody papers properly filled out (ink, signed, etc)? YES...NO...NA
18. Did you sign the custody papers in the appropriate place? YES...NO...NA
19. Were correct containers used for the analysis requested? YES...NO...NA If not, PM notified? YES...NO...NA
20. Was sufficient amount of sample sent in each container? YES...NO...NA If not, PM notified? YES...NO...NA
21. Were there Non-Conformance issues at login? YES...NO...NCR#_____

I certify that I entered this project into LIMS and answered questions 17-21 (initial/date) TH 9/12/14

I certify that I attached a label with the unique LIMS number to each container (initial/date) TH 9/12/14

I certify that I notified the laboratory of any short holding time or RUSH parameters (initial/date) TH 9/12/14

V:\Standard Operating Procedures\Current SOP File Directory\QS10_R21_20140729_CRF.doc

MEMORANDUM **CH2MHILL**

Corrections to COCs

TO: Sonya Gordon, Empirical

COPIES: File
Data Validation Package
Laboratory Package SDG: Not yet assigned

FROM: Juliana Dean
Project Chemist

DATE: September 15, 2014

This memo is to document corrections made to entries on the Chains of Custody (COC) and Logins for Vieques, SWMU 20, CTO-0013.

The corrections include changes to the sample IDs on the COC:

Sample ID on Login	Correct Sample ID	Date Collected	Time Collected	SDG
VEP4-EB01-091014-GW	VEP4-EB01-091114-GW	9/11/2014	7:30	Not yet assigned
VEP4-TB01-091014	VEP4-TB01-091114	9/11/2014	7:35	Not yet assigned

DataQual

Environmental Services, LLC

CH2M HILL
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

November 11, 2014
SDG# 1409099, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1409099. The data validation was performed in accordance with SW846 methods 8260B for volatiles, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA
VEP4-GW16-0914	1409099-01	water	X
VEP4-GW22-0914	1409099-02	water	X
VEP4-GW22P-0914	1409099-03	water	X
VEP4-GW21-0914	1409099-04	water	X
VEP4-GW20-0914	1409099-05	water	X
VEP4-GW26-0914	1409099-06	water	X
VEP4-EB01-091214-GW	1409099-07	water	X
VEP4-EB01-091514-GW	1409099-08	water	X
VEP4-TB01-091514	1409099-09	water	X
VEP4-GW19-0914	1409099-10	water	X
VEP4-GW14-0914	1409099-11	water	X
VEP4-GW18-0914	1409099-12	water	X
VEP4-EB01-091614-GW	1409099-13	water	X
VEP4-GW18-0914 MS	1409099-12MS	water	X
VEP4-GW18-0914 MSD	1409099-12 MSD	water	X

The following quality control samples were provided with this SDG: Sample VEP4-GW22P-0914- field duplicate of sample VEP4-GW22-0914, sample VEP4-TB01-091514- trip blank and samples VEP4-EB01-091214-GW, VEP4-EB01-091514-GW and VEP4-EB01-091614-GW - equipment blanks.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *

- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries *
- Matrix Duplicate RPDs *
- Field Duplicates *
- Identification/Quantitation
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

The re-analysis of one sample was excluded as it was not required.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to chain of custody records, sampling was performed on 9/11-16/14 and samples were received at the laboratory 9/17/14. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

Identification/Quantitation

According to the case narrative, sample VEP4-GW22P-0914 was re-analyzed due to a non-compliant surrogate recovery for dibromofluoromethane of 115%. However the QC criteria range for this surrogate is 85-115%. The laboratory was contacted to inquire if this was a rounding issue; however the lab responded that when the result was rounded to the appropriate significant figures the recovery does not exceed the limits. Therefore, the re-analysis was excluded, in favor of the initial analysis, as the run was not necessary (qualifier code: RE).

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
VEP4-GW22P-0914RE	all results	+/-	exclude	RE

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.
U*	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.
RL**	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action -	The sample result is greater than the RL and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R -	Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.
J -	Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.
J/UJ -	Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.
Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action -	The sample result is greater than the RL and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.
R -	Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.
J -	Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL	reporting limit
PQL	practical quantitation limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1409099

ANALYSIS DATA SHEET

VEP4-GW16-0914

Laboratory: Empirical Laboratories, LLC — SDG: 1409099
Client: CH2M Hill, Inc — Project: NTR Vieques East SWMU 20
Matrix: Water — Laboratory ID: 1409099-03 — File ID: 0909903B.D
Sampled: 09/11/14 15:00 — Prepared: 09/19/14 15:41 — Analyzed: 09/19/14 15:41
Solids: — Preparation: 5030B — Dilution: 2
Batch: 4119010 — Sequence: 4126505 — Calibration: 4205002 — Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.500	1.00	2.00	U
156-59-2	cis-1,2-Dichloroethene		0.500	1.00	2.00	U
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.500	1.00	2.00	U
79-01-6	Trichloroethene	9.37	0.200	0.400	1.00	
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	26.60	88.7	75 - 120	
Dibromofluoromethane	30.00	30.92	103	85 - 115	
1,2-Dichloroethane-d4	30.00	29.53	98.4	70 - 120	
Toluene-d8	30.00	30.31	101	85 - 120	

1409099 Summ Package

ANALYSIS DATA SHEET

VEP4-GW22-0914

Laboratory: Empirical Laboratories, LLC — SDG: 1409099
Client: CH2M Hill, Inc — Project: NTR Vieques East SWMU 20
Matrix: Water — Laboratory ID: 1409099-05 — File ID: 0909902B.D
Sampled: 09/11/14 11:05 — Prepared: 09/19/14 16:09 — Analyzed: 09/19/14 16:09
Solids: — Preparation: 5030B — Dilution: 1
Batch: 4119010 — Sequence: 4126505 — Calibration: 4205002 — Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene	0.613	0.100	0.200	0.500	
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.30	94.3	75 - 120	
Dibromofluoromethane	30.00	32.48	108	85 - 115	
1,2-Dichloroethane-d4	30.00	30.04	100	70 - 120	
Toluene-d8	30.00	28.75	95.8	85 - 120	

1409099 Summ Package

ANALYSIS DATA SHEET

VEP4-GW22P-0914

Laboratory: Empirical Laboratories, LLC — SDG: 1409099
Client: CH2M Hill, Inc — Project: NTR Vieques East SWMU 20
Matrix: Water — Laboratory ID: 1409099-07 — File ID: 0909903B.D
Sampled: 09/11/14 11:10 — Prepared: 09/19/14 16:37 — Analyzed: 09/19/14 16:37
Solids: — Preparation: 5030B — Dilution: 1
Batch: 4119010 — Sequence: 4126505 — Calibration: 4205002 — Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene	0.525	0.100	0.200	0.500	
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.20	90.7	75 - 120	
Dibromofluoromethane	30.00	34.64	115	85 - 115	
1,2-Dichloroethane-d4	30.00	33.66	112	70 - 120	
Toluene-d8	30.00	27.96	93.2	85 - 120	

1409099 Summ Package

ANALYSIS DATA SHEET

VEP4-GW22P-0914

Laboratory: Empirical Laboratories, LLC | SDG: 1409099
Client: CH2M Hill, Inc. | Project: NTR Vinegar East SWMU 20
Matrix: Water | Laboratory ID: 1409099-03R61 | File ID: 0909003C.D
Sampled: 09/12/14 11:10 | Prepared: 09/22/14 21:55 | Analyzed: 09/22/14 21:55
Solids: | Preparation: 5030B | Dilution: 1
Batch: 4122017 | Sequence: 4126602 | Calibration: 4205002 | Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene	0.570	0.100	0.200	0.500	
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.67	92.1	75 - 120	
Dibromofluoromethane	30.00	32.64	109	85 - 115	
1,2-Dichloroethane-d4	30.00	30.35	101	70 - 120	
Toluene-d8	30.00	28.81	96.0	85 - 120	

UM 11/14

ANALYSIS DATA SHEET

VEP4-GW21-0914

Laboratory: Empirical Laboratories, LLC | SDG: 1409099
Client: CH2M Hill, Inc. | Project: NTR Vinegar East SWMU 20
Matrix: Water | Laboratory ID: 1409099-04 | File ID: 0909004B.D
Sampled: 09/11/14 13:00 | Prepared: 09/19/14 17:05 | Analyzed: 09/19/14 17:05
Solids: | Preparation: 5030B | Dilution: 1
Batch: 4119810 | Sequence: 4126505 | Calibration: 4205002 | Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene	2.19	0.100	0.200	0.500	
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.09	93.6	75 - 120	
Dibromofluoromethane	30.00	30.40	101	85 - 115	
1,2-Dichloroethane-d4	30.00	32.21	107	70 - 120	
Toluene-d8	30.00	28.98	96.6	85 - 120	

UM 11/14

ANALYSIS DATA SHEET

VEP4-GW20-0914

Laboratory: Empirical Laboratories, LLC | SDG: 1409099
Client: CH2M Hill, Inc. | Project: NTR Vinegar East SWMU 20
Matrix: Water | Laboratory ID: 1409099-05 | File ID: 0909005B.D
Sampled: 09/12/14 14:10 | Prepared: 09/22/14 22:22 | Analyzed: 09/22/14 22:22
Solids: | Preparation: 5030B | Dilution: 2
Batch: 4122017 | Sequence: 4126602 | Calibration: 4205002 | Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.500	1.00	2.00	U
156-59-2	cis-1,2-Dichloroethene		0.500	1.00	2.00	U
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene	0.574	0.500	1.00	2.00	JB
79-01-6	Trichloroethene	30.6	0.200	0.400	1.00	B
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	33.50	112	75 - 120	
Dibromofluoromethane	30.00	32.00	107	85 - 115	
1,2-Dichloroethane-d4	30.00	29.39	98.0	70 - 120	
Toluene-d8	30.00	28.79	96.0	85 - 120	

UM 11/14

ANALYSIS DATA SHEET

VEP4-GW26-0914

Laboratory: Empirical Laboratories, LLC | SDG: 1409099
Client: CH2M Hill, Inc. | Project: NTR Vinegar East SWMU 20
Matrix: Water | Laboratory ID: 1409099-06 | File ID: 0909006B.D
Sampled: 09/12/14 10:55 | Prepared: 09/22/14 22:50 | Analyzed: 09/22/14 22:50
Solids: | Preparation: 5030B | Dilution: 2
Batch: 4122017 | Sequence: 4126602 | Calibration: 4205002 | Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.500	1.00	2.00	U
156-59-2	cis-1,2-Dichloroethene	0.507	0.500	1.00	2.00	JB
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.500	1.00	2.00	U
79-01-6	Trichloroethene	6.52	0.200	0.400	1.00	B
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.85	96.2	75 - 120	
Dibromofluoromethane	30.00	31.20	104	85 - 115	
1,2-Dichloroethane-d4	30.00	30.02	100	70 - 120	
Toluene-d8	30.00	29.11	97.0	85 - 120	

UM 11/14

ANALYSIS DATA SHEET

VEP4-EB01-091214-GW

Laboratory: Empirical Laboratories, LLC | SDG: 1409099
Client: CH2M HILL Inc. | Project: NTR Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1409099-07 | File ID: 0909007A.D
Sampled: 09/12/14 07:20 | Prepared: 09/22/14 17:16 | Analyzed: 09/22/14 17:16
Solids: | Preparation: 5030B | Dilution: 1
Batch: 4122017 | Sequence: 4126602 | Calibration: 4205003 | Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.90	93.0	75 - 120	
Dibromofluoromethane	30.00	30.47	102	85 - 115	
1,2-Dichloroethane-d4	30.00	29.09	97.0	70 - 120	
Toluene-d8	30.00	29.70	99.0	85 - 120	

LM 11/14

ANALYSIS DATA SHEET

VEP4-EB01-091514-GW

Laboratory: Empirical Laboratories, LLC | SDG: 1409099
Client: CH2M HILL Inc. | Project: NTR Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1409099-08 | File ID: 0909008A.D
Sampled: 09/15/14 07:15 | Prepared: 09/22/14 17:44 | Analyzed: 09/22/14 17:44
Solids: | Preparation: 5030B | Dilution: 1
Batch: 4122017 | Sequence: 4126602 | Calibration: 4205002 | Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.33	91.1	75 - 120	
Dibromofluoromethane	30.00	30.98	103	85 - 115	
1,2-Dichloroethane-d4	30.00	28.74	95.8	70 - 120	
Toluene-d8	30.00	29.02	96.8	85 - 120	

LM 11/14

ANALYSIS DATA SHEET

VEP4-TB01-091514

Laboratory: Empirical Laboratories, LLC | SDG: 1409099
Client: CH2M HILL Inc. | Project: NTR Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1409099-09 | File ID: 0909009A.D
Sampled: 09/15/14 07:12 | Prepared: 09/22/14 18:12 | Analyzed: 09/22/14 18:12
Solids: | Preparation: 5030B | Dilution: 1
Batch: 4122017 | Sequence: 4126602 | Calibration: 4205002 | Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.63	92.1	75 - 120	
Dibromofluoromethane	30.00	31.04	103	85 - 115	
1,2-Dichloroethane-d4	30.00	31.22	104	70 - 120	
Toluene-d8	30.00	28.53	95.1	85 - 120	

LM 11/14

ANALYSIS DATA SHEET

VEP4-GW19-0914

Laboratory: Empirical Laboratories, LLC | SDG: 1409099
Client: CH2M HILL Inc. | Project: NTR Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1409099-10 | File ID: 0909010B.D
Sampled: 09/15/14 11:05 | Prepared: 09/22/14 22:18 | Analyzed: 09/22/14 22:18
Solids: | Preparation: 5030B | Dilution: 2
Batch: 4122017 | Sequence: 4126602 | Calibration: 4205002 | Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.500	1.00	2.00	U
156-59-2	cis-1,2-Dichloroethene		0.500	1.00	2.00	U
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.500	1.00	2.00	U
79-01-6	Trichloroethene	3.27	0.200	0.400	1.00	J
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.25	97.5	75 - 120	
Dibromofluoromethane	30.00	31.42	105	85 - 115	
1,2-Dichloroethane-d4	30.00	30.42	101	70 - 120	
Toluene-d8	30.00	28.48	94.9	85 - 120	

LM 11/14

ANALYSIS DATA SHEET

VEP4-GW14-0914

Laboratory: Empirical Laboratories, LLC | SDG: 1409099
Client: CH2M Hill, Inc. | Project: NTR Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1409099-11 | File ID: 090991!8.D
Sampled: 09/15/14 15:10 | Prepared: 09/22/14 23:40 | Analyzed: 09/22/14 23:40
Solids: | Preparation: 5030B | Dilution: 1
Batch: 4172017 | Sequence: 4126602 | Calibration: 4205002 | Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	25.93	86.4	75 - 120	
Dibromofluoromethane	30.00	33.73	112	85 - 115	
1,2-Dichloroethane-d4	30.00	32.10	107	70 - 120	
Toluene-d8	30.00	25.93	86.4	85 - 120	

LM 11/14/14

ANALYSIS DATA SHEET

VEP4-GW18-0914

Laboratory: Empirical Laboratories, LLC | SDG: 1409099
Client: CH2M Hill, Inc. | Project: NTR Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1409099-12 | File ID: 090991!9.D
Sampled: 09/15/14 15:10 | Prepared: 09/19/14 15:12 | Analyzed: 09/19/14 15:13
Solids: | Preparation: 5030B | Dilution: 2
Batch: 4170810 | Sequence: 4126505 | Calibration: 4205002 | Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.500	1.00	2.00	U
156-59-2	cis-1,2-Dichloroethene		0.500	1.00	2.00	U
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.500	1.00	2.00	U
79-01-6	Trichloroethene	2.30	0.200	0.400	1.00	J
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.41	94.7	75 - 120	
Dibromofluoromethane	30.00	31.70	106	85 - 115	
1,2-Dichloroethane-d4	30.00	32.80	109	70 - 120	
Toluene-d8	30.00	28.75	95.8	85 - 120	

LM 11/14/14

ANALYSIS DATA SHEET

VEP4-EB01-091614-GW

Laboratory: Empirical Laboratories, LLC | SDG: 1409099
Client: CH2M Hill, Inc. | Project: NTR Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1409099-13 | File ID: 090991!A.D
Sampled: 09/16/14 07:30 | Prepared: 09/22/14 18:40 | Analyzed: 09/22/14 18:40
Solids: | Preparation: 5030B | Dilution: 1
Batch: 4172017 | Sequence: 4126602 | Calibration: 4205002 | Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.90	93.0	75 - 120	
Dibromofluoromethane	30.00	30.54	102	85 - 115	
1,2-Dichloroethane-d4	30.00	29.59	98.6	70 - 120	
Toluene-d8	30.00	29.67	98.9	85 - 120	

LM 11/14/14

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 1409099 LAB: Empirical

SITE NAME: Vieques Summ 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓ __ __

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓ __ __

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ __ __

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. **VOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓ __ __

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓ __ __

1.3 Sample Conditions/Problems

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R". Case narr. stated 2 vials for VEP4-EB01-091614 + 2 vials for VEP4-EB01-091614 no qual as 3 vials were collected

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ ✓ ___

A- 9/11-16/14 R 9/17 a 9/19-22/14

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water ✓ ___ ___

b. Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water ✓ ___ ___

b. Soil [ ] ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. ✓ ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ ✓

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] ✓ ___

If yes, were samples reanalyzed? [ ] ___ ✓

Were method blanks reanalyzed? [ ] ___ ✓

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] ✓ ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. ✓ ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ [✓]

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] [✓] ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent) VEP4-GW18-0914

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [✓] ___ ___

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [✓] ___ ___

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month (page 8000C, section 9.5.1)

a. Water [✓] ___ ___

b. Waste [ ] ___ ___

c. Soil/Solid [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [✓] ___ ___

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] [✓] ___

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? ✓ ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? ✓ ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? ✓ ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? ✓ ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ✓ ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

VEP4-EB01-091614-GW MeCl2
VEP4-TB01-091514 MeCl2
VEP4-EB01-091514-GW MeCl2
VEP4-EB01-091214-GW MeCl2

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone
** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates ✓ ___ ___

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ✓ ___ ___

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? ✓ ___ ___

YES NO N/A

Resolution? ✓ ___ ___

Peak shape? ✓ ___ ___

Full-scale graph (attenuation)? ✓ ___ ___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? ✓ ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? ✓ ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ✓ ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ✓ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

NO TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? ✓ ___ ___

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate ___ ___ ✓

b. Blanks ___ ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ ___

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ ___

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ___

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] ___ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [✓] ___ ___

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39)qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? [✓] ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. [✓] ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) [ ] [✓] ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? ✓ ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). ___ ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? ___ ✓ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? ✓ ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:
1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.
2. Do not qualify non-detects when the associated IS are counts area > + 100%.
3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".
4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ✓ ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

VEP4-GW22-0914
VEP4-GW22P-0914 > No qual, All attached sheet

DataQual

VOA

FIELD DUPLICATE SAMPLE SUMMARY

Sample ID: VEPA-GW22-0914
Duplicate Sample ID: VEPA-GW22P-0914

Water: RPD>20%
Soil: RPD>30%

Compound	Sample Conc.	Dup. Sample Conc.	%RPD
trichloroethene	0.613	0.525	15
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
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			#DIV/0!

COMMENTS: Qualify all results with RPD >30% for soils and >20% for waters as estimated (J/UJ)

* one of the results below the LOD
if both results are below the LOD the results are not compared

047

Sample Delivery Group Case Narrative

Receipt Information:
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

The following issues were discovered with the COC and/or samples upon log-in:

1. Pea-sized headspace was observed in 1 HCL vial for sample VEP4-EB01-091514 (09/15/14@0715) and 2 HCL vials for sample VEP4-EB01-091614' (09/16/14@0730).
2. At the client's request, the sample listed on the COC as VEP4-EB01-091514-GW was changed to the client ID of VEP4-EB01-091614-GW, the sample listed on the COC as VEP4-EB01-091114 was changed to the client ID of VEP4-EB01-091214-GW, and the sample listed on the COC as VEP4-EB01-091214 was changed to the client ID of VEP4-EB01-091514-GW.

Changes to the Revision:
Revision 01: The package was revised to add the original analysis for sample 1409099-03 that was originally not included in the package due to a surrogate exceedence but is being added at the request of the client.

Analytical Information:
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample preparation and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

SW8260B:
Note –Samples 1409099-01, -05, -06, -10, and -12 were analyzed at a 2x only due to the samples foaming during screening. No lower analyses were able to be performed.

The following surrogates exceeded criteria:
Dibromofluoromethane with a positive bias in 1409099-03 at 115% with an upper limit of 115%; note – the sample was re-analyzed due to the surrogate exceedence with passing criteria. Both are included in the report at the request of the client.

048

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

049

Data Qualifiers:
As applicable and where required, the following general qualifiers are associated with the sample results. Additional qualifiers will be specified within the reporting sections of the data package or within the body of the Case Narrative.

Analytical Report Terms and Qualifiers

DL: The detection limit (DL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero. The DL is supported by the method detection limit (MDL) which is determined from analysis of a sample containing the analyte in a given matrix.

LOD: The Limit of Detection is an estimate of the minimum amount of a substance that an analytical process can reliably detect. An LOD is analyte- and matrix-specific and may be laboratory-dependent. This definition is further clarified in the DoD QSM 4.2 revisions as the smallest amount or concentration of a substance that must be present in a sample in order to be detected at a high level of confidence (99%). At the LOD, the false negative rate (Type II error) is 1%.

LOQ: The Limit of Quantitation is the minimum level, concentration, or quantity of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. This term is further clarified within the DoD QSM 4.2 as the lowest concentration that produces a quantitative result within specified limits of precision and bias.

***:** Exceeding quality control criteria are associated with the reported result.

B: The presence of a "B" to the right of an analytical value indicates that this compound was also detected in the method blank and the data should be interpreted with caution. One should consider the possibility that the correct sample result might be less than the reported result and, perhaps, zero.

D: When a sample (or sample extract) is rerun diluted because one of the compound concentrations exceeded the highest concentration range for the standard curve, all of the values obtained in the dilution run will be flagged with a "D".

E: The concentration for any compound found which exceeds the highest concentration level on the standard curve for that compound will be flagged with an "E". Usually the sample will be rerun at a dilution to quantitate the flagged compound. For Metals, the qualifier indicates that the serial dilution was outside of the control limits and the compound should be considered estimated due to the presence of interference.

H1: The result was analyzed outside of the EPA recommended holding time.

H2: The result was extracted outside of the EPA recommended holding time.

H3: The sample for this analyte was received outside of the EPA recommended holding time.

J: The presence of a "J" to the right of an analytical result indicates that the reported result is estimated. The mass spectral data pass the identification criteria showing that the compound is present, but the calculated result is less than the LOQ. One should feel confident that the result is greater than zero and less than the LOQ.

050

M: Indicates that the sample matrix interfered with the quantitation of the analyte. In dual column analysis the result is reported from the column with the lower concentration. In inorganics, it indicates that the parameters DL/LOD/LOQ have been raised.

N: The MS/MSD accuracy and/or precision are outside criteria. The predigested spike recovery is not within control limits for the associated parameter.

P: The associated numerical value is an estimated quantity. There is greater than a 40% difference between the two GC columns for the detected concentrations. The higher of the two values is reported unless matrix interference is obvious or for HPLC analysis where the primary column is reported.

Q: The relative percent difference (RPD) and/or percent recovery exceeded limits in the associated Blank Spike and/or Blank Spike Duplicate.

S: The associated internal standard exceeded criteria.

U: The presence of a "U" indicates that the analyte was analyzed for but was not detected or the concentration of the analyte quantitated below the DL.

X: The parameter shows a potential positive bias on a reported concentration due to an ICV or CCV exceeding the upper control limit on the high side.

Y: The parameter shows a potential negative bias on a reported concentration due to an ICV or CCV exceeding the lower control limit on the low side.

Z: The parameter shows lack of confirmation/detection, which may be due to a negative bias in the ICV or CCV which exceeds the lower control limit.

Chromatographic Flags for Manual Integration:

The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.

B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.

C: The peak was manually integrated to correct the baseline from the original chromatogram.

D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.

E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

LIMS Definitions / Naming Conventions:

The following are general naming conventions that are used throughout the laboratory; however, on a method by method basis, there are additional QAQC items that are named in a consistent format.

BLK: LIMS assigns a unique identifier to the Method Blank by naming it as the letters BLK

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appended to the Batch ID. A Method Blank is an analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample processing. The Method Blank is used to assess for possible contamination during preparation and/or analysis steps. Method Blanks within a Batch or Analytical sequence will be appended with a numerical value beginning with 1 that will increase incrementally.

BS: LIMS assigns a unique identifier to the Blank Spike by naming it as the letters BS appended to the Batch ID. The Blank Spike or Lab Control Sample is a controlled analyte-free matrix, which is spiked with known and verified concentrations of target analytes. Spiking concentrations can be referenced in the method SOP. The BS is used to evaluate the viability of analytes taken through the entire prep (when applicable) and analytical process. Blank Spikes within a Batch or Analytical sequence will be appended with a numerical value beginning with 1 that will increase incrementally. A duplicate Blank Spike will be designated as a BSD.

MS: The LIMS assigns each Client sample with a unique identifier. The Matrix Spike is designated with a MS at the end of the sample's unique identifier. The Matrix Spike sample is used to assess the effect of the sample matrix on the precision and accuracy of the results generated using the selected method. A duplicate Matrix Spike will be designated as a MSD.

IDs: The LIMS assigns each Client sample with a unique identifier. The letter "RE" may potentially be appended to the end of the LIMS Sample ID. And **"RE"** implies that the sample was either re-prepped, re-analyzed straight, or re-analyzed at a dilution. Subsequent re-analysis for the sample will be appended with a numerical value beginning with 1 that will increase incrementally. Eg: RE1, RE2, RE3, etc.

Statement of Data Authenticity:

I certify that, based upon my inquiry of those individuals immediately responsible for obtaining the information and to the best of my knowledge, the data package is in compliance with the terms and conditions of the contract, both technically and for completeness, with the exception of the conditions detailed in this Case Narrative, as verified by my signature below. During absences, the Data Quality Manager, Technical Directors or Project Managers are authorized to sign this Statement of Data Authenticity.

Mr. Rick D. Davis
Laboratory Technical Director / VP Operations

552

EMPIRICAL 1409099

ELECTRONIC CHAIN OF CUSTODY RECORD

phone: 615-345-1115

C.O.C. 20140915-GW-EMP-01

PLEASE PRINT

Report to: CH2MHILL Phone: 703.376.5301 Invoice to: See Contact Phone:
Company Name: 15010 Conference Dr. ; 200 Company Name: Address: Fax:
Address: Chantilly, VA 20151 Fax: 703.376.5801
Attn: Mike Zamboni Attn:

Project Name/Number: not required
Sampler (Print): not required
Purchase Order Number: 955530
Sampler (Signature):
Date Shipped: 9/15/14
Carrier: FedEx
Waybill No: 771547318882
Comments:

Sample Identification	Location	Date Collected	Time Collected	No. of containers	Matrix: Aq	Soil	Sed	Soil	GW	Analysis Requested/Method Number	
VEP4-GW16-0914	MW-16	9/11/14	15:00	AST 3					✓ x		MW-16
VEP4-GW22-0914	MW-22	9/11/14	11:05	AST 3					✓ x		MW-22
VEP4-GW22P-0914		9/11/14	11:10	AST 3					✓ x		
VEP4-GW21-0914	MW-21	9/11/14	13:00	AST 3					✓ x		MW-21
VEP4-GW20-0914	MW-20	9/12/14	14:10	AST 3					✓ x		MW-20
VEP4-GW26-0914	MW-26	9/12/14	10:55	AST 3					✓ x		MW-26
VEP4-EB01-091114	QC	9/12/14	07:30	AST 3					✓ x		equipment blank
VEP4-EB01-091214	QC	9/15/14	07:15	AST 3					✓ x		equipment blank
VEP4-TB01-091514	QC	9/15/14	07:15	AST 2					✓ x		trip blank

Shipping Temperature: Temperature Received: Check one ☐ Start 0 days ☐ Chemicals ☐ 24-48 hrs. ☐ Other
Sample Disposal: ☐ Return to client ☐ Disposal by Lab (after 60 days) ☐ Archive for ___ months
not applicable

Relinquished by: Date: 9/15/14 Time: 12:30 Received by: Relinquished by: Date: Time: Received by:
Relinquished by: Date: Time: Received by: Relinquished by: Date: 9/17/14 Time: 0900 Received at Lab by:

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

Note: The first sampled date of the ARF will be used as the COC number unless indicated otherwise.

EMPIRICAL 1409099

ELECTRONIC CHAIN OF CUSTODY RECORD

phone: 615-345-1115

C.O.C. 20140915-GW-EMP-01

PLEASE PRINT

Report to: CH2MHILL Phone: 703.376.5301 Invoice to: See Contact Phone:
Company Name: 15010 Conference Dr. ; 200 Company Name: Address: Fax:
Address: Chantilly, VA 20151 Fax: 703.376.5801
Attn: Mike Zamboni Attn:

Project Name/Number: not required
Sampler (Print): not required
Purchase Order Number: 955530
Sampler (Signature):
Date Shipped: 9/16/14
Carrier: FedEx
Waybill No: 771169948128
Comments:

Sample Identification	Location	Date Collected	Time Collected	No. of containers	Matrix: Aq	Soil	Sed	Soil	GW	Analysis Requested/Method Number	
VEP4-GW19-0914	MW-19	9/15/14	11:05	AST 3					✓ x		MW-19
VEP4-GW14-0914	MW-14	9/15/14	13:10	AST 3					✓ x		MW-14
VEP4-GW18-0914	MW-18	9/15/14	15:10	AST 3					✓ x		MW-18
VEP4-GW18-0914-MS	QA/QC	9/15/14	15:10	AST 3					✓ x		matrix spike
VEP4-GW18-0914-SD	QA/QC	9/16/14	15:10	AST 3					✓ x		matrix spike duplicate
VEP4-EB01-091514-GW	QC	9/16/14	07:30	AST 3	✓				x		equipment blank

Shipping Temperature: Temperature Received: Check one ☐ Start 0 days ☐ Chemicals ☐ 24-48 hrs. ☐ Other
Sample Disposal: ☐ Return to client ☐ Disposal by Lab (after 60 days) ☐ Archive for ___ months
not applicable

Relinquished by: Date: 9/16/14 Time: 1100 Received by: Relinquished by: Date: Time: Received by: Relinquished by: Date: 9/17/14 Time: 0900 Received at Lab by:

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

Note: The first sampled date of the ARF will be used as the COC number unless indicated otherwise.

II. EMPIRICAL LABORATORIES
COOLER RECEIPT FORM

Cooler Received/Opened On: 09/16/14 @ 0930 Workorder: 1409099

1. Tracking # 8126 (last 4 digits, FedEx)
   Courier: FedEx
2. Temperature of rep. sample or temp blank when opened: 2.1 °C + correction factor(-0.3) = 1.8 °C
3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES...NO...NA
4. Were custody seals on outside of cooler? YES...NO...NA
   If yes, how many and where: 2. Front
5. Were the seals intact, signed, and dated correctly? YES...NO...NA
6. Were custody papers inside cooler? YES...NO...NA
   I certify that I opened the cooler and answered questions 1-6 (initial/date) JTW 9/17/14
7. Were custody seals on containers: YES NO and Intact YES...NO...NA
   Were these signed and dated correctly? YES...NO...NA
8. Packing material used: Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None
9. Cooling process: Ice ice-pack Ice (direct contact) Dry Ice Other None
10. Did all containers arrive in good condition (unbroken)? YES...NO...NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES...NO...NA
12. Did all container labels and tags agree with custody papers? YES...NO...NA
13. a. Were VOA vials received? YES...NO...NA
    b. Was there observable headspace present in any VOA vial (>5mm-6mm)? YES...NO...NA
14. Was there a Trip Blank in this cooler (custody seals present/intact)? YES...NO...NA...Cammanta
    If multiple coolers, sequence #
    I certify that I unloaded the cooler and answered questions 7-14 (initial/date) JTW 9/17/14
15. a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES...NO...NA
    b. Did the bottle labels indicate that the correct preservatives were used? YES...NO...NA
16. Was residual chlorine present? YES...NO...NA
    I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial/date) JTW 9/17/14
17. Were custody papers properly filled out (ink, signed, etc)? YES...NO...NA
18. Did you sign the custody papers in the appropriate place? YES...NO...NA
19. Were correct containers used for the analysis requested? YES...NO...NA If not, PM notified? YES...NO...NA
20. Was sufficient amount of sample sent in each container? YES...NO...NA If not, PM notified? YES...NO...NA
21. Were there Non-Conformance issues at login? YES...NO...NCR#
    I certify that I entered this project into LIMS and answered questions 17-21 (initial/date) JTW 9/17/14
    I certify that I attached a label with the unique LIMS number to each container (initial/date) JTW 9/17/14
    I certify that I notified the laboratory of any short holding time or RUSH parameters (initial/date) JTW 9/17/14

V:\Standard Operating Procedures\Current SOP File Directory\QS10_R21_20140729_CRF.doc

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1409099 Summ Package

II. EMPIRICAL LABORATORIES
COOLER RECEIPT FORM (Continued)

LIMS Data Entry Second Check Workorder# 1409099

22. Cooler Receipt Form issues reviewed and communicated to PM? YES...NO...NA
23. Client and Project verified to match the COC/CRF in LIMS Project Screen? YES...NO...NA
24. Following items verified to items verified to match the COC/CRF in LIMS Receipt Screen:
    a. Received Date/Received By YES...NO...NA
    b. TAT (COC specified different?) YES...NO...NA
    c. Shipping Container Temperatures (corrected temps) YES...NO...NA
    d. Condition Items (seals, intact, labels, preservation, ROI) YES...NO...NA
25. Following LIMS Sample Information verified against COC for each sample:
    a. Name YES...NO...NA
    b. QC Source YES...NO...NA
    c. Matrix YES...NO...NA
    d. Sample Type YES...NO...NA
    e. Sampled Date/Time (Correct Time Zone) YES...NO...NA
    f. Work Analyses/Versions (if applicable) YES...NO...NA
    g. Sample Issues included in comments (limited volume, concentration warnings, etc.)? YES...NO...NA
    h. Unpreserved VOA holding time set to 7 days? YES...NO...NA
26. Containers consistent with tests requested? YES...NO...NA
27. Field data entered and matching COC? YES...NO...NA

I certify that I have verified the LIMS data entry and answered questions 22-27 above (initial/date): TH 9/18/14

Additional Details:

* Pea size headspace present in the following:
- one HCl vial for VEP4-EB01-091514-GW (9/15/14@715)
- two HCl vials for VEP4-EB01-091614-GW (9/16/14@730)

* Client added a correction memorandum to the CoC.

V:\Standard Operating Procedures\Current SOP File Directory\QS10_R21_20140729_CRF.doc

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1409099 Summ Package

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MEMORANDUM **CH2MHILL**

Corrections to COCs

TO: Sonya Gordon, Empirical

COPIES: File
Data Validation Package
Laboratory Package SDG: Not yet assigned

FROM: Juliana Dean
Project Chemist

DATE: September 17, 2014

This memo is to document corrections made to entries on the Chains of Custody (COC) and Logins for Vieques, SWMU 20, CTO-0013.

The corrections include changes to the sample IDs on the COC:

	Sample ID on COC	Correct Sample ID	Date Collected	Time Collected	SDG
9099-13	VEP4-EB01-091514-GW	VEP4-EB01-091614-GW	9/16/14	7:30	Not yet assigned
9099-07	VEP4-EB01-091114	VEP4-EB01-091214-GW	9/12/14	7:30	Not yet assigned
9099-08	VEP4-EB01-091214	VEP4-EB01-091514-GW	9/15/14	7:15	Not yet assigned
9098-07	VEP4-EB01-091514	VEP4-EB01-091514-SO	9/15/14	12:00	Not yet assigned
9098-08	VEP4-TB01-091514	VEP4-TB02-091514	9/15/14	12:05	Not yet assigned

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1409099 Summ Package

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DataQual
Environmental Services, LLC

CH2M HILL
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

November 11, 2014
SDG# 1409118, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1409118. The data validation was performed in accordance with SW846 methods 8260B for volatiles, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA
VEP4-GW10-0914	1409118-01	water	X
VEP4-GW13D-0914	1409118-02	water	X
VEP4-GW13-0914	1409118-03	water	X
VEP4-GW13P-0914	1409118-04	water	X
VEP4-EB02-091714-GW	1409118-05	water	X
VEP4-TB01-091714	1409118-06	water	X

The following quality control samples were provided with this SDG: Sample VEP4-GW13P-0914- field duplicate of sample VEP4-GW13-0914, sample VEP4-TB01-091714- trip blank and sample VEP4-EB02-091714-GW - equipment blank.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Field Duplicates *

5830 Amberway Drive • St. Louis, MO 63128 • 314-330-1327 • Fax 314-849-6264

001

- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

According to the case narrative, all sample vials for trip blank VEP4-TB01-091714 were received at the laboratory with pea-sized or larger head-space present; therefore qualifications were applied to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to chain of custody records, sampling was performed on 9/16-17/14 and samples were received at the laboratory 9/18/14. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

Sample Condition

According to the case narrative, all sample vials for trip blank VEP4-TB01-091714 were received at the laboratory with pea-sized head-space present. Therefore positive results were qualified as estimated (J) and non-detected results were rejected (R) (qualifier code: OT).

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
VEP4-TB01-091714	all results	+/-	J/R	OT

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.
U*	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.
RL**	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action -	The sample result is greater than the RL and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.

J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.

Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL	reporting limit
PQL	practical quantitation limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

ANALYSIS DATA SHEET

VEP4-GW10-0914

Laboratory: Empirical Laboratories, LLC SDG: 1409118
Client: CH2M Hill, Inc. Project: NTR Vieques East SWMU 20
Matrix: Water Laboratory ID: 1409118-01 File ID: 0911801B.D
Sampled: 09/16/14 10:40 Prepared: 09/25/14 14:51 Analyzed: 09/25/14 14:51
Solids: Preparation: 5030B Dilution: 2
Batch: 4125937 Sequence: 4126908 Calibration: 4200001 Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.500	1.00	2.00	U
156-59-2	cis-1,2-Dichloroethene	0.674	0.500	1.00	2.00	JD
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene	0.720	0.500	1.00	2.00	JD
79-01-6	Trichloroethene	23.3	0.200	0.400	1.00	D
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.69	99.0	75 - 120	
Dibromofluoromethane	30.00	29.77	99.2	85 - 115	
1,2-Dichloroethane-d4	30.00	31.68	106	70 - 120	
Toluene-d8	30.00	29.30	97.7	85 - 120	

LM 111814

ANALYSIS DATA SHEET

VEP4-GW13D-0914

Laboratory: Empirical Laboratories, LLC SDG: 1409118
Client: CH2M Hill, Inc. Project: NTR Vieques East SWMU 20
Matrix: Water Laboratory ID: 1409118-02 File ID: 0911802B.D
Sampled: 09/16/14 12:40 Prepared: 09/25/14 15:16 Analyzed: 09/25/14 15:16
Solids: Preparation: 5030B Dilution: 2
Batch: 4125937 Sequence: 4126908 Calibration: 4200001 Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.500	1.00	2.00	U
156-59-2	cis-1,2-Dichloroethene		0.500	1.00	2.00	U
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene	0.725	0.500	1.00	2.00	JD
79-01-6	Trichloroethene	35.3	0.200	0.400	1.00	D
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.58	98.6	75 - 120	
Dibromofluoromethane	30.00	30.07	100	85 - 115	
1,2-Dichloroethane-d4	30.00	30.83	103	70 - 120	
Toluene-d8	30.00	29.40	98.0	85 - 120	

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ANALYSIS DATA SHEET

VEP4-GW13-0914

Laboratory: Empirical Laboratories, LLC | SDG: 1409118
Client: CH2M Hill, Inc. | Project: NTR Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1409118-03 | File ID: 0911803B.D
Sampled: 09/16/14 12:55 | Prepared: 09/25/14 15:41 | Analyzed: 09/25/14 15:41
Solids: | Preparation: 5030B | Dilution: 2
Batch: 4125937 | Sequence: 4126908 | Calibration: 4200001 | Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.500	1.00	2.00	U
156-59-2	cis-1,2-Dichloroethene	0.986	0.500	1.00	2.00	JB
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene	0.576	0.500	1.00	2.00	JB
79-01-6	Trichloroethene	32.3	0.200	0.400	1.00	B
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.46	102	75 - 120	
Dibromofluoromethane	30.00	30.97	103	85 - 115	
1,2-Dichloroethane-d4	30.00	31.77	106	70 - 120	
Toluene-d8	30.00	29.43	98.1	85 - 120	

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ANALYSIS DATA SHEET

VEP4-GW13P-0914

Laboratory: Empirical Laboratories, LLC | SDG: 1409118
Client: CH2M Hill, Inc. | Project: NTR Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1409118-04 | File ID: 0911804B.D
Sampled: 09/16/14 14:00 | Prepared: 09/25/14 16:06 | Analyzed: 09/25/14 16:06
Solids: | Preparation: 5030B | Dilution: 2
Batch: 4125937 | Sequence: 4126908 | Calibration: 4200001 | Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.500	1.00	2.00	U
156-59-2	cis-1,2-Dichloroethene	1.05	0.500	1.00	2.00	JB
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene	0.644	0.500	1.00	2.00	JB
79-01-6	Trichloroethene	32.6	0.200	0.400	1.00	B
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.28	94.3	75 - 120	
Dibromofluoromethane	30.00	30.29	101	85 - 115	
1,2-Dichloroethane-d4	30.00	31.81	106	70 - 120	
Toluene-d8	30.00	28.82	96.1	85 - 120	

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ANALYSIS DATA SHEET

VEP4-EB02-091714-GW

Laboratory: Empirical Laboratories, LLC | SDG: 1409118
Client: CH2M Hill, Inc. | Project: NTR Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1409118-05 | File ID: 0911805A.D
Sampled: 09/17/14 07:15 | Prepared: 09/25/14 13:28 | Analyzed: 09/25/14 13:28
Solids: | Preparation: 5030B | Dilution: 1
Batch: 4125937 | Sequence: 4126908 | Calibration: 4200001 | Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.02	100	75 - 120	
Dibromofluoromethane	30.00	30.33	101	85 - 115	
1,2-Dichloroethane-d4	30.00	30.98	103	70 - 120	
Toluene-d8	30.00	28.57	95.2	85 - 120	

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ANALYSIS DATA SHEET

VEP4-TB01-091714

Laboratory: Empirical Laboratories, LLC | SDG: 1409118
Client: CH2M Hill, Inc. | Project: NTR Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1409118-06 | File ID: 0911806A.D
Sampled: 09/17/14 07:20 | Prepared: 09/25/14 13:53 | Analyzed: 09/25/14 13:53
Solids: | Preparation: 5030B | Dilution: 1
Batch: 4125937 | Sequence: 4126908 | Calibration: 4200001 | Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene	0.149	0.100	0.200	0.500	J
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.85	99.5	75 - 120	
Dibromofluoromethane	30.00	30.00	100	85 - 115	
1,2-Dichloroethane-d4	30.00	30.56	102	70 - 120	
Toluene-d8	30.00	29.20	97.3	85 - 120	

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YES NO N/A

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 1409118 LAB: Empirical

SITE NAME: Vieques SWMU 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓ __ __

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓ __ __

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ __ __

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. **VOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓ __ __

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓ __ __

1.3 Sample Conditions/Problems

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ✓ __ __

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R". Lab narrative stated that both vials of VEPA-TB01-091914 had larger than pea size headspace

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? __ ✓ __

A 9/16-17/14 N 9/18/14 a 9/25

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water ✓ __ __

b. Soil __ __ __

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water ✓ __ __

b. Soil __ __ __

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. ✓ __ __

lab

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? __ __ ✓

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. __ ✓ __

If yes, were samples reanalyzed? __ __ ✓

Were method blanks reanalyzed? __ __ ✓

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] ___ ✓

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ ✓

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] ___ ✓

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent) MD MS/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] ___ ✓

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] ___ ✓

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month (page 8000C, section 9.5.1))

a. Water [ ] ___ ✓

b. Waste [ ] ___ ✓

c. Soil/Solid [ ] ___ ✓

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [ ] ___ ✓

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ ✓

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? ✓ ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? ✓ ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? ✓ ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject @ all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? ✓ ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ✓ ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ✓ ___ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

VEP4-TB01-091714 Trichloroethene 0.149J (LOD = 0.2)
VEP4-EB01-091614-GW
MOG

No qual

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone
** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates ___ ___ ✓

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ___ ___ ✓

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? ✓ ___ ___

YES NO N/A

Resolution? ✓ ___ ___

Peak shape? ✓ ___ ___

Full-scale graph (attenuation)? ✓ ___ ___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? ✓ ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? ✓ ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ✓ ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ✓ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

no TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ ___

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ ___

b. Blanks [ ] ___ ___

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ ___

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ ___

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ___

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] ___ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [✓] ___ ___

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39) qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? [✓] ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. [✓] ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) ___ ✓ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? ✓ ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). ___ ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? ___ ✓ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? ✓ ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:
1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.
2. Do not qualify non-detects when the associated IS are counts area > + 100%.
3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".
4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ✓

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

VEP4-GW13-0914
VEP4-GW13P-0914 > no qual, see attached sheet

- 30 VOA -

038

DataQual

VOA

FIELD DUPLICATE SAMPLE SUMMARY

Sample ID: VEP4-GW13-0914
Duplicate Sample ID: VEP4-GW13P-0914

Water: RPD>20%
Soil: RPD>30%

Compound	Sample Conc.	Dup. Sample Conc.	%RPD
cis-1,2-dichloroethene	0.986	1.05	6
tetrachloroethene	0.576	0.644	11
trichloroethene	32.3	32.6	1
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
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			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!

COMMENTS: Qualify all water samples with RPD >20% and soils with >30% as estimated (J/UJ).

* one of the results below the RL

039

Sample Delivery Group Case Narrative

Receipt Information:
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

The following issues were discovered with the COC and/or samples upon log-in:
1. Larger than a pea-size headspace was observed in 1 HCL vial for VEP4-GW13P-0914 (9/16/14@1400) and 2 HCL vials for VEP4-TB01-091714' (9/17/14@0720).

Changes to the Revision:
Revision 01: The package was revised to change the client ID for sample 1409118-05 from VEP4-EB01-091614-GW to VEP4-EB02-091714-GW at the client's request.

Analytical Information:
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample preparation and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

SW8260B:
Note –Samples 1409118-01, -02, -03, and -04 were analyzed at a 2x only due to the sample foaming during screening. No lower analyses were able to be performed.

No additional anomalies or deviations are noted.

040

EMPIRICAL 1409118

phone: 615-345-1115

ELECTRONIC CHAIN OF CUSTODY RECORD

C.O.C. 20140917-GW-EMP-01

PLEASE PRINT

Report to: CH2MHILL
Phone: 703.376.5301
Fax: 703.376.5801
Address: 15010 Conference Dr. ; 200
Chantilly, VA 20151
Attn: Mike Zamboni

Invoice to: See Contact
Company Name:
Address:
Phone:
Fax:
Attn:

Project Name/Number: not required
Sampler (Print): not required
Sampler (Signature): not required
Purchase Order Number: 955530

Date Shipped: 9/17/14
Carrier: FedEx
Waybill No.: 771160600051
Comments:

Sample Identification	Location	Date Collected	Time Collected	Time Zone	No. of Containers	Matrix: Aq	Matrix: Sed	Matrix: Soil	Matrix: GW	Analysis Requested/Method Number	
VEP4-GW10-0914	MW-10	9/16/14	10:40	AST	3				✓	X	-01 MW-10
VEP4-GW13D-0914	MW-13D	9/16/14	12:40	AST	3				✓	X	-02 MW-13D
VEP4-GW13-0914	MW-13	9/16/14	13:55	AST	3				✓	X	-03 MW-13
VEP4-GW13P-0914		9/16/14	14:00	AST	3				✓	X	-04
VEP4-EB01-091614-GW	QC	9/17/14	07:15	AST	3	✓				X	-05 equipment blank
VEP4-TB01-091714	QC	9/17/14	07:20	AST	3	✓				X	-06 trip blank
									✓	X	
									✓	X	
									✓	X	

Shipping Temperature:
Turnaround Requested: Check one: ☐ Std (28 days) ☐ Due next ☐ 24/48 hrs ☐ Other
Sample Disposal: ☐ Dispose by Lab ☐ Return to client ☐ Other: not applicable

Relinquished by sampler: Date 9/17/14 Time 1125
Received by: Date Time
Relinquished by: Date Time
Received by: Date Time
Relinquished by: Date 9/18/14 Time 0840
Received by: Date Time

White: Return to client with report
Yellow: Laboratory Copy
Pink: Sampler

Note: The first sampled date of the ARF will be used as the COC number unless indicated otherwise.

1409118 Sump Package

II. EMPIRICAL LABORATORIES
COOLER RECEIPT FORM

Cooler Received/Opened On: 09/15/14@ 0840 Work order: 1409118

1. Tracking # 0051 (last 4 digits, FedEx)
Courier: FedEx
2. Temperature of rep. sample or temp blank when opened: 2.3 °C + correction factor(-0.3) = 2.0°C
3. If item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO...NA
4. Were custody seals on outside of cooler? YES...NO...NA
If yes, how many and where: 2, Front + back
5. Were the seals intact, signed, and dated correctly? YES...NO...NA
6. Were custody papers inside cooler? YES...NO...NA
I certify that I opened the cooler and answered questions 1-6 (initial/date) JTG 9/18/14
7. Were custody seals on containers: YES NO and intact YES...NO...NA
Were these signed and dated correctly? YES...NO...NA
8. Packing material used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry Ice Other None
10. Did all containers arrive in good condition (unbroken)? YES...NO...NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES...NO...NA
12. Did all bottle labels and tags agree with custody papers? YES...NO...NA
13. a. Were VOA vials received? YES...NO...NA
b. Was there observable headspace present in any VOA vial (>5mm-6mm)? YES...NO...NA *
14. Was there a Trip Blank in this cooler (custody seals present/intact)? YES...NO...NA...Comments custody seals intact
If multiple coolers, sequence #
I certify that I unloaded the cooler and answered questions 7-14 (initial/date) JTG 9/18/14
15. a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES...NO...NA
b. Did the bottle labels indicate that the correct preservatives were used? YES...NO...NA
16. Was residual chlorine present? YES...NO...NA
I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial/date) JTG 9/18/14
17. Were custody papers properly filled out (ink, signed, etc)? YES...NO...NA
18. Did you sign the custody papers in the appropriate place? YES...NO...NA
19. Were correct containers used for the analysis requested? YES...NO...NA If not, PM notified? YES...NO...NA
20. Was sufficient amount of sample sent in each container? YES...NO...NA If not, PM notified? YES...NO...NA
21. Were there Non-Conformance issues at login? YES...NO...NCR#
I certify that I entered this project into LIMS and answered questions 17-21 (initial/date) JTG 9/18/14
I certify that I attached a label with the unique LIMS number to each container (initial/date) JTG 9/18/14
I certify that I notified the laboratory of any short holding time or RUSH parameters (initial/date) JTG 9/18/14

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002

1409118 Summ Package

II. EMPIRICAL LABORATORIES
COOLER RECEIPT FORM (Continued)

LIMS Data Entry Second Check Workorder# 1409118

22. Cooler Receipt Form Issues reviewed and communicated to PM? YES...NO...NA
23. Client and Project verified to match the COC/CRF in LIMS Project Screen? YES...NO...NA
24. Following items verified to items verified to match the COC/CRF in LIMS Receipt Screen:
a. Received Date/Received By YES...NO...NA
b. TAT (COC specified different?) YES...NO...NA
c. Shipping Container Temperatures (corrected temps) YES...NO ...NA
d. Condition Items (seals, intact, labels, preservation, ROI) YES...NO...NA
25. Following LIMS Sample Information verified against COC for each sample:
a. Name YES...NO...NA
b. QC Source YES...NO...NA
c. Matrix YES...NO...NA
d. Sample Type YES...NO...NA
e. Sampled Date/Time (Correct Time Zone) YES...NO...NA
f. Work Analyses/Versions (if applicable) YES...NO...NA
g. Sample issues included in comments (limited volume, concentration warnings, etc.)? YES...NO...NA
h. Unpreserved VOA holding time set to 7 days? YES...NO...NA
26. Containers consistent with tests requested? YES...NO...NA
27. Field data entered and matching COC? YES...NO...NA
I certify that I have verified the LIMS data entry and answered questions 23-27 above (initial/date):

Additional Details:
* Larger than a pea-size headspace present for the following:
- One HCl pres. vial for 'VEP4-GW13P-091414' (9/16/14@1400)
- Two HCl pres. vials for 'VEP4-TB01-091714' (9/17/14@0720)
Custody seals were still intact.

V:\Standard Operating Procedures\Current SOP File Directory\QS10_R21_20140729_CRF.doc

003

1409118 Summ Package

DataQual
Environmental Services, LLC

CH2M HILL
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

November 11, 2014
SDG# 1409098, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1409098. The data validation was performed in accordance with SW846 methods 8260B for volatiles, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA
VEP4-SS22-0001	1409098-01	soil	X
VEP4-SB22-0406	1409098-02	soil	X
VEP4-EB01-091614-SO	1409098-03	water	X
VEP4-EB01-091514-SO	1409098-07	water	X
VEP4-TB02-091514	1409098-08	water	X
VEP4-SS22-0001 MS	1409098-01MS	soil	X
VEP4-SS22-0001 MSD	1409098-01MSD	soil	X

The following quality control samples were provided with this SDG: Sample VEP4-TB02-091514- trip blank and samples VEP4-EB01-091614-SO and VEP4-EB01-091514-SO - equipment blanks.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries
- Matrix Duplicate RPDs *
- Field Duplicates NA

- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

According to the case narrative, all sample vials for trip blank VEP4-TB02-091514 were received at the laboratory with pea-sized or larger head-space present; therefore qualifications were applied to the data.

Qualifications were applied to the associated sample of the matrix spike and matrix spike duplicate due to low recoveries exhibited for one compound.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to chain of custody records, sampling was performed on 9/15-16/14 and samples were received at the laboratory 9/17/14. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

Sample Condition

According to the case narrative, all sample vials for trip blank VEP4-TB02-091514 were received at the laboratory with pea-sized head-space present. Therefore positive results were qualified as estimated (J) and non-detected results were rejected (R) (qualifier code: OT).

Matrix Spike Recoveries

The matrix spike and matrix spike duplicate associated with the sample listed exhibited non-compliant recoveries; qualifications were applied as stated in the table below.

Sample	Compound	MS %Rec	MSD %Rec	QC Limits	Qualifier	Qual Code
VEP4-SS22-0001	tetrachloroethene	55.3	46.9	65-140	J/UJ	MSL

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
VEP4-TB02-091514	all results	+/-	J/R	OT
VEP4-SS22-0001	tetrachloroethene	+/-	J/UJ	MSL

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.
U*	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.
RL**	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action -	The sample result is greater than the RL and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R -	Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.
J -	Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.
J/UJ -	Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.
Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action -	The sample result is greater than the RL and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.
R -	Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.
J -	Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL	reporting limit
PQL	practical quantitation limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1409098

C37

ANALYSIS DATA SHEET

VEP4-SS25-0001

Laboratory:	Empirical Laboratories, LLC		SDG:	1409098	
Client:	CH2M Hill, Inc.		Project:	NTR Vieques East SWMU 20	
Matrix:	Solid	Laboratory ID:	1409098-01	File ID:	0909801A.D
Sampled:	09/16/14 07:15	Prepared:	09/23/14 00:00	Analyzed:	09/23/14 15:00
Solids:	88.82	Preparation:	5035A	Dilution:	1
Batch:	4123003	Sequence: 4127203		Calibration: 4204002	Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		1.28	2.55	5.11	U
156-59-2	cis-1,2-Dichloroethene		1.28	2.55	5.11	U
156-60-5	trans-1,2-Dichloroethene		1.28	2.55	5.11	U
127-18-4	Tetrachloroethene		1.28	2.55	5.11	NOTES more
79-01-6	Trichloroethene		1.28	2.55	5.11	U
75-01-4	Vinyl chloride		1.28	2.55	5.11	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.65	27.67	90.3	85 - 120	
Dibromofluoromethane	30.65	30.18	98.5	80 - 125	
1,2-Dichloroethane-d4	30.65	30.18	98.4	75 - 140	
Toluene-d8	30.65	30.30	98.9	85 - 115	

WM 11/14

C13

ANALYSIS DATA SHEET

VEP4-SB22-0486

Laboratory:	Empirical Laboratories, LLC		SDG:	1409098	
Client:	CH2M Hill, Inc.		Project:	NTR Vieques East SWMU 20	
Matrix:	Solid	Laboratory ID:	1409098-02	File ID:	0909802B.D
Sampled:	09/16/14 08:00	Prepared:	09/23/14 00:00	Analyzed:	09/23/14 15:29
Solids:	86.26	Preparation:	5035A	Dilution:	1
Batch:	4123003	Sequence: 4127203		Calibration: 4204002	Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		1.22	2.43	4.86	U
156-59-2	cis-1,2-Dichloroethene		1.22	2.43	4.86	U
156-60-5	trans-1,2-Dichloroethene		1.22	2.43	4.86	U
127-18-4	Tetrachloroethene		1.22	2.43	4.86	U
79-01-6	Trichloroethene		1.22	2.43	4.86	U
75-01-4	Vinyl chloride		1.22	2.43	4.86	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
Bromofluorobenzene	29.18	26.98	92.5	85 - 120	
Dibromofluoromethane	29.18	29.38	101	80 - 125	
1,2-Dichloroethane-d4	29.18	28.07	96.2	75 - 140	
Toluene-d8	29.18	28.02	96.0	85 - 115	

WM 11/14

C14

ANALYSIS DATA SHEET

VEP4-EB01-091614-SO

Laboratory:	Empirical Laboratories, LLC		SDG:	1409098	
Client:	CH2M Hill, Inc.		Project:	NTR Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1409098-03	File ID:	0909803A.D
Sampled:	09/16/14 11:15	Prepared:	09/25/14 11:17	Analyzed:	09/25/14 11:17
Solids:		Preparation:	5030B	Dilution:	1
Batch:	4125923	Sequence: 4127206		Calibration: 4205002	Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.76	99.2	75 - 120	
Dibromofluoromethane	30.00	30.99	103	85 - 115	
1,2-Dichloroethane-d4	30.00	29.85	99.5	70 - 120	
Toluene-d8	30.00	32.44	108	85 - 120	

WM 11/14

C30

ANALYSIS DATA SHEET

VEP4-EB01-091514-SO

Laboratory:	Empirical Laboratories LLC		SDG:	1409098	
Client:	CH2M Hill, Inc.		Project:	NTR Viegues East SWMU 20	
Matrix:	Water	Laboratory ID:	1409098-07	File ID:	0909807A.D
Sampled:	09/15/14 12:00	Prepared:	09/25/14 11:45	Analyzed:	09/25/14 11:45
Solids:		Preparation:	5030B	Dilution:	1
Batch:	4125923	Sequence:	4127206	Calibration:	4200902
				Instrument:	MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.71	99.0	75 - 120	
Dibromofluoromethane	30.00	30.60	102	85 - 115	
1,2-Dichloroethane-d4	30.00	30.72	102	70 - 120	
Toluene-d8	30.00	29.10	97.0	85 - 120	

1409098 Summ Package

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ANALYSIS DATA SHEET

VEP4-TB02-091514

Laboratory:	Empirical Laboratories LLC		SDG:	1409098	
Client:	CH2M Hill, Inc.		Project:	NTR Viegues East SWMU 20	
Matrix:	Water	Laboratory ID:	1409098-08	File ID:	0909808A.D
Sampled:	09/15/14 12:05	Prepared:	09/25/14 10:49	Analyzed:	09/25/14 10:49
Solids:		Preparation:	5030B	Dilution:	1
Batch:	4125923	Sequence:	4127206	Calibration:	4200902
				Instrument:	MS-VOA4

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.38	94.6	75 - 120	
Dibromofluoromethane	30.00	32.49	108	85 - 115	
1,2-Dichloroethane-d4	30.00	31.63	105	70 - 120	
Toluene-d8	30.00	31.32	104	85 - 120	

1409098 Summ Package

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USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 1409098 LAB: Empirical

SITE NAME: Viegues SWMU 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. **VOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓

1.3 Sample Conditions/Problems

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ✓

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R". Case narrative stated

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded?

A 9/15-16/14 N 9/17 A 9/23-25/14 ✓

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water ☑ ___ ___

b. Soil ☑ ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water ☑ ___ ___

b. Soil ☑ ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. lab ☑ ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? ☐ ___ ☑

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. ☐ ☑ ___

If yes, were samples reanalyzed? ☐ ___ ☑

Were method blanks reanalyzed? ☐ ___ ☑

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? ☐ ☑ ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. ☑ ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water ☑ ___ ___

B. Soil ☑ ___ ___

C. Med Soil ☐ ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). ☑ ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? ☐ ___ ☑

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. ☐ ___ ☑

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent) VEP4-SS22-0001

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? ✓ __ N/A

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? ✓ __ __

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month (page 8000C, section 9.5.1)

a. Water __ __ __

b. Waste __ __ __

c. Soil/Solid ✓ __ __

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. ✓ __ __

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. ✓ __ __

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY
SW8260B

VEP4-SS22-0001

Laboratory: Empirical Laboratories LLC
Client: CH2M Hill, Inc.
Matrix: Solid
Batch: 4123035
% Solids: 88.82
SDG: 1409098
Project: NTR Vieques East SWMU 20
Source Sample Name: 1409098-01

ANALYTE	SPIKE ADDED (ug/Kg dry)	SAMPLE CONCENTRATION (ug/Kg dry)	MS CONCENTRATION (ug/Kg dry)	MS % REC	Q	QC LIMITS REC
1,1-Dichloroethene	55.85	ND	45.51	81.5		65 - 135
cis-1,2-Dichloroethene	55.85	ND	47.42	84.9		65 - 125
trans-1,2-Dichloroethene	55.85	ND	44.19	79.1		65 - 135
Tetrachloroethene	55.85	ND	30.88	55.3	*	65 - 140
Trichloroethene	55.85	ND	42.26	75.7		75 - 125
Vinyl chloride	55.85	ND	54.80	98.1		60 - 125

ANALYTE	SPIKE ADDED (ug/Kg dry)	MSD CONCENTRATION (ug/Kg dry)	MSD % REC #	% RPD	Q	QC LIMITS RPD	QC LIMITS REC
1,1-Dichloroethene	55.74	51.17	91.8	11.7		30	65 - 135
cis-1,2-Dichloroethene	55.74	56.64	102	17.2		30	65 - 125
trans-1,2-Dichloroethene	55.74	52.42	94.0	17.0		30	65 - 135
Tetrachloroethene	55.74	49.82	89.4	46.9	*	30	65 - 140
Trichloroethene	55.74	53.08	95.2	24.4		30	75 - 125
Vinyl chloride	55.74	56.56	101	3.14		30	60 - 125

J/UJ

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? ✓ ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? ✓ ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? ✓ ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? ✓ ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ✓ ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

VEP4-TB02-091514 ND®
VEP4-EB01-091614-SO ND®
VEP4-EB01-091514-SO ND®

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and ≤ blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone
** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates ✓ ___ ___

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ✓ ___ ___

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? ✓ ___ ___

YES NO N/A

Resolution? ✓ ___ ___

Peak shape? ✓ ___ ___

Full-scale graph (attenuation)? ✓ ___ ___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? ✓ ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reportec compound within 0.06 RRT units of the standard RRT in the continuing calibration? ✓ ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ✓ ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ___ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

No TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? ___ ___ ✓

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate ___ ___ ✓

b. Blanks ___ ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ ✓

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ ✓

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] ___ ___ ✓

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [✓] ___ ___

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? [✓] ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39)qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? [✓] ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. [ ] ___ ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? [✓] ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) [ ] ___ ✓ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? ✓ ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). ___ ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be < 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? ___ ✓ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? ✓ ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:
1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.
2. Do not qualify non-detects when the associated IS are counts area > + 100%.
3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".
4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ___ ✓ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

Sample Delivery Group Case Narrative

Receipt Information:
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

The following issues were discovered with the COC and/or samples upon log-in:

1. Samples VEP4-TB02-091514 (09/15/14@1205) and VEP4-TB01-091614 (09/16/14@1130) both had pea-size or larger headspace present in both HCL vials.
2. At the request of the client, the samples listed on the COC as VEP4-EB01-091514 had the client ID changed to VEP4-EB01-091514-SO, the sample listed on the COC as VEP4-TB01-091514 had the client ID changed to VEP4-TB02-091514, and the sample listed on the COC as VEP4-EB01-091614 had the client ID changed to VEP4-EB01-091614-SO.
3. Samples VEP4-SS23-0001 and VEP4-SB23-0406 were received 48 hours after sampling and the samples were not frozen. The client was contacted and indicated the samples should be cancelled for SW8260B and TOC.
4. At the request of the client, sample VEP4-TB01-091614 was cancelled for SW8260B.

Changes to the Revision:
This is an original submittal of the final report package.

Analytical Information:
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample preparation and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

SW8260B:
The following matrix spikes exceeded criteria:
4I23003-MS1/MSD1 (1409098-01) with a negative bias and exceeded criteria for Tetrachloroethene; note – the associated batch spike is within criteria

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

039

Wet Chemistry:
Note – Sample 1409098-01 is qualified with a Z-01 to indicate that the RPD between the sample and replicate exceeded the criteria of 50% at 68%.

The following matrix spikes exceeded criteria:
4I23001-MS1/MSD1 (1409098-01) with a negative bias for Total Organic Carbon; note –the associated batch spike is within criteria

No additional anomalies or deviations are noted and the proper data qualifiers have been applied.

040

EMPIRICAL 1409098

ELECTRONIC CHAIN OF CUSTODY RECORD

phone: 615-345-1115

C.O.C. 20140916-SS-SB-EMP-01

PLEASE PRINT

Report to: CH2MHILL — Phone: 703.376.5301
Address: 15010 Conference Dr. ; 200 Chantilly, VA 20151 — Fax: 703.376.5801
Attn: Mike Zamboni

Invoice to: Company Name: See Contact — Phone: — Address: — Fax: — Attn:

Project Name/Number: not required
Purchase Order Number: Non-PO, CTO-0013
Sampler (Print): not required
Sampler (Signature):

Date Shipped: 9/16/14
Carrier: FedEx
Waybill No.: 771165952699
Comments:

Sample Identification	Location	Date Collected	Time Collected	Time Zone	No. of Containers	Aq	Sed.	Soil	W	Analysis Requested/Method Number	
VEP4-SS22-0001	SS-22	9/16/14	07:15	AST	4			✓	✓	X X	-01 SS-22
VEP4-SS22-0001-MS	QA/QC	9/16/14	07:15	AST	4			✓	✓	X X	matrix spike
VEP4-SS22-0001-SD	QA/QC	9/16/14	07:15	AST	4			✓	✓	X X	matrix spike duplicate
VEP4-SB22-0406	SB-22	9/16/14	08:00	AST	4			✓		X X	-02 SB-22
VEP4-EB01-091614	QC	9/16/14	11:15	AST	3	✓				X	-03 equipment blank
VEP4-TB01-091614	QC	9/16/14	11:30	AST	2	✓				X	-04 trip blank

Shuttle Temperature:
Turnaround Requested: Check one ☐ Same/28 days ☐ One week ☐ 24/48 Hrs ☐ Other
Sample Disposal: ☐ Return to client ☐ Disposal by Lab (30 days minimum) — not applicable
Relinquished by sampler: Date 9/16/14 Time 1730 — Received by: — Date — Time — Received by:
Relinquished by: Date — Time — Received by: — Relinquished by: — Date 9/17/14 Time 0900 — Received by:

White: Return to client with report — Yellow: Laboratory Copy — Pink: Sampler

Note: The first sampled date of the ARF will be used as the COC number unless indicated otherwise.

EMPIRICAL 1409098

ELECTRONIC CHAIN OF CUSTODY RECORD

phone: 615-345-1115

C.O.C. 20140915-SS-SB-EMP-01

PLEASE PRINT

Report to: CH2MHILL — Phone: 703.376.5301
Address: 15010 Conference Dr. ; 200 Chantilly, VA 20151 — Fax: 703.376.5801
Attn: Mike Zamboni

Invoice to: Company Name: See Contact — Phone: — Address: — Fax: — Attn:

Project Name/Number: not required
Purchase Order Number: Non-PO, CTO-0013
Sampler (Print): not required
Sampler (Signature):

Date Shipped: 9/15/14
Carrier: FedEx
Waybill No.: 771155227838
Comments:

Sample Identification	Location	Date Collected	Time Collected	Time Zone	No. of Containers	Aq	Sed.	Soil	W	Analysis Requested/Method Number	
VEP4-SS23-0001	SS-23	9/15/14	09:00	AST	4			✓	✓	X X	-05 SS-23
VEP4-SB23-0406	SB-23	9/15/14	09:15	AST	4			✓		X X	-06 SB-23
VEP4-EB01-091514	QC	9/15/14	12:00	AST	3	✓				X	-07 equipment blank
VEP4-TB01-091514	QC	9/15/14	12:05	AST	2	✓				X	-08 trip blank

Shuttle Temperature:
Turnaround Requested: Check one ☐ Same/28 days ☐ One week ☐ 24/48 Hrs ☐ Other
Sample Disposal: ☐ Return to client ☐ Disposal by Lab (30 days minimum) — not applicable
Relinquished by sampler: Date 9/15/14 Time 1300 — Received by: — Date — Time — Received by:
Relinquished by: Date — Time — Received by: — Relinquished by: — Date 9/17/14 Time 0900 — Received by:

White: Return to client with report — Yellow: Laboratory Copy — Pink: Sampler

Note: The first sampled date of the ARF will be used as the COC number unless indicated otherwise.

II. EMPIRICAL LABORATORIES
COOLER RECEIPT FORM

Cooler Received/Opened On: 09/15/14 @ 0900 Workorder: 1409098

1. Tracking # 2699 (last 4 digits, FedEx)
   Courier: FedEX
2. Temperature of rep. sample or temp blank when opened: 2.7 °C + correction factor(-0.3) = 2.4 °C
3. If item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO...NA
4. Were custody seals on outside of cooler? YES...NO...NA
   If yes, how many and where: 2 on front
5. Were the seals intact, signed, and dated correctly? YES...NO...NA
6. Were custody papers inside cooler? YES...NO...NA
   I certify that I opened the cooler and answered questions 1-6 (initial/date) JTG 9/17/14
7. Were custody seals on containers: YES NO and intact YES...NO...NA
   Were these signed and dated correctly? YES...NO...NA
8. Packing material used? Bubblewrap Plastic bag Peanuts Vermiculite Foam insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry Ice Other None
10. Did all containers arrive in good condition (unbroken)? YES...NO...NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES...NO...NA
12. Did all container labels and tags agree with custody papers? YES...NO...NA
13. a. Were VOA vials received? YES...NO...NA
    ☆ b. Was there observable headspace present in any VOA vial (>6mm-8mm)? YES...NO...NA
14. Was there a Trip Blank in this cooler (custody seals present/intact)? YES NO...NA...Comments Headspace in 2 sets
    If multiple coolers, sequence # ___
    I certify that I unloaded the cooler and answered questions 7-14 (initial/date) JTG 9/17/14
15. a. On prep'd bottles, did pH test strips suggest preservation reached the correct pH level? YES...NO...NA
    b. Did the bottle labels indicate that the correct preservatives were used? YES...NO...NA
16. Was residual chlorine present? YES...NO...NA
    I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial/date) JTG 9/17/14
17. Were custody papers properly filled out (ink, signed, etc)? YES...NO...NA
18. Did you sign the custody papers in the appropriate place? YES...NO...NA
19. Were correct containers used for the analysis requested? YES...NO...NA If not, PM notified? YES...NO...NA
20. Was sufficient amount of sample sent in each container? YES...NO...NA If not, PM notified? YES...NO...NA
21. Were there Non-Conformance issues at login? YES...NO...NCR# ___
    I certify that I entered this project into LIMS and answered questions 17-21 (initial/date) JTG 9/17/14
    I certify that I attached a label with the unique LIMS number to each container (initial/date) JTG 9/17/14
    I certify that I notified the laboratory of any short holding time or RUSH parameters (initial/date) JTG 9/17/14

V:\Standard Operating Procedures\Current SOP File Directory\QS10_R21_20140729_CRF.doc

1409098 Summ Package

II. EMPIRICAL LABORATORIES
COOLER RECEIPT FORM (Continued)

LIMS Data Entry Second Check Workorder# 1409098

22. Cooler Receipt Form issues reviewed and communicated to PM? YES...NO...NA
23. Client and Project verified to match the COC/CRF in LIMS Project Screen? YES...NO...NA
24. Following items verified to items verified to match the COC/CRF in LIMS Receipt Screen:
    a. Received Date/Received By YES...NO...NA
    b. TAT (COC specified different?) YES...NO...NA
    c. Shipping Container Temperatures (corrected temps) YES...NO...NA
    d. Condition items (seals, intact, labels, preservation, ROI) YES...NO...NA
25. Following LIMS Sample Information verified against COC for each sample:
    a. Name YES...NO...NA
    b. QC Source YES...NO...NA
    c. Matrix YES...NO...NA
    d. Sample Type YES...NO...NA
    e. Sampled Date/Time (Correct Time Zone) YES...NO...NA
    f. Work Analyses/Versions (if applicable) YES...NO...NA
    g. Sample Issues included in comments (limited volume, concentration warnings, etc.)? YES...NO...NA
    h. Unpreserved VOA holding time set to 7 days? YES...NO...NA
26. Containers consistent with tests requested? YES...NO...NA
27. Field data entered and matching COC? YES...NO...NA

I certify that I have verified the LIMS data entry and answered questions 22-27 above (initial/date): TH 9/18/14

TH 9/18/14

Additional Details:
☆ Both sets of trip blanks have pea-size or larger headspace present in both HCl pres. vials.
- VEP4-TB02-091514 (9/15/14 @ 1205)
- VEP4-TB01-091614 (9/16/14 @ 1130)
☆ Client added corrections on sample IDs.

V:\Standard Operating Procedures\Current SOP File Directory\QS10_R21_20140729_CRF.doc

1409098 Summ Package 14

MEMORANDUM CH2MHILL

Corrections to COCs

TO: Sonya Gordon, Empirical

COPIES: File
Data Validation Package
Laboratory Package SDG: Not yet assigned

FROM: Juliana Dean
Project Chemist

DATE: September 17, 2014

This memo is to document corrections made to entries on the Chains of Custody (COC) and Logins for Vieques, SWMU 20, CTO-0013.

The corrections include changes to the sample IDs on the COC:

	Sample ID on COC	Correct Sample ID	Date Collected	Time Collected	SDG
	VEP4-EB01-091514-GW	VEP4-EB01-091614-GW	9/16/14	7:30	Not yet assigned
	VEP4-EB01-091114	VEP4-EB01-091214-GW	9/12/14	7:30	Not yet assigned
	VEP4-EB01-091214	VEP4-EB01-091514-GW	9/15/14	7:15	Not yet assigned
9098-07	VEP4-EB01-091514	VEP4-EB01-091514-SO	9/15/14	12:00	Not yet assigned
9098-08	VEP4-TB01-091514	VEP4-TB02-091514	9/15/14	12:05	Not yet assigned

1409098 Summ Package 15

DataQual
Environmental Services, LLC

CH2M HILL
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

November 11, 2014
SDG# 1409117, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1409117. The data validation was performed in accordance with SW846 methods 8260B for volatiles, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA
VEP4-SS21-0001	1409117-01	soil	X
VEP4-SS21P-0001	1409117-02	soil	X
VEP4-SB21-0406	1409117-03	soil	X
VEP4-EB01-091714-SO	1409117-04	water	X

The following quality control samples were provided with this SDG: Sample VEP4-SS21P-0001- field duplicate of sample VEP4-SS21-0001 and sample VEP4-EB01-091714-SO- equipment blank.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Field Duplicates *
- Identification/Quantitation *
- Reporting Limits *

5830 Amberway Drive • St. Louis, MO 63128 • 314-330-1327 • Fax 314-849-6264

001

- Tentatively Identified Compounds: NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

No qualifications were required to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to chain of custody records, sampling was performed on 9/17/14 and samples were received at the laboratory 9/18/14. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.
U*	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.
RL**	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action -	The sample result is greater than the RL and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R -	Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.
J -	Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.
J/UJ -	Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.
Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action -	The sample result is greater than the RL and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.
R -	Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.
J -	Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL	reporting limit
PQL	practical quantitation limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between standard inventory
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Reanalysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1409117

ANALYSIS DATA SHEET

VEP4-SS21-0001

Laboratory: Empirical Laboratories, LLC
SDG: 1409117
Client: CH2M HILL Inc.
Project: NTR Vieques East SWMU 20
Matrix: Solid
Laboratory ID: 1409117-01
File ID: 0911701A.D
Sampled: 09/17/14 07:00
Prepared: 09/23/14 00:00
Analyzed: 09/23/14 14:51
Solids: 92.88
Preparation: 5035A
Dilution: 1
Batch: 4120012
Sequence: 4126709
Calibration: 4126004
Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		1.20	2.40	4.79	U
156-59-2	cis-1,2-Dichloroethene		1.20	2.40	4.79	U
156-60-5	trans-1,2-Dichloroethene		1.20	2.40	4.79	U
127-18-4	Tetrachloroethene		1.20	2.40	4.79	U
79-01-6	Trichloroethene		1.20	2.40	4.79	U
75-01-4	Vinyl chloride		1.20	2.40	4.79	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
Bromofluorobenzene	28.75	29.00	101	85 - 120	
Dibromofluoromethane	28.75	27.59	96.0	80 - 125	
1,2-Dichloroethane-d4	28.75	32.54	113	75 - 140	
Toluene-d8	28.75	26.46	92.0	85 - 115	

ANALYSIS DATA SHEET

VEP4-SS21P-0001

Laboratory: Empirical Laboratories, LLC
SDG: 1409117
Client: CH2M HILL Inc.
Project: NTR Vieques East SWMU 20
Matrix: Solid
Laboratory ID: 1409117-02
File ID: 0911702A.D
Sampled: 09/17/14 07:05
Prepared: 09/23/14 00:00
Analyzed: 09/23/14 15:21
Solids: 92.36
Preparation: 5035A
Dilution: 1
Batch: 4120012
Sequence: 4126709
Calibration: 4126004
Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		1.25	2.49	4.98	U
156-59-2	cis-1,2-Dichloroethene		1.25	2.49	4.98	U
156-60-5	trans-1,2-Dichloroethene		1.25	2.49	4.98	U
127-18-4	Tetrachloroethene		1.25	2.49	4.98	U
79-01-6	Trichloroethene		1.25	2.49	4.98	U
75-01-4	Vinyl chloride		1.25	2.49	4.98	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
Bromofluorobenzene	29.91	30.91	103	85 - 120	
Dibromofluoromethane	29.91	27.58	92.2	80 - 125	
1,2-Dichloroethane-d4	29.91	33.95	114	75 - 140	
Toluene-d8	29.91	28.02	93.7	85 - 115	

ANALYSIS DATA SHEET

VEP4-SB21-0406

Laboratory: Empirical Laboratories, LLC
SDG: 1409117
Client: CH2M HILL Inc.
Project: NTR Vieques East SWMU 20
Matrix: Solid
Laboratory ID: 1409117-03
File ID: 0911703A.D
Sampled: 09/17/14 07:25
Prepared: 09/23/14 00:00
Analyzed: 09/23/14 15:44
Solids: 94.01
Preparation: 5035A
Dilution: 1
Batch: 4120012
Sequence: 4126709
Calibration: 4126004
Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		1.29	2.57	5.14	U
156-59-2	cis-1,2-Dichloroethene		1.29	2.57	5.14	U
156-60-5	trans-1,2-Dichloroethene		1.29	2.57	5.14	U
127-18-4	Tetrachloroethene		1.29	2.57	5.14	U
79-01-6	Trichloroethene		1.29	2.57	5.14	U
75-01-4	Vinyl chloride		1.29	2.57	5.14	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.86	32.25	104	85 - 120	
Dibromofluoromethane	30.86	29.10	94.3	80 - 125	
1,2-Dichloroethane-d4	30.86	34.88	113	75 - 140	
Toluene-d8	30.86	28.21	91.4	85 - 115	

ANALYSIS DATA SHEET

VEP4-EB01-091714-SO

Laboratory:	Empirical Laboratories, LLC	SDG:	1409117
Client:	CH2M Hill, Inc.	Project:	NTR Vieques East SWMU 30
Matrix:	Water	Laboratory ID: 1409117-04	File ID: 09117004.A.D
Sampled:	09/17/14 12:00	Prepared: 09/26/14 10:27	Analyzed: 09/26/14 10:27
Solids:		Preparation: 5030B	Dilution: 1

Batch: 4126913 Sequence: 4127201 Calibration: 4505002 Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	50.00	27.60	92.0	75 - 120	
Dibromofluoromethane	50.00	50.59	102	85 - 115	
1,2-Dichloroethane-d4	50.00	50.11	100	70 - 120	
Toluene-d8	50.00	28.28	94.3	85 - 120	

LMM 11/14

LTO

YES NO N/A

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 1409117 LAB: Empirical

SITE NAME: Vieques SWMU 30

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. **VOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓ ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓ ___ ___

1.3 Sample Conditions/Problems

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ ✓ ___

A 9/17/14 r 9/18 a 9/23-26/14

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water ✓ ___ ___

b. Soil ✓ ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water ✓ ___ ___

b. Soil ✓ ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. [ ] ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ ✓

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] ✓ ___

If yes, were samples reanalyzed? [ ] ___ ✓

Were method blanks reanalyzed? [ ] ___ ✓

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] ✓ ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [✓] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ ✓

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] ✓ ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent) no MS/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] ___ ✓

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] ___ ✓

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month [page 8000C, section 9.5.])

a. Water ___ ___ ✓

b. Waste ___ ___ ✓

c. Soil/Solid ___ ___ ✓

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. ___ ___ ✓

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. ___ ___ ✓

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit < %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? ✓ ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? ✓ ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? ✓ ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? ✓ ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ✓ ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ✓ ___ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

* VEP4-TB01-091714 trichloroethene 0.1495 (LOD 0.2)
VEP4-EB01-091714-50 ND

No qual required

* in SDG # 1409118

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ☑ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ☑ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ☑ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ☑ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ☑ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ☑ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ☑ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ☑ ___

9.7 Have the appropriate number of significant figures (two) been reported? ☑ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ☑ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ☑ ___ ___

b. Matrix spikes and matrix spike duplicates ☐ ___ ☑

c. Blanks ☑ ___ ___

d. Laboratory Control Samples ☑ ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ☑ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ☐ ___ ☑

c. Blanks ☑ ___ ___

d. Laboratory Control Samples ☑ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? ☑ ___ ___

YES NO N/A

Resolution? ✓ ___ ___

Peak shape? ✓ ___ ___

Full-scale graph (attenuation)? ✓ ___ ___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? ✓ ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? ✓ ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ✓ ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ✓ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification. no ncn

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? ___ ___ ✓

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate ___ ___ ✓

b. Blanks ___ ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? ___ ___ ✓

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ___ ___ ✓

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? ___ ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? ___ ✓ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? ✓ ___ ___

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? ✓ ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? ✓ ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39) qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. ✓ ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) ___ ✓ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? ✓ ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ___ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). ___ ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? ___ ✓ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? ✓ ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION: 1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.

2. Do not qualify non-detects when the associated IS are counts area > + 100%.

3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".

4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

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YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ✓ ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

VEP4-SS21-0001
VEP4-SS21P-0001 > 100%

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Sample Delivery Group Case Narrative

Receipt Information:
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

The following issues were discovered with the COC and/or samples upon log-in:

1. At the request of the client, the samples listed on the COC as VEP4-EB01-091714 had the client ID changed to VEP4-EB01-091714-SO and the sample listed on the COC as VEP4-SB21-0001 had the client ID changed to VEP4-SB21-0406.

Changes to the Revision:
This is an original submittal of the final report package.

Analytical Information:
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample preparation and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

SW8260B:
No anomalies or deviations are noted.

Wet Chemistry:
No anomalies or deviations are noted.

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ELECTRONIC CHAIN OF CUSTODY RECORD

EMPIRICAL 1409117

phone: 615-345-1115

C.O.C. 20140917-SS-SB-EMP-01

PLEASE PRINT

Report to: CH2MHILL
Company Name: CH2MHILL
Address: 15010 Conference Dr. ; 200
Chantilly, VA 20151
Attn: Mike Zamboni
Phone: 703.376.5301
Fax: 703.376.5801

Invoice to: See Contact
Company Name: See Contact
Address:
Attn:
Phone:
Fax:

Project Name/Number: not required
Purchase Order Number: Non-PO, CTO-0013
Sampler (Print): not required
Sampler (Signature): not required

Date Shipped: 9/17/14
Carrier: FedEx
Waybill No.: 771118090005
Comments:

Sample Identification	Location	Date Collected	Time Collected	Time Zone	# of Containers	Matrix: Air	Soil	Sed	Water	Analysis Requested/Method Number	
VEP4-SS21-0001	SS-21	9/17/14	07:00	AST	4				✓	X	SS-21 -01
VEP4-SS21P-0001		9/17/14	07:05	AST	4				✓	X	-02
VEP4-SB21-0001	SB-21	9/17/14	07:25	AST	4				✓	X	SB-21 -03
VEP4-EB01-091714	QC	9/17/14	12:00	AST	3				✓	X	equipment blank -04
									✓		
									✓		
									✓		
									✓		
									✓		

Turnaround Required: Check one ☐ Same/28 days, ☐ One week, ☐ 24/48 hrs, ☐ Other
Sample Disposal: ☐ Return-to-client, ☐ Disposed-by-Lab (client assumes costs) not applicable

Relinquished by: Date 9/18/14 Time 12:15
Received by: Date Time
Relinquished by: Date Time
Received by: Date Time
Relinquished by: Date 9/18/14 Time 0834
Received by: Date Time

Shipping Temperature:

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

Note: The first sampled date of the 1REF will be used as the COC number unless indicated otherwise.

II. EMPIRICAL LABORATORIES
COOLER RECEIPT FORM

Cooler Received/Opened On: 09/18/14@ 0940 Work order: 1409117

1. Tracking # 0051 (last 4 digits, FedEx)
Courier: FedEx
2. Temperature of rep. sample or temp blank when opened: 2.3 °C + correction factor(-0.3) = 2.0c
3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO...NA
4. Were custody seals on outside of cooler? YES...NO...NA
If yes, how many and where: 2. Front + back
5. Were the seals intact, signed, and dated correctly? YES...NO...NA
6. Were custody papers inside cooler? YES...NO...NA
I certify that I opened the cooler and answered questions 1-6 (initial/date) JTG 9/18/14
7. Were custody seals on containers: YES NO and intact YES...NO...NA
Were these signed and dated correctly? YES...NO...NA
8. Packing material used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry ice Other None
10. Did all containers arrive in good condition (unbroken)? YES...NO...NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES...NO...NA
12. Did all container labels and tags agree with custody papers? YES...NO...NA
13. a. Were VOA vials received? YES...NO...NA
b. Was there observable headspace present in any VOA vial (>5mm diam)? YES...NO...NA
14. Was there a Trip Blank in this cooler (custody seals present/intact)? YES...NO...NA...Comments
If multiple coolers, sequence #
I certify that I unloaded the cooler and answered questions 7-14 (initial/date) JTG 9/18/14
15. a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES...NO...NA
b. Did the bottle labels indicate that the correct preservatives were used? YES...NO...NA
16. Was residual chlorine present? YES...NO...NA
I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial/date) JTG 9/18/14
17. Were custody papers properly filled out (ink, signed, etc)? YES...NO...NA
18. Did you sign the custody papers in the appropriate place? YES...NO...NA
19. Were correct containers used for the analysis requested? YES...NO...NA If not, PM notified? YES...NO...NA
20. Was sufficient amount of sample sent in each container? YES...NO...NA If not, PM notified? YES...NO...NA
21. Were there Non-Conformance issues at login? YES...NO...NCIs#
I certify that I entered this project into LIMS and answered questions 17-21 (initial/date) JTG 9/18/14
I certify that I attached a label with the unique LIMS number to each container (initial/date) JTG 9/18/14
I certify that I notified the laboratory of any short holding time or RUSH parameters (initial/date) JTG 9/18/14

V:\Standard Operating Procedures\Current SOP File Directory\051_621_Sheet\75_COF.doc

MEMORANDUM CH2MHILL

Corrections to COCs

TO: Sonya Gordon, Empirical

COPIES: File
Data Validation Package
Laboratory Package SDG: Not yet assigned

FROM: Juliana Dean
Project Chemist

DATE: September 18, 2014

This memo is to document corrections made to entries on the Chains of Custody (COC) and Logins for Vieques, SWMU 20, CTO-0013.

The corrections include changes to the sample IDs on the COC:

Sample ID on COC	Correct Sample ID	Date Collected	Time Collected	SDG
VEP4-EB01-091714	VEP4-EB01-091714-SO	9/17/14	12:00	Not yet assigned
VEP4-SB21-0001	VEP4-SB21-0406	9/17/14	7:25	Not yet assigned

DataQual
Environmental Services, LLC

CH2M HILL
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

November 11, 2014
SDG# 1409128, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1409128. The data validation was performed in accordance with SW846 methods 8260B for volatiles, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA
VEP4-GW23-0914	1409128-01	water	X
VEP4-GW17-0914	1409128-02	water	X
VEP4-GW17D-0914	1409128-03	water	X
VEP4-EB01-091714-GW	1409128-04	water	X
VEP4-TB02-091714	1409128-05	water	X

The following quality control samples were provided with this SDG: Sample VEP4-TB02-091714- trip blank and sample VEP4-EB01-091714-GW - equipment blank.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Field Duplicates NA
- Identification/Quantitation *

- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

No qualifications were required to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to chain of custody records, sampling was performed on 9/17/14 and samples were received at the laboratory 9/19/14. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff
President

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1409128

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

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SWMU 20- Vieques, Puerto Rico
SDG# 1409128

003

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U not detected above the reported sample quantitation limit
J estimated value
UJ reported quantitation limit is qualified as estimated
N analyte has been tentatively identified
JN analyte has been tentatively identified, estimated value
R result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.

U* The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.

RL** The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1409128

004

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.

J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.
Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL reporting limit
PQL practical quantitation limit
IDL instrument detection limit
MDL method detection limit
CRDL contract required detection limit
CRQL contract required quantitation limit
+ positive result
- non-detect result

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1409128

005

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1409128

006

ANALYSIS DATA SHEET

VEP4-GW23-0914

Laboratory: Empirical Laboratories, LLC SDG: 1409128
Client: CH2M Hill, Inc. Project: NTR Vieques East SWMU 20
Matrix: Water Laboratory ID: 1409128-01 File ID: 0912801D.D
Sampled: 09/17/14 10:55 Prepared: 09/26/14 17:57 Analyzed: 09/26/14 17:57
Solids: Preparation: 5030B Dilution: 2
Batch: 4126924 Sequence: 4127212 Calibration: 4200001 Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene	0.754	0.500	1.00	2.00	JB
156-59-2	cis-1,2-Dichloroethene	1.33	0.500	1.00	2.00	JB
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene	1.62	0.500	1.00	2.00	JB
79-01-6	Trichloroethene	84.1	0.200	0.400	1.00	B
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.50	95.0	75 - 120	
Dibromofluoromethane	30.00	31.45	105	85 - 115	
1,2-Dichloroethane-d4	30.00	31.76	106	70 - 120	
Toluene-d8	30.00	29.40	98.0	85 - 120	

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ANALYSIS DATA SHEET

VEP4-GW17-0914

Laboratory: Empirical Laboratories, LLC SDG: 1409128
Client: CH2M Hill, Inc. Project: NTR Vieques East SWMU 20
Matrix: Water Laboratory ID: 1409128-02 File ID: 0912802B.D
Sampled: 09/17/14 12:55 Prepared: 09/26/14 18:22 Analyzed: 09/26/14 18:22
Solids: Preparation: 5030B Dilution: 2
Batch: 4126924 Sequence: 4127212 Calibration: 4200001 Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.500	1.00	2.00	U
156-59-2	cis-1,2-Dichloroethene		0.500	1.00	2.00	U
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene	2.14	0.500	1.00	2.00	JB
79-01-6	Trichloroethene	98.1	0.200	0.400	1.00	B
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.64	98.8	75 - 120	
Dibromofluoromethane	30.00	31.06	104	85 - 115	
1,2-Dichloroethane-d4	30.00	29.93	99.8	70 - 120	
Toluene-d8	30.00	29.85	99.5	85 - 120	

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ANALYSIS DATA SHEET

VEP4-GW17D-0914

Laboratory: Empirical Laboratories, LLC SDG: 1409128
Client: CH2M Hill, Inc. Project: NTR Vieques East SWMU 20
Matrix: Water Laboratory ID: 1409128-03 File ID: 0912803B.D
Sampled: 09/17/14 13:05 Prepared: 09/26/14 18:47 Analyzed: 09/26/14 18:47
Solids: Preparation: 5030B Dilution: 2
Batch: 4126924 Sequence: 4127212 Calibration: 4200001 Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.500	1.00	2.00	U
156-59-2	cis-1,2-Dichloroethene	0.651	0.500	1.00	2.00	JB
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene	1.01	0.500	1.00	2.00	JB
79-01-6	Trichloroethene	47.6	0.200	0.400	1.00	B
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.80	96.0	75 - 120	
Dibromofluoromethane	30.00	30.65	102	85 - 115	
1,2-Dichloroethane-d4	30.00	30.72	102	70 - 120	
Toluene-d8	30.00	29.68	98.9	85 - 120	

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ANALYSIS DATA SHEET

VEP4-EB01-091714-GW

Laboratory: Empirical Laboratories, LLC SDG: 1409128
Client: CH2M Hill, Inc. Project: NTR Vieques East SWMU 20
Matrix: Water Laboratory ID: 1409128-04 File ID: 0912804A.D
Sampled: 09/17/14 14:20 Prepared: 09/26/14 13:22 Analyzed: 09/26/14 13:22
Solids: Preparation: 5030B Dilution: 1
Batch: 4126924 Sequence: 4127212 Calibration: 4200001 Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.72	102	75 - 120	
Dibromofluoromethane	30.00	30.80	103	85 - 115	
1,2-Dichloroethane-d4	30.00	31.23	104	70 - 120	
Toluene-d8	30.00	29.02	96.7	85 - 120	

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ANALYSIS DATA SHEET

VEP4-TB02-091714

Laboratory:	Empirical Laboratories, LLC		SDG:	1409128	
Client:	CH2M HILL Inc.		Project:	NTR Vieques East SWMU 30	
Matrix:	Water	Laboratory ID:	1409128-05	File ID:	0912803A.D
Sampled:	09/17/14 13:25	Prepared:	09/26/14 12:07	Analyzed:	09/26/14 12:07
Solids:		Preparation:	5030B	Dilution:	1
Batch:	4026924	Sequence:	4027212	Calibration:	4208001

Instrument: MS-VOA1

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.83	103	75 - 120	
Dibromofluoromethane	30.00	30.63	102	85 - 115	
1,2-Dichloroethane-d4	30.00	30.29	101	70 - 120	
Toluene-d8	30.00	29.63	98.8	85 - 120	

011

YES NO N/A

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 1409128 LAB: Empirical

SITE NAME: Vieques SWMU 30

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓ __ __

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓ __ __

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ __ __

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. **VOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓ __ __

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓ __ __

1.3 Sample Conditions/Problems

012

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? __ ✓ __

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? __ ✓ __

a 9/17/14 a 9/19 a 9/26/14

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

013

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water ✓ __ __

b. Soil [ ] __ __

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water ✓ __ __

b. Soil [ ] __ __

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

014

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. [ ] [✓] ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sedimem
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ [✓]

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. [ ] [✓] ___

If yes, were samples reanalyzed? [ ] ___ [✓]

Were method blanks reanalyzed? [ ] ___ [✓]

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] [✓] ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SOG. [✓] ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [✓] ___ ___

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [✓] ___ ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent) No MS/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] ___ [✓]

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] ___ [✓]

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month [page 8000C, section 9.5.])

a. Water [ ] ___ ✓

b. Waste [ ] ___ ✓

c. Soil/Solid [ ] ___ ✓

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7) for each matrix. [ ] ___ ✓

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ ✓

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? ✓ ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? ✓ ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? ✓ ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? ✓ ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. [ ] ✓ ___ ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

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Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	≥ CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates ___ ___ ✓

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ___ ___ ✓

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? ✓ ___ ___

YES NO N/A

Resolution? [✓] ___ ___

Peak shape? [✓] ___ ___

Full-scale graph (attenuation)? [✓] ___ ___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

NO TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [✓] ___ ___

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [✓] ___ ___

b. Blanks [✓] ___ ___

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [✓] ___ ___

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [✓] ___ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [✓] ___ ___

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? ✓ ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39)qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. ✓ ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) ___ ✓ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? ✓ ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). ___ ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? ___ ✓ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? ✓ ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:
1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.
2. Do not qualify non-detects when the associated IS are counts area > + 100%.
3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".
4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ✓

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ✓

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

Sample Delivery Group Case Narrative

Receipt Information:
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Changes to the Revision:
Revision 01: The package was revised to change the client ID of sample 1409128-05 from VEP4-TB01-091714 to VEP4-TB02-091714 at the request of the client.

Analytical Information:
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample preparation and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

SW8260B:
Note –Samples 1409128-01, -02, and -03 were analyzed at a 2x only due to the sample foaming during screening. No lower analyses were able to be performed.

No additional anomalies or deviations are noted.

ELECTRONIC CHAIN OF CUSTODY RECORD

EMPIRICAL 1409128

phone: 615-345-1115

C.O.C. 20140918-GW-EMP-01

PLEASE PRINT

Report to: CH2MHILL
Company Name: 15010 Conference Dr.; 200
Address: Chantilly, VA 20151
Attn: Mike Zamboni
Phone: 703.376.5301
Fax: 703.376.5801

Invoice to: See Contact
Company Name:
Address:
Attn:
Phone:
Fax:

Project Name/Number: not required
Purchase Order Number: 955530
Sampler (Print): not required
Sampler (Signature):

Date Shipped: 9/18/14
Carrier: FedEx
Waybill No.: 771995880700
Comments:

Sample Identification	Location	Date Collected	Time Collected	Time Zone	Laboratory ID	Matrix: Air	Soil/Sed	Soil	GW	Analysis Requested/Method Number	
VEP4-GW23-0914	MW-23	9/17/14	10:55	AST	3				✓	X	-01 MW-23
VEP4-GW17-0914	MW-17	9/17/14	12:55	AST	3				✓	X	-02 MW-17
VEP4-GW17D-0914	MW-17D	9/17/14	13:05	AST	3				✓	X	-03 MW-17D
VEP4-EB01-091714-GW	QC	9/17/14	14:20	AST	3	✓				X	-04 equipment blank
VEP4-TB01-091714	QC	9/17/14	14:25	AST	2	✓				X	-05 trip blank
									✓		
									✓		
									✓		
									✓		

Shuttle Temperature:
Turnaround Requested: Check one: ☐ Std 28 days ☐ One week ☐ 24-48 Hrs ☐ Other
Sample Disposal: ☐ Return to client ☐ Disposed by Lab (fees may apply)
not applicable

Relinquished by sampler: Date 9/18/14 Time 1200
Received by: Date Time
Relinquished by: Date Time
Received by: Date 9/18/14 Time 0845
Relinquished by: Date Time
Received by: Date Time

White: Return to client with report Yellow: Laboratory Copy Pink: Sampler

Note: The first sampled date of the ARF will be used as the COC number unless indicated otherwise.

1409128 Summ Package

II. EMPIRICAL LABORATORIES
COOLER RECEIPT FORM

Cooler Received/Opened On: 9/19/14 @ 0845 Work Order: 1409128

1. Tracking # 9799 (last 4 digits, FedEx)

Courier: FedEx

2. Temperature of rep. sample or temp blank when opened: -0.5 °C + correction factor(-0.3) = -0.8 °C

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES (NO) NA

4. Were custody seals on outside of cooler? (YES) NO...NA

If yes, how many and where: 2, front + back

5. Were the seals intact, signed, and dated correctly? (YES) NO...NA

6. Were custody papers inside cooler? (YES) NO...NA

I certify that I opened the cooler and answered questions 1-6 (initial/date) JTG 9/19/14

7. Were custody seals on containers: YES (NO) and intact YES...NO (NA)

Were these signed and dated correctly? YES...NO (NA)

8. Packing material used? (Bubblewrap) Plastic bag Peanuts Vermiculite Foam insert Paper Other None

9. Cooling process: (Ice) Ice-pack Ice (direct contact) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? (YES) NO...NA

11. Were all container labels complete (#, date, signed, pres., etc)? (YES) NO...NA

12. Did all container labels and tags agree with custody papers? (YES) NO...NA

13. a. Were VOA vials received? (YES) NO...NA

b. Was there observable headspace present in any VOA vial (>5mm-6mm)? YES...(NO) NA

14. Was there a Trip Blank in this cooler (custody seals present/intact)? (YES) NO...NA...Comments —
If multiple coolers, sequence # —

I certify that I unloaded the cooler and answered questions 7-14 (initial/date) JTG 9/19/14

15. a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES...NO (NA)

b. Did the bottle labels indicate that the correct preservatives were used? YES...NO (NA)

16. Was residual chlorine present? YES...NO (NA)

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial/date) JTG 9/19/14

17. Were custody papers properly filled out (ink, signed, etc)? (YES) NO...NA

18. Did you sign the custody papers in the appropriate place? (YES) NO...NA

19. Were correct containers used for the analysis requested? (YES) NO...NA If not, PM notified? YES...NO (NA)

20. Was sufficient amount of sample sent in each container? (YES) NO...NA If not, PM notified? YES...NO (NA)

21. Were there Non-Conformance issues at login? YES (NO) NCR# —

I certify that I entered this project into LIMS and answered questions 17-21 (initial/date) JTG 9/19/14

I certify that I attached a label with the unique LIMS number to each container (initial/date) JTG 9/19/14

I certify that I notified the laboratory of any short holding time or RUSH parameters (initial/date) JTG 9/19/14

V:\Standard Operating Procedures\Current SOP File Directory\QS10. R21_20140728_CRF.doc 031

DataQual
Environmental Services, LLC

CH2M HILL
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

November 11, 2014
SDG# 1409129, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1409129. The data validation was performed in accordance with SW846 methods 8260B for volatiles, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA
VEP4-SS24-0001	1409129-01	soil	X
VEP4-SB24-0406	1409129-02	soil	X
VEP4-EB01-091814-SO	1409129-03	water	X

The following quality control samples were provided with this SDG: Sample VEP4-EB01-091814-SO - equipment blank.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Field Duplicates NA
- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

5830 Amberway Drive • St. Louis, MO 63128 • 314-330-1327 • Fax 314-849-6264

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

No qualifications were required to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to chain of custody records, sampling was performed on 9/18/14 and samples were received at the laboratory 9/19/14. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U	not detected above the reported sample quantitation limit
J	estimated value
UJ	reported quantitation limit is qualified as estimated
N	analyte has been tentatively identified
JN	analyte has been tentatively identified, estimated value
R	result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA	The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.
U*	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.
RL**	The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action -	The sample result is greater than the RL and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R -	Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.
J -	Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.
J/UJ -	Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.
Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action -	The sample result is greater than the RL and greater than ten times (10X) the blank value.
U -	The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.
R -	Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.
J -	Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL	reporting limit
PQL	practical quantitation limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RU	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

ANALYSIS DATA SHEET

VEP4-SS24-0001

Laboratory:	Empirical Laboratories, LLC		SDG:	1409129	
Client:	CH2M Hill, Inc.		Project:	NTR Vieques East SWMU 20	
Matrix:	Solid	Laboratory ID:	14091294-01	File ID:	0912901A.D
Sampled:	09/18/14 07:15	Prepared:	09/23/14 00:00	Analyzed:	09/23/14 18:04
Solids:	94.97	Preparation:	5035A	Dilution:	1
Batch:	4726112	Sequence:	4726209	Calibration:	4226004

Instrument: MS-VGA2

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		1.29	2.58	5.15	U
156-59-2	cis-1,2-Dichloroethene		1.29	2.58	5.15	U
156-60-5	trans-1,2-Dichloroethene		1.29	2.58	5.15	U
127-18-4	Tetrachloroethene		1.29	2.58	5.15	U
79-01-6	Trichloroethene		1.29	2.58	5.15	U
75-01-4	Vinyl chloride		1.29	2.58	5.15	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.91	28.33	91.7	85 - 120	
Dibromofluoromethane	30.91	29.04	94.0	80 - 125	
1,2-Dichloroethane-d4	30.91	33.27	108	75 - 140	
Toluene-d8	30.91	29.57	95.7	85 - 115	

ANALYSIS DATA SHEET

VEP4-SB24-0406

Laboratory:	Empirical Laboratories, LLC		SDG:	1409129	
Client:	CH2M Hill, Inc.		Project:	NTR Vieques East SWMU 20	
Matrix:	Solid	Laboratory ID:	1409129-02	File ID:	0912902A.D
Sampled:	09/18/14 07:20	Prepared:	09/23/14 00:00	Analyzed:	09/29/14 18:28
Solids:	93.81	Preparation:	5035A	Dilution:	1
Batch:	4125012	Sequence:	4126708	Calibration:	4226004

Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		1.66	3.32	6.64	U
156-59-2	cis-1,2-Dichloroethene		1.66	3.32	6.64	U
156-60-5	trans-1,2-Dichloroethene		1.66	3.32	6.64	U
127-18-4	Tetrachloroethene		1.66	3.32	6.64	U
79-01-6	Trichloroethene		1.66	3.32	6.64	U
75-01-4	Vinyl chloride		1.66	3.32	6.64	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
Bromofluorobenzene	39.86	40.16	101	85 - 120	
Dibromofluoromethane	39.86	38.12	95.6	80 - 125	
1,2-Dichloroethane-d4	39.86	43.59	109	75 - 140	
Toluene-d8	39.86	37.06	93.0	85 - 115	

WM 11/14

ANALYSIS DATA SHEET

VEP4-CB01-091914-SG

Laboratory:	Empirical Laboratories, LLC		SDG:	1409129	
Client:	CH2M Hill, Inc.		Project:	NTR Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1409129-03	File ID:	0915903A.D
Sampled:	09/18/14 11:45	Prepared:	09/26/14 13:47	Analyzed:	09/26/14 13:47
Solids:		Preparation:	5030B	Dilution:	1
Batch:	4126924	Sequence:	4127712	Calibration:	4200061

Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.73	99.1	75 - 120	
Dibromofluoromethane	30.00	30.43	101	85 - 115	
1,2-Dichloroethane-d4	30.00	31.29	104	70 - 120	
Toluene-d8	30.00	28.83	96.1	85 - 120	

WM 11/14

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 1409129 LAB: Empirical

SITE NAME: Vieques SWMU 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. **VOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓

1.3 Sample Conditions/Problems

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ✓

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ✓

A 9/18/14 b 9/19/14 a 9/23-26/14

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water ☑ ___ ___

b. Soil ☑ ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water ☑ ___ ___

b. Soil ☑ ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. Lab ☑ ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? ☐ ___ ☑

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. ☐ ☑ ___

If yes, were samples reanalyzed? ☐ ___ ☑

Were method blanks reanalyzed? ☐ ___ ☑

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? ☐ ☑ ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SOG. ☑ ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water ☑ ___ ___

B. Soil ☑ ___ ___

C. Med Soil ☐ ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). ☑ ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? ☐ ___ ☑

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. ☐ ___ ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent) no MS/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] ___ ✓

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] ___ ✓

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month (page 8000C, section 9.5.1)

a. Water [ ] ___ ✓

b. Waste [ ] ___ ✓

c. Soil/Solid [ ] ___ ✓

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [ ] ___ ✓

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ ✓

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? ✓ ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? ✓ [ ] ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? ✓ ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? ✓ ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. [ ] ✓ ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

* VEP4-TB02-091714 MOE
VEP4-EB01-091814-SO MOE

* in SDG# 1409128

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone
** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates ___ ___ ✓

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ___ ___ ✓

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? ✓ ___ ___

YES NO N/A

Resolution? ✓ ___ ___

Peak shape? ✓ ___ ___

Full-scale graph (attenuation)? ✓ ___ ___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? ✓ ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? ✓ ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ✓ ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ✓ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

no TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? ___ ___ ✓

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate ___ ___ ✓

b. Blanks ___ ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? ___ ___ ✓

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ___ ___ ✓

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? ___ ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? ___ ✓ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? ✓ ___ ___

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? ✓ ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? ✓ ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39)qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. ✓ ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) ___ ✓ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? ✓ ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ___ ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). ___ ___ ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? [ ] [✓] [ ]

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds in section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? [✓] [ ] [ ]

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:
1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.
2. Do not qualify non-detects when the associated IS are counts area > + 100%.
3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".
4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? [✓] [ ] [ ]

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? [ ] [✓] [ ]

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

Sample Delivery Group Case Narrative

Receipt Information:
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

The following issues were discovered with the COC and/or samples upon log-in:
1. At the request of the client, the samples listed on the COC as VEP4-EB01-091814 had the client ID changed to VEP4-EB01-091814-SO.

Changes to the Revision:
This is an original submittal of the final report package.

Analytical Information:
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample preparation and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

SW8260B:
No anomalies or deviations are noted.

Wet Chemistry:
No anomalies or deviations are noted.

ELECTRONIC CHAIN OF CUSTODY RECORD

C.O.C. 20140918-SS-SB-EMP-01

EMPIRICAL 1409129

phone: 615-345-1115

PLEASE PRINT

Report to: CH2MHILL — Phone: 703.376.5301
Company Name: 15010 Conference Dr. ; 200 — Fax: 703.376.5801
Address: Chantilly, VA 20151
Attn: Mike Zamboni

Invoice to: See Contact — Company Name: — Phone:
Address: — Fax:
Attn:

Project Name/Number: not required
Purchase Order Number: Non-PO, CTO-0013
Sampler (Print): not required
Sampler (Signature):

Date Shipped: 9/18/14
Carrier: FedEx
Waybill No.: 771159987799
Comments:

Sample Identification	Location	Date Collected	Time Collected	Time Zone	Matrix: Air	Matrix: Sed.	Matrix: Soil	Matrix: Water	Analysis Requested/Method Number	Analysis Requested/Method Number	Analysis Requested/Method Number	Analysis Requested/Method Number	Analysis Requested/Method Number	Analysis Requested/Method Number	Analysis Requested/Method Number	Analysis Requested/Method Number	Analysis Requested/Method Number	Analysis Requested/Method Number	Analysis Requested/Method Number	Analysis Requested/Method Number	Analysis Requested/Method Number	Analysis Requested/Method Number
VEP4-SS24-0001	SS-24	9/18/14	7:15	AST	4		✓	X	X													
VEP4-SB24-0406	SB-24	9/18/14	7:30	AST	4		✓	X	X													
VEP4-EB01-091814	QC	9/18/14	11:45	AST	3	✓		X	X													
							✓															
							✓															
							✓															
							✓															
							✓															
							✓															

Sample Disposal: ☐ Dispose by Lab ☐ Return to client ☐ Disposal by Lab (fees may apply)

Turnaround Requested (TAT): ☑ Std. 28 days ☐ Rush TAT: ☐ Other ☐ 24/48 hrs. Check one box

Relinquished by: Date 9/18/14 Time 12pm — Received by:
Relinquished by: Date — Time — Received by:
Relinquished by: Date 9/19/14 Time 0845 — Received by: not applicable

Sample Temperature: — Relinquished by: Date 9/19/14 Time 1845 — Received by: not applicable

White: Return to client with report. Yellow: Laboratory Copy. Pink: Sampler

Note: The first sampled date of the ARF will be used as the COC number unless indicated otherwise.

1409129 Sumin Package

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II. EMPIRICAL LABORATORIES
COOLER RECEIPT FORM

Cooler Received/Opened On: 9/19/14 @ 0845 — Work Order: 1409129

1. Tracking # 9799 (last 4 digits, FedEx)
Courier: FedEx
2. Temperature of rep. sample or temp blank when opened: -0.5 °C + correction factor (-0.3) = -0.8 °C
3. If item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO NA
4. Were custody seals on outside of cooler? YES NO NA
If yes, how many and where: 2, front + back
5. Were the seals intact, signed, and dated correctly? YES NO NA
6. Were custody papers inside cooler? YES NO NA
I certify that I opened the cooler and answered questions 1-6 (initial/date) JTG 9/19/14
7. Were custody seals on containers: YES NO and intact YES NO NA
Were these signed and dated correctly? YES NO NA
8. Packing material used: Bubblewrap Plastic bag Peanuts Vermiculite Foam insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry ice Other None
10. Did all containers arrive in good condition (unbroken)? YES NO NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES NO NA
12. Did all container labels and tags agree with custody papers? YES NO NA
13. a. Were VOA vials received? YES NO NA
b. Was there observable headspace present in any VOA vial (>5mm-6mm)? YES NO NA
14. Was there a Trip Blank in this cooler (custody seals present/intact)? YES NO NA Comments
If multiple coolers, sequence #
I certify that I unloaded the cooler and answered questions 7-14 (initial/date) JTG 9/19/14
15. a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES NO NA
b. Did the bottle labels indicate that the correct preservatives were used? YES NO NA
16. Was residual chlorine present? YES NO NA
I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial/date) JTG 9/19/14
17. Were custody papers properly filled out (ink, signed, etc)? YES NO NA
18. Did you sign the custody papers in the appropriate place? YES NO NA
19. Were correct containers used for the analysis requested? YES NO NA If not, PM notified? YES NO NA
20. Was sufficient amount of sample sent in each container? YES NO NA If not, PM notified? YES NO NA
21. Were there Non-Conformance issues at login? YES NO NCR#
I certify that I entered this project into LIMS and answered questions 17-21 (initial/date) JTG 9/19/14
I certify that I attached a label with the unique LIMS number to each container (initial/date) JTG 9/19/14
I certify that I notified the laboratory of any short holding time or RUSH parameters (initial/date) JTG 9/19/14

V:\Standard Operating Procedures\Current SOP File Directory\QS\8.9.2.1_20140729_CRF.doc

1409129 Sumin Package

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DataQual
Environmental Services, LLC

CH2M HILL
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

November 11, 2014
SDG# 1409148, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1409148. The data validation was performed in accordance with SW846 methods 8260B for volatiles, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA
VEP4-SS25-0001	1409148-01	soil	X
VEP4-SB25-0406	1409148-02	soil	X
VEP4-SS23-0001	1409148-03	soil	X
VEP4-SB23-0406	1409148-04	soil	X
VEP4-EB01-092214-SO	1409148-05	water	X
VEP4-GW25-0914	1409148-06	soil	X
VEP4-EB01-091914-GW	1409148-07	water	X
VEP4-TB01-091914	1409148-08	water	X

The following quality control samples were provided with this SDG: Sample VEP4-VEP4-TB01-091914- trip blank and samples VEP4-EB01-092214-SO and VEP4-EB01-091914-GW - equipment blanks.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA

- Field Duplicates NA
- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

No qualifications were required to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to chain of custody records, sampling was performed on 9/18-22/14 and samples were received at the laboratory 9/23/14. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U not detected above the reported sample quantitation limit
J estimated value
UJ reported quantitation limit is qualified as estimated
N analyte has been tentatively identified
JN analyte has been tentatively identified, estimated value
R result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.

U* The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.

RL** The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.

J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.
Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL reporting limit
PQL practical quantitation limit
IDL instrument detection limit
MDL method detection limit
CRDL contract required detection limit
CRQL contract required quantitation limit
– positive result
- non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

ANALYSIS DATA SHEET

VEP4-SS25-0001

Laboratory:	Empirical Laboratories, LLC	SDG:	1409148
Client:	CH2M Hill, Inc.	Project:	NTR Voyager East SWMU 20
Matrix:	Solid	Laboratory ID:	1409148-01
Sampled:	09/22/14 08:00	File ID:	09140014.D
Prepared:	09/29/14 00:00	Analyzed:	09/29/14 13:41
Solids:	92.96	Preparation:	5035A
Dilution:	1		
Batch:	4129001	Sequence:	4127506
Calibration:	4226004	Instrument:	MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		1.51	3.02	6.03	U
156-59-2	cis-1,2-Dichloroethene		1.51	3.02	6.03	U
156-60-5	trans-1,2-Dichloroethene		1.51	3.02	6.03	U
127-18-4	Tetrachloroethene		1.51	3.02	6.03	U
79-01-6	Trichloroethene		1.51	3.02	6.03	U
75-01-4	Vinyl chloride		1.51	3.02	6.03	U
Total Target Analytes Reported: 6 Project Analytes: 6			1.51	3.02	6.03	U

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
Bromofluorobenzene	36.18	33.19	91.7	85 - 120	
Dibromofluoromethane	36.18	36.52	101	80 - 125	
1,2-Dichloroethane-d4	36.18	42.71	118	75 - 140	
Toluene-d8	36.18	34.06	94.1	85 - 115	

ANALYSIS DATA SHEET

VEP4-SD25-0406

Laboratory:	Empirical Laboratories, LLC	SDG:	1409148
Client:	CH2M Hill, Inc.	Project:	NTR Voyager East SWMU 20
Matrix:	Solid	Laboratory ID:	1409148-02
Sampled:	09/22/14 08:10	File ID:	09140026.D
Prepared:	09/29/14 00:00	Analyzed:	09/29/14 15:36
Solids:	95.33	Preparation:	5035A
Dilution:	1		
Batch:	4129001	Sequence:	4127506
Calibration:	4226004	Instrument:	MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		1.35	2.70	5.40	U
156-59-2	cis-1,2-Dichloroethene		1.35	2.70	5.40	U
156-60-5	trans-1,2-Dichloroethene		1.35	2.70	5.40	U
127-18-4	Tetrachloroethene		1.35	2.70	5.40	U
79-01-6	Trichloroethene		1.35	2.70	5.40	U
75-01-4	Vinyl chloride		1.35	2.70	5.40	U
Total Target Analytes Reported: 6 Project Analytes: 6			1.35	2.70	5.40	U

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
Bromofluorobenzene	32.38	29.61	91.5	85 - 120	
Dibromofluoromethane	32.38	32.51	100	80 - 125	
1,2-Dichloroethane-d4	32.38	37.07	114	75 - 140	
Toluene-d8	32.38	30.52	94.3	85 - 115	

ANALYSIS DATA SHEET

VEP4-SS23-0001

Laboratory:	Empirical Laboratories, LLC	SDG:	1409148
Client:	CH2M Hill, Inc.	Project:	NTR Voyager East SWMU 20
Matrix:	Solid	Laboratory ID:	1409148-03
Sampled:	09/22/14 08:55	File ID:	09140030.D
Prepared:	09/29/14 00:00	Analyzed:	09/29/14 14:19
Solids:	96.50	Preparation:	5035A
Dilution:	1		
Batch:	4129001	Sequence:	4127506
Calibration:	4226004	Instrument:	MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		1.51	3.01	6.02	U
156-59-2	cis-1,2-Dichloroethene		1.51	3.01	6.02	U
156-60-5	trans-1,2-Dichloroethene		1.51	3.01	6.02	U
127-18-4	Tetrachloroethene		1.51	3.01	6.02	U
79-01-6	Trichloroethene		1.51	3.01	6.02	U
75-01-4	Vinyl chloride		1.51	3.01	6.02	U
Total Target Analytes Reported: 6 Project Analytes: 6			1.51	3.01	6.02	U

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
Bromofluorobenzene	36.14	34.76	96.2	85 - 120	
Dibromofluoromethane	36.14	38.01	99.6	80 - 125	
1,2-Dichloroethane-d4	36.14	39.94	110	75 - 140	
Toluene-d8	36.14	34.08	94.3	85 - 115	

ANALYSIS DATA SHEET

VEP4-SD23-0406

Laboratory:	Empirical Laboratories, LLC	SDG:	1409148
Client:	CH2M Hill, Inc.	Project:	NTR Voyager East SWMU 20
Matrix:	Solid	Laboratory ID:	1409148-04
Sampled:	09/22/14 09:15	File ID:	09140046.D
Prepared:	09/29/14 00:00	Analyzed:	09/29/14 14:43
Solids:	90.22	Preparation:	5035A
Dilution:	1		
Batch:	4129001	Sequence:	4127506
Calibration:	4226004	Instrument:	MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		1.70	3.40	6.81	U
156-59-2	cis-1,2-Dichloroethene		1.70	3.40	6.81	U
156-60-5	trans-1,2-Dichloroethene		1.70	3.40	6.81	U
127-18-4	Tetrachloroethene		1.70	3.40	6.81	U
79-01-6	Trichloroethene		1.70	3.40	6.81	U
75-01-4	Vinyl chloride		1.70	3.40	6.81	U
Total Target Analytes Reported: 6 Project Analytes: 6			1.70	3.40	6.81	U

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
Bromofluorobenzene	40.85	38.45	94.1	85 - 120	
Dibromofluoromethane	40.85	41.54	102	80 - 125	
1,2-Dichloroethane-d4	40.85	46.42	114	75 - 140	
Toluene-d8	40.85	38.60	94.5	85 - 115	

ANALYSIS DATA SHEET

VEP4-EB01-092214-SO

Laboratory: Empirical Laboratories, LLC
SDG: 1409148
Client: CH2M Hill, Inc.
Project: NTR Vieques East SWMU 20
Matrix: Water
Laboratory ID: 1409148-05
File ID: 0914805A.D
Sampled: 09/22/14 11:30
Prepared: 09/29/14 16:15
Analyzed: 09/29/14 16:15
Solids:
Preparation: 5030B
Dilution: 1
Batch: 4129018
Sequence: 4127316
Calibration: 4272001
Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.250	0.500	1.00	U
75-01-4	Vinyl chloride		0.100	0.200	0.500	U
Total Target Analytes Reported: 6 Project Analytes: 6			0.140	0.200	0.500	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.85	103	75 - 120	
Dibromofluoromethane	30.00	30.98	103	85 - 115	
1,2-Dichloroethane-d4	30.00	31.60	105	70 - 120	
Toluene-d8	30.00	29.38	97.9	85 - 120	

011

ANALYSIS DATA SHEET

VEP4-GW25-0914

Laboratory: Empirical Laboratories, LLC
SDG: 1409148
Client: CH2M Hill, Inc.
Project: NTR Vieques East SWMU 20
Matrix: Water
Laboratory ID: 1409148-06
File ID: 0914806B.D
Sampled: 09/18/14 11:15
Prepared: 09/29/14 20:50
Analyzed: 09/29/14 20:50
Solids:
Preparation: 5030B
Dilution: 2
Batch: 4129018
Sequence: 4127316
Calibration: 4272001
Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene	0.527	0.500	1.00	2.00	~~U~~
156-59-2	cis-1,2-Dichloroethene		0.500	1.00	2.00	U
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene	2.35	0.500	1.00	2.00	~~U~~
79-01-6	Trichloroethene	157	0.200	0.400	1.00	~~U~~
75-01-4	Vinyl chloride		0.280	0.400	1.00	U
Total Target Analytes Reported: 6 Project Analytes: 6						

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.77	99.2	75 - 120	
Dibromofluoromethane	30.00	30.82	103	85 - 115	
1,2-Dichloroethane-d4	30.00	29.32	97.7	70 - 120	
Toluene-d8	30.00	29.44	98.1	85 - 120	

LM 111814

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ANALYSIS DATA SHEET

VEP4-EB01-091914-GW

Laboratory: Empirical Laboratories, LLC
SDG: 1409148
Client: CH2M Hill, Inc.
Project: NTR Vieques East SWMU 20
Matrix: Water
Laboratory ID: 1409148-07
File ID: 0914807A.D
Sampled: 09/19/14 07:45
Prepared: 09/29/14 16:42
Analyzed: 09/29/14 16:42
Solids:
Preparation: 5030B
Dilution: 1
Batch: 4129018
Sequence: 4127316
Calibration: 4272001
Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.250	0.500	1.00	U
75-01-4	Vinyl chloride		0.100	0.200	0.500	U
Total Target Analytes Reported: 6 Project Analytes: 6			0.140	0.200	0.500	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.97	99.9	75 - 120	
Dibromofluoromethane	30.00	31.13	104	85 - 115	
1,2-Dichloroethane-d4	30.00	29.03	96.8	70 - 120	
Toluene-d8	30.00	29.59	98.6	85 - 120	

LM 111814

013

ANALYSIS DATA SHEET

VEP4-TB01-091914

Laboratory: Empirical Laboratories, LLC
SDG: 1409148
Client: CH2M Hill, Inc.
Project: NTR Vieques East SWMU 20
Matrix: Water
Laboratory ID: 1409148-08
File ID: 0914808A.D
Sampled: 09/19/14 08:00
Prepared: 09/29/14 15:20
Analyzed: 09/29/14 15:20
Solids:
Preparation: 5030B
Dilution: 1
Batch: 4129018
Sequence: 4127316
Calibration: 4272001
Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.250	0.500	1.00	U
75-01-4	Vinyl chloride		0.100	0.200	0.500	U
Total Target Analytes Reported: 6 Project Analytes: 6			0.140	0.200	0.500	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.84	99.5	75 - 120	
Dibromofluoromethane	30.00	30.69	102	85 - 115	
1,2-Dichloroethane-d4	30.00	30.58	102	70 - 120	
Toluene-d8	30.00	29.53	98.4	85 - 120	

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014

YES NO N/A

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 1409148 LAB: Empirical

SITE NAME: Vieques Sanmu 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓ __ __

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓ __ __

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ __ __

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. **VOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓ __ __

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓ __ __

1.3 Sample Conditions/Problems

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? __ ✓ __

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? __ ✓ __

A 9/18-22/14 N 9/23 a 9/29/14

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water ✓ __ __

b. Soil ✓ __ __

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water ✓ __ __

b. Soil ✓ __ __

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. lab ✓ __ __

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? __ __ ✓

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank. Table 2. __ ✓ __

If yes, were samples reanalyzed? __ __ ✓

Were method blanks reanalyzed? __ __ ✓

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] [✓] [ ]

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. [✓] [ ] [ ]

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] [ ] [ ]

B. Soil [✓] [ ] [ ]

C. Med Soil [ ] [ ] [ ]

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] [ ] [ ]

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 – 130% (Method 8000c Sect 9.5)? [ ] [ ] [✓]

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 – 130% recovery limits. [ ] [✓] [ ]

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent) no MS/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] [ ] [✓]

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] [ ] [✓]

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month [page 8000C, section 9.5.1]

a. Water [ ] [ ] [✓]

b. Waste [ ] [ ] [✓]

c. Soil/Solid [ ] [ ] [✓]

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. [ ] [ ] [✓]

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] [ ] [✓]

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? ✓ ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? ✓ ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? ✓ ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject @ all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data – chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? ✓ ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ✓ ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

VEP4-TB01-091914 MWG
VEP4-EB01-091914-GW MWG

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contamination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone
** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument? (see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates ___ ___ ✓

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ___ ___ ✓

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? ✓ ___ ___

YES NO N/A

Resolution? ✓ ___ ___

Peak shape? ✓ ___ ___

Full-scale graph (attenuation)? ✓ ___ ___

Other: _____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? ✓ ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? ✓ ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ✓ ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ✓ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

no TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? ✓

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate ✓

b. Blanks ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? ✓

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ✓

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? ✓

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? ✓

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? ✓

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? ✓

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39) qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? ✓

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. ✓

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) ___ ✓ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? ✓ ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). ___ ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? ___ ✓ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds in section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? ✓ ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION:
1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.
2. Do not qualify non-detects when the associated IS are counts area > + 100%.
3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".
4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ___ ✓ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

- 30 VOA -

039

Sample Delivery Group Case Narrative

Receipt Information:
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

The following issues were discovered with the COC and/or samples upon log-in:
1. At the request of the client, the samples listed on the COC as VEP4-EB01-092214 had the client ID changed to VEP4-EB01-092214-SO.

Changes to the Revision:
This is an original submittal of the final report package.

Analytical Information:
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample preparation and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

SW8260B:
Note – Sample 1409148-06 was analyzed at a 2x due to the sample foaming during screening. No lower analysis was able to be performed.

No additional anomalies or deviations are noted.

Wet Chemistry:
No anomalies or deviations are noted.

040

ELECTRONIC CHAIN OF CUSTODY RECORD

1409148

C.O.C. 20160903-GW-EMPLOY

PLEASE PRINT

Report to: CH2MHILL
Company Name: 15010 Conference Dr. ; 200
Address: Chantilly, VA 20151
Attn: Mike Zamboni
Phone: 703.376.5301
Fax: 703.376.5801

Invoice to: See Contact
Company Name:
Address:
Attn:
Phone:
Fax:

Date Shipped: 9/22/14
Carrier: FedEx
Waybill No.: 771230117508
Comments:

Project Name/Number: not required
Purchase Order Number: Non-PO, CTO-0013
Sampler (Print): not required
Sampler (Signature):

Sample Identification	Location	Date Collected	Time Collected	No. of Containers	Air	Soil	Sed.	Water	Analysis Requested/Method Number
VEP4-SS25-0201	SS-25	9/22/14	08:00 AST	4		✓		✓	X X
VEP4-SB25-0406	SB-25	9/22/14	08:30 AST	4		✓		✓	X X
VEP4-SS23-0001	SS-23	9/22/14	08:55 AST	4		✓		✓	X X
VEP4-SB23-0406	SB-23	9/22/14	09:15 AST	4		✓		✓	X X
VEP4-EB01-092214	QC	9/22/14	11:30 AST	3	✓				X

Shipping Requested: Check one: ☐ Rush ☐ One week ☐ 24-48 hrs. ☐ Other
Sample Disposal: ☐ Return to client ☐ Disposal by Laboratory
Relinquished by: Date: 9/22/14 Time: 1:30 Received by:
Relinquished by: Date: Time: Received by:
Relinquished by: Date: Time: Received by: Date: 9/24/14 Time: 8:40
Static Temperature:
White: Return to client with report Yellow: Laboratory Copy Pink: Samples

1409148 Summ Package

ELECTRONIC CHAIN OF CUSTODY RECORD

1409148

C.O.C. 20160903-GW-EMPLOY

PLEASE PRINT

Report to: CH2MHILL
Company Name: 15010 Conference Dr. ; 200
Address: Chantilly, VA 20151
Attn: Mike Zamboni
Phone: 703.376.5301
Fax: 703.376.5801

Invoice to: See Contact
Company Name:
Address:
Attn:
Phone:
Fax:

Date Shipped: 9/22/14
Carrier: FedEx
Waybill No.: 771230117508
Comments:

Project Name/Number: not required
Purchase Order Number: 955530
Sampler (Print): not required
Sampler (Signature):

Sample Identification	Location	Date Collected	Time Collected	No. of Containers	Air	Soil	Sed.	Water	Analysis Requested/Method Number
VEP4-GW25-0914	MW-25	9/18/14	11:15 AST	3				✓	X
VEP4-EB01-091914-GW	QC	9/19/14	07:45 AST	3	✓				X
VEP4-TB01-091914	QC	9/19/14	08:00 AST	3	✓				X

Shipping Requested: Check one: ☐ Rush ☐ One week ☐ 24-48 hrs. ☐ Other
Sample Disposal: ☐ Return to client ☐ Disposal by Laboratory
Relinquished by: Date: 9/22/14 Time: 1:30 Received by:
Relinquished by: Date: Time: Received by:
Relinquished by: Date: Time: Received by: Date: 9/24/14 Time: 8:40
Static Temperature:
White: Return to client with report Yellow: Laboratory Copy Pink: Samples

1409148 Summ Package

II. EMPIRICAL LABORATORIES
COOLER RECEIPT FORM

Cooler Received/Opened On: 09/23/14@840 Work Order: 1409148

1. Tracking # 7508 (last 4 digits, FedEx)
   Courier: FedEx
2. Temperature of rep. sample or temp blank when opened: 1.1 °C + correction factor(-0.3) = 0.8°C
3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO...NA
4. Were custody seals on outside of cooler? YES...NO...NA
   If yes, how many and where: 2 front + Back
5. Were the seals intact, signed, and dated correctly? YES...NO...NA
6. Were custody papers inside cooler? YES...NO...NA
   I certify that I opened the cooler and answered questions 1-5 (initial/date) TH 9/23/14
7. Were custody seals on containers: YES NO and intact YES...NO...NA
   Were these signed and dated correctly? YES...NO...NA
8. Packing material used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry Ice Other None
10. Did all containers arrive in good condition (unbroken)? YES...NO...NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES...NO...NA
12. Did all container labels and tags agree with custody papers? YES...NO...NA
13. a. Were VOA vials received? YES...NO...NA
    b. Was there observable headspace present in any VOA vial (>5mm-6mm)? YES...NO...NA
14. Was there a Trip Blank in this cooler (custody seals present/intact)? YES...NO...NA...Comments
    If multiple coolers, sequence #
    I certify that I unloaded the cooler and answered questions 7-14 (initial/date) TH 9/23/14
15. a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES...NO...NA
    b. Did the bottle labels indicate that the correct preservatives were used? YES...NO...NA
16. Was residual chlorine present? YES...NO...NA
    I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial/date) TH 9/23/14
17. Were custody papers properly filled out (ink, signed, etc)? YES...NO...NA
18. Did you sign the custody papers in the appropriate place? YES...NO...NA
19. Were correct containers used for the analysis requested? YES...NO...NA If not, PM notified? YES...NO...NA
20. Was sufficient amount of sample sent in each container? YES...NO...NA If not, PM notified? YES...NO...NA
21. Were there Non-Conformance issues at login? YES...NO...NCR#
    I certify that I entered this project into LIMS and answered questions 17-21 (initial/date) TH 9/23/14
    I certify that I attached a label with the unique LIMS number to each container (initial/date) TH 9/23/14
    I certify that I notified the laboratory of any short holding time or RUSH parameters (initial/date) TH 9/23/14

V:\Standard Operating Procedures\Current SOP File Directory\QS10_R21_20140729_CRF.doc

C43

MEMORANDUM

CH2MHILL

Corrections to COCs

TO: Sonya Gordon, Empirical

COPIES: File
Data Validation Package
Laboratory Package SDG: Not yet assigned

FROM: Juliana Dean
Project Chemist

DATE: September 23, 2014

This memo is to document corrections made to entries on the Chains of Custody (COC) and Logins for Vieques, SWMU 20, CTO-0013.

The corrections include changes to the sample IDs on the COC:

Sample ID on COC	Correct Sample ID	Date Collected	Time Collected	SDG
VEP4-EB01-092214	VEP4-EB01-092214-SO	9/22/14	11:30	Not yet assigned

C44

DataQual
Environmental Services, LLC

CH2M HILL
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

November 11, 2014
SDG# 1409188, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1409188. The data validation was performed in accordance with SW846 methods 8260B for volatiles, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA
VEP4-GW32-0001	1409188-01	water	X
VEP4-GW25D-0914	1409188-02	water	X
VEP4-GW24-0914	1409188-03	water	X
VEP4-GW24P-0914	1409188-04	water	X
VEP4-EB01-092314-GW	1409188-05	water	X
VEP4-TB-092314	1409188-06	water	X

The following quality control samples were provided with this SDG: Sample VEP4-GW24P-0914- field duplicate of sample VEP4-GW24-0914, sample VEP4-TB-092314- trip blank and sample VEP4-EB01-092314-GW - equipment blank.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Field Duplicates *

- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

According to the case narrative, all sample vials for trip blank VEP4-TB092314 were received at the laboratory with pea-sized head-space present; therefore qualifications were applied to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to chain of custody records, sampling was performed on 9/23/14 and samples were received at the laboratory 9/25/14. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

Sample Condition

According to the case narrative, all sample vials for trip blank VEP4-TB092314 were received at the laboratory with pea-sized head-space present. Therefore positive results were qualified as estimated (J) and non-detected results were rejected (R) (qualifier code: OT).

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff
President

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
VEP4-TB092314	all results	+/-	J/R	OT

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U not detected above the reported sample quantitation limit
J estimated value
UJ reported quantitation limit is qualified as estimated
N analyte has been tentatively identified
JN analyte has been tentatively identified, estimated value
R result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.

U* The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.

RL** The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.

J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.
Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL reporting limit
PQL practical quantitation limit
IDL instrument detection limit
MDL method detection limit
CRDL contract required detection limit
CRQL contract required quantitation limit
+ positive result
- non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1409188

037

ANALYSIS DATA SHEET

VEP4-GW32-0914

Laboratory: Empirical Laboratories, LLC SDG: 1409188
Client: CH2M Hill, Inc. Project: NTR Vieques East SWMU 20
Matrix: Water Laboratory ID: 1409188-03 File ID: 091880JB.D
Sampled: 09/23/14 10:20 Prepared: 10/01/14 14:24 Analyzed: 10/01/14 14:24
Solids: Preparation: 5030B Dilution: 2
Batch: 4J01009 Sequence: 4J27503 Calibration: 4J27001 Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.500	1.00	2.00	U
156-59-2	cis-1,2-Dichloroethene		0.500	1.00	2.00	U
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.500	1.00	2.00	U
79-01-6	Trichloroethene		0.200	0.400	1.00	U
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.80	99.3	75 - 120	
Dibromofluoromethane	30.00	31.10	104	85 - 115	
1,2-Dichloroethane-d4	30.00	28.72	95.7	70 - 120	
Toluene-d8	30.00	29.09	97.0	85 - 120	

038

ANALYSIS DATA SHEET

VEP4-GW25D-0914

Laboratory: Empirical Laboratories, LLC SDG: 1409188
Client: CH2M Hill, Inc. Project: NTR Vieques East SWMU 20
Matrix: Water Laboratory ID: 1409188-02 File ID: 091880JB.D
Sampled: 09/23/14 12:40 Prepared: 10/01/14 15:01 Analyzed: 10/01/14 15:01
Solids: Preparation: 5030B Dilution: 2
Batch: 4J01009 Sequence: 4J27503 Calibration: 4J27001 Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.500	1.00	2.00	U
156-59-2	cis-1,2-Dichloroethene		0.500	1.00	2.00	U
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene	**1.50**	0.500	1.00	2.00	JB
79-01-6	Trichloroethene	**101**	0.200	0.400	1.00	B
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.09	100	75 - 120	
Dibromofluoromethane	30.00	31.00	103	85 - 115	
1,2-Dichloroethane-d4	30.00	29.17	97.2	70 - 120	
Toluene-d8	30.00	29.15	97.2	85 - 120	

039

ANALYSIS DATA SHEET

VEP4-GW24-0914

Laboratory: Empirical Laboratories, LLC SDG: 1409188
Client: CH2M Hill, Inc. Project: NTR Vieques East SWMU 20
Matrix: Water Laboratory ID: 1409188-03 File ID: 091880JB.D
Sampled: 09/23/14 14:30 Prepared: 10/01/14 15:26 Analyzed: 10/01/14 15:26
Solids: Preparation: 5030B Dilution: 2
Batch: 4J01009 Sequence: 4J27503 Calibration: 4J27001 Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene	**1.15**	0.500	1.00	2.00	JB
156-59-2	cis-1,2-Dichloroethene	**0.719**	0.500	1.00	2.00	JB
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene	**5.87**	0.500	1.00	2.00	B
79-01-6	Trichloroethene	**334**	0.200	0.400	1.00	B
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.12	100	75 - 120	
Dibromofluoromethane	30.00	30.98	103	85 - 115	
1,2-Dichloroethane-d4	30.00	29.75	99.2	70 - 120	
Toluene-d8	30.00	29.66	98.9	85 - 120	

040

ANALYSIS DATA SHEET

VEP4-GW24P-0914

Laboratory: Empirical Laboratories, LLC | SDG: 1409188
Client: CH2M Hill, Inc. | Project: NTR Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1409188-04 | File ID: 09180604D.D
Sampled: 09/23/14 14:35 | Prepared: 10/01/14 16:24 | Analyzed: 10/01/14 16:24
Solids: | Preparation: 5030B | Dilution: 2
Batch: 4101009 | Sequence: 4127503 | Calibration: 4227001 | Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene	1.29	0.500	1.00	2.00	JB
156-59-2	cis-1,2-Dichloroethene	0.648	0.500	1.00	2.00	JB
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene	5.33	0.500	1.00	2.00	B
79-01-6	Trichloroethene	317	0.200	0.400	1.00	B
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.69	99.0	75 - 120	
Dibromofluoromethane	30.00	30.88	103	85 - 115	
1,2-Dichloroethane-d4	30.00	29.57	98.6	70 - 120	
Toluene-d8	30.00	29.28	97.6	85 - 120	

E11

ANALYSIS DATA SHEET

VEP4-EB01-092314-GW

Laboratory: Empirical Laboratories, LLC | SDG: 1409188
Client: CH2M Hill, Inc. | Project: NTR Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1409188-05 | File ID: 09180605A.D
Sampled: 09/23/14 15:40 | Prepared: 10/01/14 10:58 | Analyzed: 10/01/14 10:58
Solids: | Preparation: 5030B | Dilution: 1
Batch: 4101006 | Sequence: 4127502 | Calibration: 4204002 | Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.12	93.7	75 - 120	
Dibromofluoromethane	30.00	30.94	103	85 - 115	
1,2-Dichloroethane-d4	30.00	29.89	99.6	70 - 120	
Toluene-d8	30.00	29.94	99.8	85 - 120	

E12

ANALYSIS DATA SHEET

VEP4-TB-092314

Laboratory: Empirical Laboratories, LLC | SDG: 1409188
Client: CH2M Hill, Inc. | Project: NTR Vieques East SWMU 20
Matrix: Water | Laboratory ID: 1409188-06 | File ID: 09180606A.D
Sampled: 09/23/14 15:45 | Prepared: 10/01/14 10:58 | Analyzed: 10/01/14 11:56
Solids: | Preparation: 5030B | Dilution: 1
Batch: 4101006 | Sequence: 4127502 | Calibration: 4204002 | Instrument: MS-VOA4

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	27.12	90.4	75 - 120	
Dibromofluoromethane	30.00	31.27	104	85 - 115	
1,2-Dichloroethane-d4	30.00	30.15	100	70 - 120	
Toluene-d8	30.00	29.25	97.5	85 - 120	

E13

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 1409188 LAB: Empirical

SITE NAME: Vieques SWMU20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? |_|_ __

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? |_|_ __

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? |_|_ __

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. **VOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? |_|_ __

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? |_|_ __

1.3 Sample Conditions/Problems

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ✓ [ ] ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

See case narrative - trip blank had air bubbles

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ ✓ ___

A 9/23/14 & 9/25 & 10/1/14

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water ✓ ___ ___

b. Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water ✓ ___ ___

b. Soil [ ] ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. ✓ ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? [ ] ___ ✓

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank, Table 2. [ ] ✓ ___

If yes, were samples reanalyzed? [ ] ___ ✓

Were method blanks reanalyzed? [ ] ___ ✓

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? [ ] ✓ ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. ✓ ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water [✓] ___ ___

B. Soil [ ] ___ ___

C. Med Soil [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). [✓] ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? [ ] ___ ___

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. [ ] ___ ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent) NW MS/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? [ ] ___ ___

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? [ ] ___ ___

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month (page 8000C, section 9.5.1))

a. Water [ ] ___ ___

b. Waste [ ] ___ ___

c. Soil/Solid [ ] ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C Sect 9.7)for each matrix. [ ] ___ ___

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. [ ] ___ ___

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? ✓ ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? ✓ ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? ✓ ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? ✓ ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ✓ ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ✓ ___ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

VEP4-TB01-092314 MU@

VEP4-EB01-092314-GW MU@

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ✓ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ✓ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ✓ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ✓ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ✓ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ✓ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ✓ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ✓ ___

9.7 Have the appropriate number of significant figures (two) been reported? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ✓ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates ___ ___ ✓

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ✓ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ___ ___ ✓

c. Blanks ✓ ___ ___

d. Laboratory Control Samples ✓ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? ✓ ___ ___

YES NO N/A

Resolution? ✓ ___ ___

Peak shape? ✓ ___ ___

Full-scale graph (attenuation)? ✓ ___ ___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? ✓ ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? ✓ ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ✓ ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? ✓ ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

NO TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present, and do listed TICs include scan number or retention time, estimated concentration and a qualifier? ___ ___ ✓

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate ___ ___ ✓

b. Blanks ___ ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? ___ ___ ✓

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? ___ ___ ✓

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? ___ ___ ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? ___ ✓ ___

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? ✓ ___ ___

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? ✓ ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? ✓ ___ ___

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39) qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? ✓ ___ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. ✓ ___ ___

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? ✓ ___ ___

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) ___ ✓ ___

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? ☑ ___ ___

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ☑ ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

_____

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? ☑ ___ ___

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). ☐ ✓ ___

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? ☐ ✓ ___

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds is section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? ☑ ___ ___

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit

(Attach additional sheets if necessary.)

ACTION: 1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.

2. Do not qualify non-detects when the associated IS are counts area > + 100%.

3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".

4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ☑ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ☑ ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

VEP4-GW24-0914
VEP4-GW24P-0914 > No Qual, See attached sheet

DataQual

VOA

FIELD DUPLICATE SAMPLE SUMMARY

Sample ID: VEPA-GW24-0914
Duplicate Sample ID: VEPA-GW24P-0914

Water: RPD>20%
Soil: RPD>30%

Compound	Sample Conc.	Dup. Sample Conc.	%RPD
1,1-dichloroethene	1.15	1.29	11
tetrachloroethene	5.87	5.33	10
trichloroethene	334	317	5
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!
			#DIV/0!

COMMENTS: Qualify all results with RPD >30% for soils and >20% for waters as estimated (J/UJ)

* one of the results below the LOD
if both results are below the LOD the results are not compared

039

Sample Delivery Group Case Narrative

Receipt Information:
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

The following issues were discovered with the COC and/or samples upon log-in:
1. Two HCL vials for sample VEP4-TB01-092314 (09/23/14 @1545) had pea-size headspace present. The custody seals were still intact on the vials.

Changes to the Revision:
This is an original submittal of the final report package.

Analytical Information:
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample preparation and dilution information is provided within the final results report and at the beginning ot each form set. The following information is provided specific to individual methods:

SW8260B:
Note –Samples 1409188-01, -02, -03, and -04 were analyzed at a 2x only due to the sample foaming during screening. No lower analyses were able to be performed.

The following were analyzed after the 12-hour tune criteria:
4J01006-BSD1 was analyzed 12 hours 9 minutes after the associated tune standard

No additional anomalies or deviations are noted.

040

ELECTRONIC CHAIN OF CUSTODY RECORD

EMPIRICAL 1409188 — JTC 9/25/14

phone: 615-345-1115

C.O.C. 20140922-GW EMP-01

PLEASE PRINT

Report to: Company Name: CH2MHILL Address: 15010 Conference Dr. ; 200 Chantilly, VA 20151 Attn: Mike Zamboni Phone: 703.376.5301 Fax: 703.376.5801

Invoice to: Company Name: See Contact Address: Attn: Phone: Fax:

Project Name/Number: not required
Purchase Order Number: 955530
Sampler (Print): not required
Sampler (Signature): not required

Date Shipped: 9/24/14
Carrier: FedEx
Waybill No.: 771256937618
Comments:

Sample Identification	Location	Date Collected	Time Collected	Date Rec.	Time Rec.	No. of Containers	Aq	Sed	Soil	GW	Analysis Requested/Method Number	
VEP4-GW32-0914	MW-32	9/23/14	10:20	AST		3				✓	X	MW-32
VEP4-GW25D-0914	MW-25D	9/23/14	12:40	AST		3				✓	X	MW-25D
VEP4-GW24-0914	MW-24	9/23/14	14:30	AST		3				✓	X	MW-24
VEP4-GW24P-0914		9/23/14	14:35	AST		3				✓	X	equipment blank
VEP4-EB01-092314-GW	QC	9/23/14	15:40	AST		3	✓				X	trip blank
VEP4-TB01-092314	QC	9/23/14	15:45	AST		2	✓				X	

Shuttle Temperature:

Turnaround Required: Check one: ☐ Same 28 days ☐ 24-48 Hrs ☐ One week ☐ Other

Sample Disposal: ☐ Return to client ☐ Disposal by Lab (Fees may accrue) ☐ Archive for ___ months — not applicable

Relinquished by sampler: Date 9/24/14 Time 6PM
Received by: Date Time
Relinquished by: Date Time
Received by: Date 9/25/14 Time 0840
Relinquished by: Date Time
Received by: Date Time

White: Return to client with report — Yellow: Laboratory Copy — Pink: Sampler

Note: The first sampled date of the ARF will be used as the COC number unless indicated otherwise.

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II. EMPIRICAL LABORATORIES COOLER RECEIPT FORM

Cooler Received/Opened On: 9/25/14 @0840 Workorders 1409188

1. Tracking # 7818 (last 4 digits, FedEx)
   Courier: FedEx
2. Temperature of rep. sample or temp blank when opened: 2.9 °C + correction factor(-0.3) = 2.6
3. If item #2 temperature is 0°C or less, was this representative sample or temp blank frozen? YES NO NA
4. Were custody seals on outside of cooler? YES NO NA
   If yes, how many and where: 2. Front + back
5. Were the seals intact, signed, and dated correctly? YES NO NA
6. Were custody papers inside cooler? YES NO NA
   I certify that I opened the cooler and answered questions 1-6 (initial/date) JTC 9/25/14
7. Were custody seals on containers: YES NO and intact YES NO NA
   Were those signed and dated correctly? YES NO NA
8. Packing material used? Bubblewrap Plastic bags Peanuts Vermiculite Foam Insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry ice Other None
10. Did all containers arrive in good condition (unbroken)? YES NO NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES NO NA
12. Did all container labels and tags agree with custody papers? YES NO NA
13. a. Were VOA vials received? YES NO NA
    b. Was there observable headspace present in any VOA vial (>5mm-6mm)? YES NO NA
14. Was there a Trip Blank in this cooler (custody seals present/intact)? YES NO NA Comments Custody seals intact
    If multiple coolers, sequence # ___
    I certify that I unloaded the cooler and answered questions 7-14 (initial/date) JTC 9/25/14
15. a. On prep'd bottles, did pH test strips suggest preservation reached the correct pH level? YES NO NA
    b. Did the bottle labels indicate that the correct preservatives were used? YES NO NA
16. Was residual chlorine present? YES NO NA
    I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial/date) JTC 9/25/14
17. Were custody papers properly filled out (ink, signed, etc)? YES NO NA
18. Did you sign the custody papers in the appropriate place? YES NO NA
19. Were correct containers used for the analysis requested? YES NO NA If not, PM notified? YES NO NA
20. Was sufficient amount of sample sent in each container? YES NO NA If not, PM notified? YES NO NA
21. Were there Non-Conformance issues at login? YES NO NCR# ___
    I certify that I entered this project into LIMS and answered questions 17-21 (initial/date) JTC 9/25/14
    I certify that I attached a label with the unique LIMS number to each container (initial/date) JTC 9/25/14
    I certify that I notified the laboratory of any short holding time or BUSH parameters (initial/date) JTC 9/25/14

V:\Standard Operating Procedures\Current SOP File Directory\0510_021_20140729_CRF.doc

042

DataQual
Environmental Services, LLC

CH2M HILL
5701 Cleveland Street
Suite 200
Virginia Beach, VA 23462

November 11, 2014
SDG# 1409231, Empirical
Vieques Island, Puerto Rico- SWMU 20

Dear Ms. Dean,

The following Data Validation report is provided as requested for the parameters noted in the table below for SDG # 1409231. The data validation was performed in accordance with SW846 methods 8260B for volatiles, the Region II Standard Operating Procedures for the Validation of Organic Data Acquired Using SW-846 Methods (8260B-Rev 2, August 2008- SOP #HW-24), and professional judgment. All areas of concern are discussed in the body of the report and a summary of data qualifications is provided.

Sample ID	Lab ID	Matrix	VOA
VEP4-GW28D-0914	1409231-01	water	X
VEP4-GW31-0914	1409231-02	water	X
VEP4-GW24D-0914	1409231-03	water	X
VEP4-EB01-092614-GW	1409231-04	water	X
VEP4-GW33-0914	1409231-05	water	X
VEP4-EB02-092614-GW	1409231-06	water	X
VEP4-TB01-092614	1409231-07	water	X

The following quality control samples were provided with this SDG: Sample VEP4-TB01-092614- trip blank and samples VEP4-EB01-092614-GW and VEP4-EB02-092614-GW - equipment blanks.

The samples were evaluated based on the following criteria:

- Data Completeness *
- Sample Condition *
- Technical Holding Times *
- GC/MS Tuning *
- Initial/Continuing Calibrations *
- Blanks *
- Internal Standards *
- Surrogate Recoveries *
- Laboratory Control Samples *
- Matrix Spike Recoveries NA
- Matrix Duplicate RPDs NA
- Field Duplicates NA

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001

- Identification/Quantitation *
- Reporting Limits *
- Tentatively Identified Compounds NA

* - indicates that qualifications were not required based on this criteria

Overall Evaluation of Data/Potential Usability Issues

A summary of qualifications applied to the sample results are noted below for the fractions validated. Specific details regarding qualification of the data are addressed in the Specific Evaluation section of this narrative. If an issue is not addressed there were no actions required based on unmet quality criteria. When more than one qualifier is associated with a compound/analyte the validator has chosen the qualifier that best indicates possible bias in the results and flagged the data accordingly. However, information regarding all quality control issues is provided in the body of the report and on the qualification summary page. Please note that when a compound or analyte is flagged due to blank contamination the BL qualifier code takes precedence over all other qualifier codes except a code that explains rejected data.

VOA

No qualifications were required to the data.

Specific Evaluation of Data

Data Completeness

The SDG was received complete and intact. Resubmissions were not required.

Technical Holding Times

According to chain of custody records, sampling was performed on 9/26/14 and samples were received at the laboratory 9/30/14. All sample preparation and analysis was performed within Region II and/or method holding time requirements.

A summary of qualifications required is provided on the following page. Please do not hesitate to contact DataQual ES with any questions regarding this validation report.

Sincerely,

Laura Maschhoff
President

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1409231

002

Summary of Data Qualifications

VOA

Sample ID	Compound	Results	Q flag	Q Code
no qualifications				

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1409231

003

Glossary of Qualification Flags and Abbreviations

Qualification Flags (Q-Flags)

U not detected above the reported sample quantitation limit
J estimated value
UJ reported quantitation limit is qualified as estimated
N analyte has been tentatively identified
JN analyte has been tentatively identified, estimated value
R result is rejected; the presence or absence of the analyte cannot be verified

Method/Preparation/Field QC Blank Qualification Flags (Q-Flags)

Organic Methods

NA The sample result for the blank contaminant is greater than the RL (2X sample RL for common laboratory contaminants) when the blank value is less than the RL. The sample result for the blank contaminant is not qualified with any blank qualifiers.

U* The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is qualified as non-detect U at the reported concentration.

RL** The sample result for the blank contaminant is less than the RL (2X sample RL for common laboratory contaminants) but greater than the MDL when the blank value is less than the RL. The sample result for the blank contaminant is changed to the RL and qualified as non-detect U.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Inorganic Methods

ICB/CCB/PB Action:

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the ICB/CCB/PB result is less or greater than the RL.

CH2M HILL
SWMU 20- Vieques, Puerto Rico
SDG# 1409231

004

Glossary of Qualification Flags and Abbreviations, continued

R - Sample result is greater than the RL and less than the ICB/CCB/PB value when the ICB/CCB/PB value is greater than the RL.

J - Sample result is greater than the ICB/CCB/PB value but less than 10X the ICB/CCB/PB value when ICB/CCB/PB value is greater than the RL.

J/UJ - Sample result is less than 10X RL when blank result is below the negative RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

Field QC Blank action:

Note – Use field blanks to qualify data only if field blank results are greater than prep blank results.

Do not use rinsate blank associated with soils to qualify water samples and vice versa.

No Action - The sample result is greater than the RL and greater than ten times (10X) the blank value.

U - The sample result is greater than or equal to the MDL but less than or equal to the RL, result is reported as non-detect at the RL* or at the reported concentration**, when the FB result is less or greater than the RL.

R - Sample result is greater than the RL and less than the FB value when the FB value is greater than the RL.

J - Sample result is greater than the FB value but less than 10X the FB value when FB value is greater than the RL.

* This guideline is used when the laboratory is reporting non-detects to the MDL. ** This guideline is used when the laboratory is reporting non-detects to the RL.

General Abbreviations

RL	reporting limit
PQL	practical quantitation limit
IDL	instrument detection limit
MDL	method detection limit
CRDL	contract required detection limit
CRQL	contract required quantitation limit
+	positive result
-	non-detect result

QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report
%SOL	High moisture content

ANALYSIS DATA SHEET

VEP4-GW28D-0914

Laboratory: Empirical Laboratories, LLC SDG: 1409231
Client: CH2M Hill, Inc. Project: NTR Vieques East SWMU 20
Matrix: Water Laboratory ID: 1409231-01 File ID: 09231018.D
Sampled: 09/26/14 09:45 Prepared: 10/03/14 13:46 Analyzed: 10/03/14 13:46
Solids: Preparation: 5030B Dilution: 2
Batch: 4103009 Sequence: 4127911 Calibration: 4272001 Instrument: MS-VOA6

CAS NO	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.500	1.00	2.00	U
156-59-2	cis-1,2-Dichloroethene		0.500	1.00	2.00	U
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.500	1.00	2.00	U
79-01-6	Trichloroethene	1.01	0.200	0.400	1.00	J
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.76	99.2	75 - 120	
Dibromofluoromethane	30.00	31.33	104	85 - 115	
1,2-Dichloroethane-d4	30.00	29.94	99.8	70 - 120	
Toluene-d8	30.00	29.74	99.1	85 - 120	

11/18/14

ANALYSIS DATA SHEET

VEP4-GW3D-0914

Laboratory: Empirical Laboratories, LLC SDG: 1409231
Client: CH2M Hill, Inc. Project: NTR Vieques East SWMU 20
Matrix: Water Laboratory ID: 1409231-02 File ID: 09231076.D
Sampled: 09/26/14 11:35 Prepared: 10/03/14 14:12 Analyzed: 10/03/14 14:12
Solids: Preparation: 5030B Dilution: 2
Batch: 4103009 Sequence: 4127911 Calibration: 4272001 Instrument: MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.500	1.00	2.00	U
156-59-2	cis-1,2-Dichloroethene		0.500	1.00	2.00	U
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.500	1.00	2.00	U
79-01-6	Trichloroethene		0.200	0.400	1.00	U
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.83	99.5	75 - 120	
Dibromofluoromethane	30.00	31.16	104	85 - 115	
1,2-Dichloroethane-d4	30.00	29.67	98.8	70 - 120	
Toluene-d8	30.00	29.28	97.6	85 - 120	

11/18/14

ANALYSIS DATA SHEET

VEP4-GW24D-0914

Laboratory:	Empirical Laboratories, LLC	SDG:	1409231
Client:	CH2M Hill, Inc.	Project:	NTR Vieques East SWMU 20
Matrix:	Water	Laboratory ID: 1409231-03	File ID: 09231103B.D
Sampled:	09/26/14 13:15	Prepared: 10/03/14 14:41	Analyzed: 10/03/14 14:41
Solids:		Preparation: 5030B	Dilution: 2

Batch: 4J03009 Sequence: 4J27911 Calibration: 4272001 Instrument: MS-VOA6

CAS NO	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.500	1.00	2.00	U
156-59-2	cis-1,2-Dichloroethene		0.500	1.00	2.00	U
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene	1.52	0.500	1.00	2.00	JP
79-01-6	Trichloroethene	98.2	0.200	0.400	1.00	D
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.28	97.6	75 - 120	
Dibromofluoromethane	30.00	31.17	104	85 - 115	
1,2-Dichloroethane-d4	30.00	28.68	95.6	70 - 120	
Toluene-d8	30.00	29.43	98.1	85 - 120	

LM 111814

ANALYSIS DATA SHEET

VEP4-EB01-092614-GW

Laboratory:	Empirical Laboratories, LLC	SDG:	1409231
Client:	CH2M Hill, Inc.	Project:	NTR Vieques East SWMU 20
Matrix:	Water	Laboratory ID: 1409231-04	File ID: 09231104A.D
Sampled:	09/26/14 14:30	Prepared: 10/03/14 11:56	Analyzed: 10/03/14 11:56
Solids:		Preparation: 5030B	Dilution: 1

Batch: 4J03009 Sequence: 4J27911 Calibration: 4272001 Instrument: MS-VOA6

CAS NO	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.03	100	75 - 120	
Dibromofluoromethane	30.00	30.93	103	85 - 115	
1,2-Dichloroethane-d4	30.00	31.53	105	70 - 120	
Toluene-d8	30.00	29.64	98.8	85 - 120	

LM 111814

ANALYSIS DATA SHEET

VEP4-GW32-0914

Laboratory:	Empirical Laboratories, LLC	SDG:	1409231
Client:	CH2M Hill, Inc.	Project:	NTR Vieques East SWMU 20
Matrix:	Water	Laboratory ID: 1409231-02	File ID: 09231105B.D
Sampled:	09/26/14 17:20	Prepared: 10/03/14 15:08	Analyzed: 10/03/14 15:08
Solids:		Preparation: 5030B	Dilution: 2

Batch: 4J03009 Sequence: 4J27911 Calibration: 4272001 Instrument: MS-VOA6

CAS NO	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.500	1.00	2.00	U
156-59-2	cis-1,2-Dichloroethene		0.500	1.00	2.00	U
156-60-5	trans-1,2-Dichloroethene		0.500	1.00	2.00	U
127-18-4	Tetrachloroethene		0.500	1.00	2.00	U
79-01-6	Trichloroethene		0.200	0.400	1.00	U
75-01-4	Vinyl chloride		0.280	0.400	1.00	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.68	98.9	75 - 120	
Dibromofluoromethane	30.00	30.68	102	85 - 115	
1,2-Dichloroethane-d4	30.00	29.51	98.4	70 - 120	
Toluene-d8	30.00	29.56	98.5	85 - 120	

LM 111814

ANALYSIS DATA SHEET

VEP4-EB02-092614-GW

Laboratory:	Empirical Laboratories, LLC	SDG:	1409231
Client:	CH2M Hill, Inc.	Project:	NTR Vieques East SWMU 20
Matrix:	Water	Laboratory ID: 1409231-06	File ID: 09231106A.D
Sampled:	09/26/14 18:00	Prepared: 10/03/14 12:23	Analyzed: 10/03/14 12:23
Solids:		Preparation: 5030B	Dilution: 1

Batch: 4J03009 Sequence: 4J27911 Calibration: 4272001 Instrument: MS-VOA6

CAS NO	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.32	101	75 - 120	
Dibromofluoromethane	30.00	31.68	106	85 - 115	
1,2-Dichloroethane-d4	30.00	30.93	103	70 - 120	
Toluene-d8	30.00	29.24	97.5	85 - 120	

LM 111814

ANALYSIS DATA SHEET

VEPA-T001-092014

Laboratory:	Empirical Laboratories LLC		SDG:	1409231	
Client:	CH2M Hill, Inc.		Project:	NTR Vieques East SWMU 20	
Matrix:	Water	Laboratory ID:	1409231-05	File ID:	0923107A.D
Sampled:	09/26/14 13:40	Prepared:	10/03/14 11:01	Analyzed:	10/03/14 11:01
Solids:		Preparation:	5030B	Dilution:	1
Batch:	4303009	Sequence:	4327911	Calibration:	4272001	Instrument:	MS-VOA6

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
75-35-4	1,1-Dichloroethene		0.250	0.500	1.00	U
156-59-2	cis-1,2-Dichloroethene		0.250	0.500	1.00	U
156-60-5	trans-1,2-Dichloroethene		0.250	0.500	1.00	U
127-18-4	Tetrachloroethene		0.250	0.500	1.00	U
79-01-6	Trichloroethene		0.100	0.200	0.500	U
75-01-4	Vinyl chloride		0.140	0.200	0.500	U

Total Target Analytes Reported: 6 Project Analytes: 6

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.67	102	75 - 120	
Dibromofluoromethane	30.00	31.04	103	85 - 115	
1,2-Dichloroethane-d4	30.00	29.79	99.3	70 - 120	
Toluene-d8	30.00	30.05	100	85 - 120	

1409231 Summ Package

YES NO N/A

I. **PACKAGE COMPLETENESS AND DELIVERABLES**

CASE NUMBER: 1409231 LAB: Empirical

SITE NAME: Vieques SWMU 20

1.0 Data Completeness and Deliverables

1.1 Has all data been submitted in CLP deliverable format or CLP Forms Equivalent? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

2.0 Cover Letter, SDG Narrative

2.1 Is a laboratory narrative, and/or cover letter signed release present? ✓ ___ ___

2.2 Are case number and SDG number(s) contained in the narrative or cover letter? ✓ ___ ___

ACTION: If not, note the effect on review of the data in the Data Assessment narrative.

II. **VOLATILE ANALYSES**

1.0 Traffic Reports and Laboratory Narrative

1.1 Are the Traffic Reports, and/or Chain of Custodies from the field samplers present for all samples sign release present? ✓ ___ ___

ACTION: If no, contact the laboratory/sampling team for replacement of missing or illegible copies.

1.2 Is a sampling trip report present (if required)? ✓ ___ ___

1.3 Sample Conditions/Problems

YES NO N/A

1.3.1 Do the Traffic Reports, Chain of Custodies, or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ ✓ ___

ACTION: If all the VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R". See cust narr - no qual - vials available for rerun

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50%-90% water, all data should be flagged as estimated ("J"). If a soil sample, other than TCLP, contains more than 90% water, flag all positive results "J" and all non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon receipt at the laboratory and the temperature of the cooler was elevated (>10°C), flag all positive results "J" and all non-detects non"UJ".

2.0 Holding Times

2.1 Have any volatile holding times, determined from date of collection to date of analysis, been exceeded? ___ ✓ ___

A 9/26 R 9/30 A 10/3

The maximum holding time for aqueous samples is 14 days.

The maximum holding time for soils non aqueous samples is 14 days.

NOTE: If unpreserved, aqueous samples maintained at 4°C for aromatic hydrocarbons analysis must be analyzed within 7 days. If preserved with HCL acid to a pH<2 and stored at 4°C, then aqueous samples must be analyzed within 14 days from time of collection. For non-aqueous samples for volatile components that are frozen (less than 7°C) or are properly cooled (4°C ± 2°C) and perserved with $NaHSO_4$, the maximum holding time is 14 days from sample collection. If

YES NO N/A

uncertain about preservation, contact the laboratory /sampling team to determine whether or not samples were preserved.

ACTION: Qualify sample results according to Table 1:

Table 1. Holding Time Actions for Trace Volatile Analysis

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤7 days	No qualifications	
	No	> 7 days	J	R
	Yes	≤14 days	No qualifications	
	Yes	> 14 days	J	R
Non Aqueous	No	≤ 14 days	J	R
	Yes	≤ 14 days	No qualifications	
	Yes/No	> 14 days	J	R

3.0 Surrogate Recovery (CLP Form II Equivalent)

3.1 Have the volatile surrogate recoveries been listed on Surrogate Recovery forms for each of the following matrices:

a. Water ✓ ___ ___

b. Soil [ ] ___ ___

3.2 If so, are all the samples listed on the appropriate Surrogate Recovery forms for each matrix:

a. Water ✓ ___ ___

b. Soil [ ] ___ ___

ACTION: If large errors exist, deliverables are unavailable or information is missing, document the effect(s) in Data

YES NO N/A

Assessments and contact the laboratory/project officer/appropriate official for an explanation /resubmittal, make any necessary corrections and document effect in the Data Assessment.

3.3 Were the surrogate recovery limits followed per Table 2. If Table 2 criteria were not followed, the laboratory may use in-house performance criteria (per SW-846, Method 8000C, section 9.7). Other compounds may be used as surrogates, depending upon the analysis requirements. lab ✓ ___ ___

Table 2. Surrogate Spike Recovery Limits for Water and Soil/Sediments

DMC	Recovery Limits (%)Water	Recovery Limits Soil/Sediment
4-Bromofluorobenzene	80-120	70-130
Dibromofluoromethane	80-120	70-130
Toluene-d_8	80-120	70-130
Dichloroethane-d_4	80-120	70-130

Note: Use above table if laboratory did not provide in house recovery criteria.

Note: Other compounds may be used as surrogated depending upon the analysis requirements.

3.4 Were outliers marked correctly with an asterisk? ___ ___ ✓

ACTION: Circle all outliers with a red pencil.

3.5 Were one or more volatile surrogate recoveries out of specification for any sample or method blank, Table 2. ___ ✓ ___

If yes, were samples reanalyzed? ___ ___ ✓

Were method blanks reanalyzed? ___ ___ ✓

YES NO N/A

ACTION: If all surrogate recoveries are > 10% but 1 or more compounds do not meet method specifications:

1. Flag all positive results as estimated ("J").
2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.
3. If recoveries are greater than the upper acceptance limit, do not qualify non-detects, but qualify positive results as estimated "J".

If any surrogate has a recovery of < 10%:

1. Positive results are qualified with ("J").
2. Non-detects for that should be qualified as unusable ("R").

NOTE: Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. The basic concern is whether the blank problems represent an isolated problem with the blank alone or whether there is a fundamental problem with the analytical process. If one or more samples in the batch show acceptable surrogate recoveries, the reviewer may choose the blank problem to be an isolated occurrence.

3.6 Are there any transcription/calculation errors between raw data and reported data? ___ ✓ ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

4.0 Laboratory Control Sample(Form III/Equivalent)

4.1 Is the LCS prepared, extracted, analyzed, and reported once for every 20 field samples of a similar matrix, per SDG. ✓ ___ ___

YES NO N/A

Note: LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume.

ACTION: If any Laboratory Control Sample data are missing, call the lab for explanation /resubmittals. Make note in the data assessment.

4.2 Were the Laboratory Control Samples analyzed at the required frequency for each of the following matrices:

A. Water ✓ ___ ___

B. Soil ___ ___ ___

C. Med Soil ___ ___ ___

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

4.3 Have in house LCS recovery limits been developed (Method 8000C, Sect 9.7). ✓ ___ ___

4.4 If in house limits are not developed, are LCS acceptance recovery limits between 70 - 130% (Method 8000c Sect 9.5)? ___ ___ ✓

4.5 Were one or more of the volatile LCS recoveries outside the in house laboratory recovery criteria for spiked analytes? If in house limits are not present use 70 - 130% recovery limits. ___ ✓ ___

YES NO N/A

Table 3. LCS Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

5.0 Matrix Spikes(Form III or equivalent) NO MS/MSD

5.1 Are all data for matrix spike and matrix duplicate or matrix spike duplicate (MS/MD or MS/MSD) present and complete for each matrix? ___ ___ ✓

NOTE: The laboratory should use one matrix spike and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If the sample is not expected to contain target analytes, a MS/MSD should be analyzed (SW-846, Method 8260B, Sect 8.4.2).

5.2 Have MS/MD or MS/MSD results been summarized on modified CLP Form III? ___ ___ ✓

ACTION: If any data are missing take action as specified in section 3.2 above.

5.3 Were matrix spikes analyzed at the required frequency for each of the following matrices? (One MS/MD, MS/MSD or laboratory replicate must be performed for every 20 samples

YES NO N/A

of similar matrix or concentration level. Laboratories analyzing one to ten samples per month are required to analyze at least one MS per month (page 8000C, section 9.5.1)

a. Water ___ ___ ✓

b. Waste ___ ___ ✓

c. Soil/Solid ___ ___ ✓

Note: The LCS is spiked with the same analytes at the same concentrations as the matrix spike (SW-846 8000C, Section 9.5). If different make note in data assessment. Matrix/LCS spiking standards should be prepared from volatile organic compounds which are representative of the compounds being investigating. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The concentration of the LCS should be determined as described SW-Method 8000C Section 9.5.

ACTION: If any MS/MD, MS/MSD or replicate data are missing, take the action specified in 3.2 above.

5.4 Have in house MS recovery limits been developed (Method 8000C, Sect 9.7)for each matrix. ___ ___ ✓

5.5 Were one or more of the volatile MS/MSD recoveries outside of the in-house laboratory recovery criteria for spiked analytes? If none are present, then use 70-130% recovery as per SW-846, 8000C, Sect. 9.5.4. ___ ___ ✓

ACTION: Circle all outliers with a red pencil.

NOTE: If any individual % recovery in the MS (or MSD) falls outside the designated range for recovery the reviewer should determine if there is a matrix effect. A matrix effect is indicated if the LCS data are within limits but the MS data exceeds the limits.

YES NO N/A

NOTE: No qualification of data is necessary on MS and MSD data alone. However, using informed professional judgement, the data reviewer may use MS and MSD results in conjunction with other QC criteria to determine the need for some qualification.

Note: The data reviewer should first try to determine to what extent the results of the MS and MSD affect the associated data. This determination should be made with regard to he MS and MSD sample itself, as well as specific analytes for all samples associated with the MS and MSD.

Note: In those instances where it can be determine that the results of the MS and MSD affect only the sample spiked, limit qualification to this sample only. However, it may be determined through the MS and MSD results that a laboratory is having a systematic problem in the analysis of one or more analytes that affect all associated samples, and the reviewer must use professional judgement to qualify the data from all associated samples.

Note: The reviewer must use professional judgement to determine the need for qualification of non-spiked compounds.

ACTION: Follow criteria in Table 4 when professional judgement deems qualification of sample.

Table 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Actions for Volatile Analysis

Criteria	Action	
	Detected Spiked Compounds	Non-Detected Spiked Compounds
%R > Upper Acceptance Limit	J	No Qualifiers
%R < Lower Acceptance Limit	J	UJ
Lower Acceptance Limit ≤ %R	No Qualifications	

YES NO N/A

6.0 Blank (CLP Form IV Equivalent)

6.1 Is the Method Blank Summary form present? ✓ ___ ___

6.2 Frequency of Analysis: Has a method blank been analyzed for every 20 (or less) samples of similar matrix or concentration or each extraction batch? ✓ ___ ___

6.3 Has a method blank been analyzed for each GC/MS system used ? ✓ ___ ___

ACTION: If any blank data are missing, take action as specified above (section 3.2). If blank data is not available, reject ® all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

6.4 Chromatography: review the blank raw data - chromatograms, quant reports or data system printouts.

Is the chromatographic performance (baseline stability) for each instrument acceptable for volatile organic compounds? ✓ ___ ___

7.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

7.1 Do any method/instrument/reagent blanks have positive results for target analytes and/or TICs? When applied as described below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for percent moisture where necessary. ___ ✓ ___

YES NO N/A

7.2 Do any field/rinse blanks have positive volatile organic compound results? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, or calibration QC problems.

ACTION: Follow the directions in Table 5 below to qualify sample results due to contamination. Use the largest value from all the associated blanks.

VEP4-TB01-092614 MW®
VEP4-EB01-092614-GW MW®
VEP4-EB02-092614-GW MW®

Table 5. Volatile Organic Analysis Blank Contamination Criteria

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, Instrument**	Detects	Not detected	No qualification
	< CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	> CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL and < blank contamination	Report the concentration for the sample with a U, or qualify the data as unusable R
		≥ CRQL and ≥ blank contamination	Use professional judgement
	= CRQL*	< CRQL	Report CRQL value with a U
		≥ CRQL	Use professional judgement
	Gross contam-ination	Detects	Qualify results as unusable R

* 2x the CRQL for methylene chloride, 2-butanone, and acetone

** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 ug/L.

NOTE: If gross blank contamination exists(e.g., saturated peaks, "hump-o-grams," "junk" peaks), all affected positive compounds in the associated samples should be qualified as unusable "R", due to interference. Non-detected volatile organic target compounds do not require qualification unless the contamination is so high that it interferes with the analyses of non-detected compounds.

YES NO N/A

7.3 Are there field/rinse/equipment blanks associated with every sample? ☑ ___ ___

ACTION: For low level samples, note in data assessment that there is no associated field/rinse/equipment blank. Exception: samples taken from a drinking water tap do not have associated field blanks.

8.0 GC/MS Apparatus and Materials

8.1 Did the lab use the proper gas chromatographic column(s) for analysis of volatiles by Method 8260B? Check raw data, instrument logs or contact the lab to determine what type of column(s) was (were) used. ☑ ___ ___

NOTE: For the analysis of volatiles, the method requires the use of 60 m. x 0.75 mm capillary column, coated with VOCOL(Supelco) or equivalent column. (see SW-846, page 8260B-7, section 4.9.2)

ACTION: If the specified column, or equivalent, was not used, document the effects in the Data Assessment. Use professional judgement to determine the acceptability of the data.

9.0 GC/MS Instrument Performance Check (CLP Form V Equivalent)

9.1 Are the GC/MS Instrument Performance Check forms present for Bromofluorobenzene (BFB), and do these forms list the associated samples with date/time analyzed? ☑ ___ ___

9.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? ☑ ___ ___

9.3 Has an instrument performance check solution (BFB)

YES NO N/A

been analyzed for every twelve hours of sample analysis per instrument?(see Table 4, SW-846, page 8260B-36) ☑ ___ ___

ACTION: List date, time, instrument ID, and sample analyses for which no associated GC/MS GC/MS tuning data are available.

ACTION: If the laboratory/project officer cannot provide missing data, reject ("R") all data generated outside an acceptable twelve hour calibration interval.

ACTION: If mass assignment is in error, flag all associated sample data as unusable, "R".

9.4 Have the ion abundances been normalized to m/z 95? ☑ ___ ___

9.5 Have the ion abundance criteria been met for each instrument used? ☑ ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, take action as specified in section 3.2.

9.6 Are there any transcription/calculation errors between mass lists and reported values? (Check at least two values but if errors are found, check more.) ___ ☑ ___

9.7 Have the appropriate number of significant figures (two) been reported? ☑ ___ ___

ACTION: If large errors exist, take action as specified in section 3.2.

9.8 Are the spectra of the mass calibration compounds acceptable. ☑ ___ ___

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

YES NO N/A

10.0 Target Analytes (CLP Form I Equivalent)

10.1 Are the Organic Analysis reporting forms present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate ☑ ___ ___

b. Matrix spikes and matrix spike duplicates ☐ ___ ☑

c. Blanks ☑ ___ ___

d. Laboratory Control Samples ☑ ___ ___

10.2 Are the reconstructed Ion Chromatograms, mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following?

a. Samples and/or fractions as appropriate ☑ ___ ___

b. Matrix spikes and matrix spike duplicates (Mass spectra not required) ☐ ___ ☑

c. Blanks ☑ ___ ___

d. Laboratory Control Samples ☑ ___ ___

ACTION: If any data are missing, take action specified in 3.2 above.

10.3 Is chromatographic performance acceptable with respect to:

Baseline stability? ☑ ___ ___

YES NO N/A

Resolution? [✓] ___ ___

Peak shape? [✓] ___ ___

Full-scale graph (attenuation)? [✓] ___ ___

Other:_____

ACTION: Use professional judgement to determine the acceptability of the data.

10.4 Are the lab-generated standard mass spectra of identified volatile compounds present for each sample? [✓] ___ ___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. If the lab does not generate their own standard spectra, make a note in the Data Assessment. If spectra are missing, contact the lab for missing spectra.

10.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [✓] ___ ___

10.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [✓] ___ ___

10.7 Do the relative intensities of the characteristic ions in the sample agree within ± 30% of the corresponding relative intensities in the reference spectrum? [✓] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected ("R"), flagged ("N") - Presumptive evidence of the presence of the compound) or changed to non detected ("U") at the calculated detection limit. In order to be

YES NO N/A

positively identified, the data must comply with the criteria listed in 9.6, 9.7, and 9.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

no TICs

11.0 Tentatively Identified Compounds (TIC) (CLP Form I/TIC Equivalent)

11.1 If Tentatively Identified Compound were required for this project, are all Tentatively Identified Compound reporting forms present; and do listed TICs include scan number or retention time, estimated concentration and a qualifier? [ ] ___ ___ ✓

NOTE: Add "N" qualifier to all TICs which have CAS number, if missing.

NOTE: Have the project officer/appropriate official check the project plan to determine if lab was required to identify non-target analytes (SW-846, page 8260B-23, Sect. 7.6.2).

11.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate [ ] ___ ___ ✓

b. Blanks [ ] ___ ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier only to analytes identified by a CAS#.

NOTE: If TICs are present in the associated blanks take action as specified in section 3.2 above.

YES NO N/A

11.3 Are any priority pollutants listed as TIC compounds (i.e., an BNA compound listed as a VOA TIC)? [ ] ___ ___ ✓

ACTION: 1. Flag with "R" any target compound listed as a TIC.

2. Make sure all rejected compounds are properly reported if they are target compounds.

11.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% (of the most abundant ion) also present in the sample mass spectrum? [ ] ___ ___ ✓

11.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ___ ✓

ACTION: Use professional judgement to determine acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R". (Common lab contaminants: CO_2(M/E 44), Siloxanes (M/E 73), Hexane, Aldol Condensation Products, Solvent Preservatives, and related byproducts).

12.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in organic analysis reporting form results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and average initial RRF/CF were used to calculate organic analysis reporting form result. Were any errors found? [ ] ___ ___ ✓

NOTE: Structural isomers with similar mass spectra, but insufficient GC resolution (i.e. percent valley between the two peaks > 25%) should be

YES NO N/A

reported as isomeric pairs. The reviewer should check the raw data to ensure that all such isomers were included in the quantitation (i.e., add the areas of the two coeluting peaks to calculate the total concentration).

12.2 Are the method CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? [✓] ___ ___

ACTION: If errors are large, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest detection limits are used (unless a QC accedence dictates the use of the higher detection limit from the diluted sample data). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original reporting form (if present) and substituting the data from the analysis of the diluted sample. Specify which organic analysis reporting form is to be used, then draw a red "X" across the entire page of all reporting forms that should not be used, including any in the summary package.

13.0 Standards Data (GC/MS)

13.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant Reports) present for initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.2 above.

14.0 GC/MS Initial Calibration (CLP Form VI Equivalent)

YES NO N/A

14.1 Are the Initial Calibration reporting forms present and complete for the volatile fraction? ✓

ACTION: If any calibration forms or standard raw data are missing, take action specified in section 3.2 above.

ACTION: If the percent relative standard deviation (% RSD) is > 20%, (8000C-39) qualify positive results for that analyte "J". When % RSD > 90%,. Qualify all positive results for that analyte "J" and all non-detects results for that analyte "R".

14.2 Are all average RRFs > 0.050? ✓

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list. If individual RRF values reported are below the listed values document in the Data Assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with red pencil.

ACTION: For any target analyte with average RRF < 0.05, or for the requirements for the 5 compounds in 14.2 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

14.3 Are response factors stable over the concentration range of the calibration. ✓

NOTE: (Method Requirement) For the following CCC compounds, the %RSD values must be ≤ 30.0%. If %RSD values reported are > 30.0% document in the Data Assessment.

YES NO N/A

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

ACTION: Circle all outliers with a red pencil.

ACTION: If the % RSD is > 20.0%, or > 30% for the 6 compounds in 14.3 above, qualify positive results for that analyte "J" and non-detects using professional judgement. When RSD > 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

14.4 Was the % RSD determined using RRF or CF? ✓

If no, what method was used to determine the linearity of the initial calibration? Document any effects to the case in the Data Assessment.

14.5 Are there any transcription/calculation errors in the reporting of RRF or % RSD? (Check at least two values but if errors are found, check more.) ✓

ACTION: Circle errors with a red pencil.

ACTION: If errors are large, take action as specified in section 3.2 above.

15.0 GC/MS Calibration Verification (CLP Form VII Equivalent)

YES NO N/A

15.1 Are the Calibration Verification reporting forms present and complete for all compounds of interest? ✓

15.2 Has a calibration verification standard been analyzed for every twelve hours of sample analysis per instrument? ✓

ACTION: List below all sample analyses that were not within twelve hours of a calibration verification analysis for each instrument used.

ACTION: If any forms are missing or no calibration verification standard has been analyzed twelve hours prior to sample analysis, take action as specified in section 3.2 above. If calibration verification data are not available, flag all associated sample data as unusable ("R").

15.3 Was the % D determined from the calibration verification determined using RRF or CF? ✓

If no, what method was used to determine the calibration verification? Document any effects to the case in the Data Assessment.

15.4 Do any volatile compounds have a % D (difference or drift) between the initial and continuing RRF or CF which exceeds 20% (SW-846, page 8260B-19, section 7.4.5.2). ✓

NOTE: (Method Requirement) For the following CCC compounds, the %D values must be ≤ 20.0%. If %D values reported are > 20.0% document in the Data Assessment.

1,1-Dichloroethene
Chloroform
1,2-Dichloropropane
Toluene
Ethylbenzene
Vinyl chloride

YES NO N/A

ACTION: Circle all outliers with a red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated, "J". When %D is above 90%, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

15.5 Do any volatile compounds have a RRF < 0.05? ✓

NOTE: (Method Requirement) For SPCC compounds, the individual RRF values must be ≥ the values in the following list for each calibration verification. If average RRF values reported are below the listed values document in the data assessment.

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

ACTION: Circle all outliers with a red pencil.

ACTION: If RRF < 0.05, or < the requirements for the 5 compounds in section 15.5 above, qualify all positive results for that analyte "J" and all non-detect results for that analyte "R".

NOTE: The above data qualification action applies regardless of method requirements.

16.0 Internal Standards (CLP Form VIII Equivalent)

16.1 Are the internal standard (IS) areas on the internal standard reporting forms of every sample and blank within the upper and lower limits (-50% to + 100%) for each initial mid-point calibration (SW-846, 8260B-20, Sect. 7.4.7)? ✓

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

ACTION: If errors are large or information is missing, take action as specified in section 3.2 above.

ACTION: List each outlying internal standard below.

Sample ID	IS #	Area Lower Limit	Area Upper Limit
		NA	

(Attach additional sheets if necessary.)

ACTION: 1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.

2. Do not qualify non-detects when the associated IS are counts area > + 100%.

3. If the IS area is below the lower limit (< -50%), qualify all associated non-detects (U-values) "J".

4. If extremely low area counts are reported (< -25%) or if performance exhibits a major abrupt drop off, flag all associated non-detects as unusable "R" and positive results as estimated "J".

16.2 Are the retention times of all internal standards within 30 seconds of the associated initial mid-point calibration standard (SW-846, 8260B-20, Sect. 7.4.6)? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

USEPA Region II
SW846 Method 8260B VOA

Date: August 2008
SOP: HW-24, Rev. 2

YES NO N/A

17.0 Field Duplicates

17.1 Were any field duplicates submitted for volatile analysis? ___ ✓ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the Data Assessment. However, if large differences exist, take action specified in section 3.2 above.

Sample Delivery Group Case Narrative

Receipt Information:
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

The following issues were discovered with the COC and/or samples upon log-in:
1. One HCL vial for sample VEP4-GW33-0914 (09/26/14 @1720) and one HCL vial for VEP4-TB01-092614 (09/26/14 @1440) had pea-size headspace present.

Changes to the Revision:
This is an original submittal of the final report package.

Analytical Information:
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample preparation and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

SW8260B:
Note –Samples 1409231-01, -02, -03, and -05 were analyzed at a 2x only due to the samples foaming during screening. No lower analyses were able to be performed.

No additional anomalies or deviations are noted.

EMPIRICAL
1409231

phone: 615-345-1115

ELECTRONIC CHAIN OF CUSTODY RECORD

C.O.C. 20140929-GW-EMP-01

Report to: Company Name: CH2MHILL; Address: 15010 Conference Dr.: 200, Chantilly, VA 20151; Phone: 703.376.5301; Fax: 703.376.5801; Attn: Mike Zamboni

Invoice to: Company Name: See Contact

Sampler (Print): not required
Sampler (Signature): not required
Purchase Order Number: 955530

Date Shipped: 9/29/14; Carrier: FedEx; Waybill No.: 771303137054

Sample Identification	Location	Date Collected	Time Collected	Time Zone	No. of Containers	Aq	Sed	Soil	GW	VOCs	Comments
VEP4-GW28D-0914	MW-28D	9/26/14	09:45	AST	3				✓	X	-01 MW-28D
VEP4-GW31-0914	MW-31	9/26/14	11:35	AST	3				✓	X	-02 MW-31
VEP4-GW24D-0914	MW-24D	9/26/14	13:45	AST	3				✓	X	-03 MW-24D
VEP4-EB01-092614-GW	QC	9/26/14	14:30	AST	3	✓				X	-04 equipment blank
VEP4-GW33-0914	MW-33	9/26/14	17:20	AST	3				✓	X	-05 MW-33
VEP4-EB02-092614-GW	QC	9/26/14	18:00	AST	3	✓				X	-06 equipment blank
VEP4-TB01-092614	QC	9/26/14	14:40	AST	2	✓				X	-07 trip blank

Turnaround Requested: ☒ Std 28 days
Sample Disposal: not applicable

Relinquished by sampler: [signature] Date: 9/27/14 Time: 1200
Received at lab by: [signature] Date: 9/30/14 Time: 0840

White: Return to client with report; Yellow: Laboratory Copy; Pink: Sampler

Note: The first sampled date of the ARF will be used as the COC number unless indicated otherwise.

II. EMPIRICAL LABORATORIES
COOLER RECEIPT FORM

Cooler Received/Opened On: 9/30/14 @0840 Workorder# 1409231

1. Tracking #: 7054 (last 4 digits, FedEx)

   Cooler: FEDEX

2. Temperature of rep. sample or temp blank when opened: 2.6 °C + correction factor(-0.3) = 2.3 °C
3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO...NA
4. Were custody seals on outside of cooler? YES...NO...NA

   If yes, how many and where: 2 front + back

5. Were the seals intact, signed, and dated correctly? YES...NO...NA
6. Were custody papers inside cooler? YES...NO...NA

   I certify that I opened the cooler and answered questions 1-6 (Initial/date) JTG 9/30/14

7. Were custody seals on containers: YES NO and intact YES...NO...NA

   Were these signed and dated correctly? YES...NO...NA

8. Packing material used: Bubblewrap Plastic bag Peanuts Vermiculite Foam insert Paper Other None
9. Cooling process: Ice Ice-pack Ice (direct contact) Dry Ice Other None
10. Did all containers arrive in good condition (unbroken)? YES...NO...NA
11. Were all container labels complete (#, date, signed, pres., etc)? YES...NO...NA
12. Did all container labels and tags agree with custody papers? YES...NO...NA
13. a. Were VOA vials received? YES...NO...NA

    b. Was there observable headspace present in any VOA vial (>5mm-6mm)? YES...NO...NA

14. Was there a Trip Blank in this cooler (custody seals present/intact)? YES...NO...NA...Comments Seal intact; air bubble present

    If multiple coolers, sequence #_____

    I certify that I unloaded the cooler and answered questions 7-14 (initial/date) JTG 9/30/14

15. a. Did preserved bottles, did pH test strips suggest preservation reached the correct pH level? YES...NO...NA

    b. Did the bottle labels indicate that the correct preservatives were used? YES...NO...NA

16. Was residual chlorine present? YES...NO...NA

    I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (initial/date) JTG 9/30/14

17. Were custody papers properly filled out (ink, signed, etc)? YES...NO...NA
18. Did you sign the custody papers in the appropriate place? YES...NO...NA
19. Were correct containers used for the analysis requested? YES...NO...NA If not, PM notified? YES...NO...NA
20. Was sufficient amount of sample sent in each container? YES...NO...NA If not, PM notified? YES...NO...NA
21. Were there Non-Conformance issues at login? YES...NO...NCRs: ✓

I certify that I entered this project into LIMS and answered questions 17-21 (Initial/date) JTG 9/30/14

I certify that I attached a label with the unique LIMS number to each container (Initial/date) JTG 9/30/14

I certify that I notified the laboratory of any short holding time or RUSH parameters (Initial/date) JTG 9/30/14

V:\Standard Operating Procedures\Current SOP File Directory\QS10_021_20140729_CRF.doc

Appendix J
Data Quality Evaluation

Final

Data Quality Evaluation
SWMU 20 Remedial Investigation

Atlantic Fleet Weapons Training Area – Vieques
Former Vieques Naval Training Range
Vieques, Puerto Rico

August 2016

Prepared for

Department of the Navy
Naval Facilities Engineering Command
Atlantic

Prepared by

ch2m SM

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Acronyms and Abbreviations

COC	chemical of concern / contaminant of concern
CRQL	contract-required quantification limit
DoD	Department of Defense
DQE	Data Quality Evaluation
DQO	data quality objective
EPA	Environmental Protection Agency
ESV	ecological screening value
GW	groundwater
LCS	laboratory control sample
LOD	limit of detection
LOQ	limit of quantitation
MCL	maximum contaminant level
MS	matrix spike
MSD	matrix spike duplicate
PAL	project action limit
PRWQ	Puerto Rico Water Quality
QA	quality assurance
QC	quality control
RSL	regional screening level
SAP	Sampling and Analysis Plan
SB	subsurface soil sample
SL	screening level
SOP	Standard Operating Procedure
SS	surface soil sample
SSL	soil screening level
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit
TCE	trichloroethene
TCL	target compound list
UFP	Uniform Federal Policy
ug/kg	microgram/kilogram
ug/L	microgram/liter
VOA	volatile organic analysis
VOC	volatile organic compound

SECTION 1

Data Quality Assessment

This Data Quality Evaluation (DQE) assesses the effect of the overall analytical process on the "availability" of the analytical data. "Availability" in this context refers to whether results can be used by the project team based on their analytical soundness. If a result is analytically sound, it is available for use for evaluating the potential releases, nature and extent of contamination, and estimating potentially associated human health and ecological risks. However, a particular result or group of results may not be "usable" for these purposes if other conditions apply. For example, if there were a hypothetical site where a trichloroethene (TCE) spill had occurred and the TCE data for many or all of the samples were rejected, the data may not be usable for making site-specific determinations even if all the non-TCE data were analytically sound and available for use by the project team. In order to avoid confusion of terms, this Data Quality Evaluation differentiates the "availability" of results from "usability" of results. "Available" results are analytically sound and available for use by the project team to make decisions, even if they are not usable for a particular purpose.

The three major categories of data evaluation are laboratory performance, field collection performance (i.e. blank contamination), and matrix interferences. Evaluation of laboratory performance is a check for compliance with the method requirements; in other words, a check of whether the laboratory analyzed the samples within the limits of the analytical method. Additionally, a third-party validator (DataQual Environmental Services, LLC) conducted a review of the laboratory data to assess whether the analytical methods were within required control limits at the time of analysis. Evaluation of potential matrix interferences involves the review of several areas of results, including surrogate spike recoveries, matrix spike recoveries, and duplicate sample results. Evaluation of field collection performance, such as blank contamination and field duplicates, involves the review of field quality control (QC) and the determination of their effect on the sample results.

The data evaluation and validation is a multi-tiered approach. The process begins with an internal laboratory review, continues with a review by a third-party data validator, and ends with an overall review by the Navy contractor project chemistry team. The process provides a medium for essential communication between the laboratory, validator, and project team, and allows for data quality to be thoroughly evaluated.

This document presents the results of the data quality evaluation performed on one data set:

- Vieques_East Solid Waste Management Unit (SWMU)-20 2010-2014 Selected Samples
  - Activity: Vieques_East
  - Site: SWMU-20 (also known as PI-4)
  - Matrices: surface soil sample (SS), Subsurface soil sample (SB), groundwater (GW)
  - Date Range: July, 2010 through 2014
  - Data Use: Definitive (volatile organic compounds [VOCs] and 1,4-Dioxane only)
  - Selected Samples: Samples such as "VEP4-GWXX-MMDDYY" were not included because they were collected prior to development, in excess of that required by the work plan, and only to help determine the location of new wells if possible.

1.1 Laboratory Internal Quality Control Review

Prior to releasing the analytical data, the laboratories, Katahdin Analytical Services, Inc. (in July 2010) and Empirical Laboratories LLC (November 2011 and later), reviewed both the sample and QC data to verify sample identity, instrument calibration, limits of quantitation (LOQs), dilution factors, numerical computations, accuracy of transcriptions, and chemical interpretations. In addition, the QC data were tabulated and the results reviewed to ascertain whether they were within the contract-required or laboratory-defined limits for accuracy and

precision. Any non-conforming data were discussed in the data package cover letter and case narrative. The case narrative was then reviewed by the data validator and incorporated into the data validation report. If necessary, the exceedances were verified and qualifiers were applied based on this information.

1.2 Data Validation

A third-party data validator reviewed all data packages using the validation criteria outlined in the site-specific Uniform Federal Policy (UFP) Sampling and Analysis Plan (SAP) Worksheets #34-36 (CH2M, 2013). For the most part, these Worksheets reference the appropriate Region II Standard Operating Procedure (SOP) if such an SOP exists for that analysis method. Then, UFP-SAP limits are used in place of those referenced in the SOP. If a Region II SOP does not exist for the analysis method, then the data are validated against the limits in the UFP-SAP. Guidance and qualifiers are taken from related Region II SOPs and guidance is taken from National Functional Guidelines. The following protocol was used for validation:

- For VOCs via SW-846 8260B and 8260B_SIM:
  - SOP HW-24. "Validating Volatile Organic Compounds by SW-846 Method 8260B." Rev 2. August, 2009.
- For semivolatile organic compounds (SVOCs) via SW_846 8270D Low-Level:
  - This test was for 1,4-Dioxane which was added per regulator request
  - "Validating Semivolatile Organic Compounds by SW-846 Method 8270" (SOP HW-22; Rev. 4; August, 2009)

As stated above, the data validation process was separate from the laboratory's internal review. The process was specifically focused on the effects of the laboratory's performance and sample matrix on the analytical results. Example areas of review include holding time compliance, surrogate recovery accuracy, matrix spiked sample precision and accuracy, blank contamination, initial and continuing calibration accuracy and precision, laboratory control sample accuracy, internal standard response and retention time accuracy, instrument tune criteria accuracy, and duplicate sample precision (laboratory replicates and field duplicates). Please refer to the complete data validation report for full areas of review. The following summarizes QC parameters which were evaluated during data validation (an asterisk (*) indicates that qualification was required due to an exceedance:

- Completeness
- Sample Condition
- Holding Times
- GC/MS Tuning
- Initial Calibration *
- Continuing Calibration *
- Blanks *
- System Monitoring Compounds and Spiked Surrogates *
- Laboratory Control Samples
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) *
- Field Duplicates *
- Laboratory Replicates
- Internal Standards
- Target Compound Identification
- Reporting Limits
- System Performance
- Overall Assessment of Data
- Other *

Multiple analyses are most often the result of concentrations exceeding the calibration range or QC results outside of control limits. When multiple analyses were performed, the "best result" was selected for purposes of this data quality evaluation. Among multiple valid and/or invalid results, the "best result" is:

1. The non-rejected result
2. The result from the appropriate concentration range (dilution factor)
3. The detect when one or more result is detected and one or more result is nondetect
4. The greater of detects, and
5. The lesser of nondetects (U-Values)

Qualification of data is not an unusual occurrence. To define a laboratory QC exceedance and when a laboratory QC exceedance occurs, the laboratory refers to its in-house SOPs. The SOPs are based on United States Department of Defense (DoD) requirements, the requested analytical method, and accumulated laboratory experience. When a laboratory QC exceedance occurs, the situation may be acceptable or it may require further action by the laboratory, such as application of a laboratory qualifier or re-extraction and/or reanalysis of the sample. The data validator uses a separate set of QC criteria, based on guidance from the Environmental Protection Agency (EPA) region that applies to the samples. A laboratory QC exceedance may not constitute a data validation exceedance and a data validation exceedance may not constitute a laboratory QC exceedance. Data validation criteria exceedances may result in the qualification of or rejection of data, as deemed appropriate by the data validator.

The data validator examines each data point and determines any effects that QC exceedances have had. Most often, these effects dictate that the result or limit of detection (LOD) should be considered estimated, but is still available for use. The J-qualification, J^+-qualification, UJ-qualification, and U-qualification of results are common occurrences and have no adverse effect on the availability of that result to the project team for making decisions. J-qualified, and J^+-qualified results are available, at the reported result, for use as detects as long as they are considered "estimated" by the project team. Human Health Risk Assessment guidance suggests that these qualifiers "indicate uncertainty in the reported concentration of the chemical, but not in its assigned identity. Therefore, these data can be used just as positive data with no qualifiers or codes." In addition, the same risk assessment guidance (EPA, 1989) suggests that one should use "J-qualified concentrations the same way as positive data that do not have this qualifier." U-qualified and UJ-qualified results are available, at the reported LOD or level, for use as nondetects as long as they are considered "nondetect or not detected at significantly greater than that in an associated blank" or "nondetect, estimated LOD," as appropriate.

In extreme cases, a result is rejected and deemed to be unusable. "Unusable" in this instance is defined as a result that is not analytically sound and is not generally considered available for use by the project team. In some cases, the project team may still decide to use a rejected result. An example of this occurrence would be if a result is rejected because it is biased extremely high, yet it is still less than the screening level (SL). A conservative decision may be made to consider this result a non-exceedance, even if its concentration was rejected. For that reason, it is important to examine why a result was rejected. For the most part, however, rejected results are not usable, and the R-qualifier is the only qualifier that has an adverse effect on the availability of data. It should be noted, for this data set, that potential use of rejected data is a purely hypothetical discussion and this did not occur.

In large data sets, rejected results are often inconsequential because there are sufficient non-rejected data available to the project team. If there are enough non-rejected data or the project team is able to infer results from adjacent sampling locations or there is other site-specific information that can provide additional lines of evidence, it may not be necessary to know the concentrations of some rejected constituents. It may also not be necessary to prove a constituent's absence if there are sufficient additional lines of evidence.

1.3 Primary Data Validation Qualifiers

The following data validation qualifiers were applied to one or more analytical results:

- **U** - Not detected. Sample was analyzed for this parameter, but it was not detected at greater than the reported LOD. The data validator may also apply this qualifier to indicate that a concentration was not

detected at significantly greater than that in an associated blank. Thus, this qualifier does not necessarily indicate a quality control exceedance.

- **UJ** – Not detected, LOD estimated. Sample was analyzed for this parameter, but it was not detected at greater than the reported LOD. The LOD for this parameter is estimated due to a quality control exceedance.
- **J** - Concentration estimated. The parameter was positively identified and the associated numerical value is the approximate concentration of the parameter in the sample. Often, a J-qualifier is applied simply because the result was less than the LOQ and thus does not necessarily indicate a quality control exceedance.
- **R** - Rejected. The parameter was analyzed but a severe quality control exceedance necessitates its rejection. The result is not usable as a detection or as a nondetect.
- **[none]** - Detected. Qualification was not warranted.

1.4 Impact of Data Quality on Project Data Quality Objectives and Data Usability

The laboratories analyzed the samples in accordance with the respective analysis methods and standard operating procedures. The data packages were reviewed by a data validator taking guidance from EPA Region II validation procedures. Field QC samples were collected and analyzed at the planned frequencies.

The laboratory utilized various qualifiers to represent “below reporting limit,” “nondetect,” and “detected.” Any other extraneous laboratory qualifiers were superseded by data validation qualifiers. The data validator utilized J-qualifiers, UJ-qualifiers, and U-qualifiers to represent “estimated,” “nondetect, estimated LOD,” and “nondetect or not detected at significantly greater than that in an associated blank” respectively. The only time the data validator changed a result’s detect status was when J-qualifiers were changed to U-qualifiers (detect to nondetect) as a result of blank contamination.

The data validator utilized R-qualified to indicate results are “rejected.” The R-qualifier is the only one which negatively affects data availability. Rejected results are not usable as detections or as nondetects; their presentation is only to document that an analysis was performed.

The J- and UJ-qualifiers indicate that some results are estimated. These qualifiers indicate that data are available for use as detects and nondetects, respectively. These qualifiers do not necessarily indicate a problem that adversely affects the availability of data. For example, J-qualifiers are often applied simply because results are less than the LOQ.

Region II data validation guidance mandates the use of J- and UJ-qualifiers when quality assurance (QA)/QC exceedances dictate their necessity. In Region II, if a result is attributable to blank contamination, it is U-qualified and is no longer distinguishable from results that are simply nondetect. The U-qualified value is elevated to the LOD if necessary. This supports the practice that J-qualified results, while estimated, are available for use as detects at their qualified concentration and U- and UJ-qualifiers are available for use as nondetects at their qualified LOD or level. In general, J-, UJ-, and U-qualified results are available for use as qualified for evaluating potential releases, the nature and extent of contamination, and estimating potentially associated human health and ecological risks.

It is a common occurrence for achieved LODs to be greater than SLs or for LODs to be elevated to greater than what was expected or requested. In many cases, SLs are simply unreasonably low or the laboratory was forced, by the analytical method or sample matrices, to raise limits for various reasons. In the instance where nondetect LODs are greater than SLs, the results are available for use as nondetects, but their use adds uncertainty to the conclusions drawn. There are a variety of typical and potentially unavoidable reasons why the reporting limits of nondetect results may exceed SLs:

- If an SL is unreasonably low, current instrumentation technology may not be able to achieve an LOD less than the SL.

  - For example, the MCL-based soil screening level (SSL) (June, 2015) for vinyl chloride is 0.69 ug/kg whereas it is reasonable to expect a reporting limit of 5.0 ug/kg (low soil contract-required quantification limit [CRQL] from EPA CLP SOM02.2).
- The laboratory-specific limits may have been established at a time when the SL was higher (less stringent) or not present, but the reporting is being done using new (more stringent) criteria. Published screening levels, such as EPA Regional Screening Levels (RSLs), may change periodically as toxicity values are updated.
  - For example, the adjusted tap water RSL for 1,4-Dioxane changed from 0.78ug/L to 0.46ug/L in June, 2015 after all analyses had been completed.
- If a target compound or analyte is present at an elevated level, the laboratory will dilute the entire sample in order to report that concentration within the instrument's linear calibration range. It may not be possible to analyze the sample at a lesser dilution if the target compound's high concentration is likely to damage or saturate the instrument. The high concentration of a non-target compound or analyte may also necessitate initial dilution for the same reason.
- If matrix effects mask low concentrations, the laboratory may be forced to elevate their limits to demonstrate the fact that low concentrations cannot be detected.
- If matrix effects are particularly strong, the laboratory may be forced to analyze the sample at an initial dilution in an attempt to dilute the matrix effects.
  - For example, VEP4-GW24-0914 was analyzed at a 2X dilution due to the sample foaming during screening. A lower dilution was not possible and trichloroethene was detected at 334ug/L in this diluted run.
- If historical concentrations warrant, the laboratory detects an odor or the field team designates a sample as "expected high concentration," the laboratory may pre-screen the sample and initially dilute it.
- If the sample appearance indicates possible high concentrations, the laboratory may be forced to analyze the sample at a concentration range different from what is requested. For example, if a sample is designated as "groundwater," but is actually an emulsion or sludge, the laboratory may be forced to analyze the sample using the "medium" instead of the "low" or "SIM" concentration range.
- If the field team cannot provide the full sample volume, the laboratory may be forced to dilute the sample by adding water until the minimum volume is achieved.
- If a soil or sediment sample is characterized by high percent moisture, the reporting limits will be elevated such that the concentrations and quantitation limits are reported on a dry-weight basis.

1.5 Comparison of Nondetects to Screening Levels

When evaluating the data and making decisions, the project team compares detected sample results to SLs in order to determine exceedances. For this project, the SLs are as follows:

- Groundwater samples (GW) are compared to:
  - Adjusted Tap Water RSLs (June, 2015 revised)
  - Puerto Rico Water Quality (PRWQ) Class SG standards
  - Federal Maximum Contaminant Levels (MCLs)
- Subsurface soil samples (SB) are compared to:
  - Selected SSL
    - MCL-Based SSL (June, 2015 revised)
    - Risk-Based SSL (June, 2015 revised) if MCL-Based SSL does not exist

  - Adjusted Industrial Soil RSLs (June, 2015 revised)
- In addition to SB screening levels, surface soil samples are also compared to:
  - Vieques Soil Ecological Screening Values (ESVs)

Note that background is not applicable to this data set which does not include metals.

Nondetect results are also compared to SLs, typically during a risk assessment or exceedance screening, by comparing one-half the LOD to the SL. However, this is only done when the same constituent was detected in another sample of the same matrix at the same site. The assumption is that, if the constituent is present in a given sample of a particular matrix at a site, then it may also be present at low concentrations (less than the LOD) in a nondetect sample of the same matrix from the same site. However, when a constituent was not detected in any samples of a particular matrix at a site, then it is considered not present at the site in that matrix. In this instance, it is important to compare the nondetect results to the SL. If the nondetect results (LODs) are not low enough when compared to the SL, then it may be possible that the constituent is present in a sample at greater than the SL but not detected or reported by the laboratory instrumentation. This situation is a common occurrence and is not cause for alarm. There are various typical reasons why this occurs and is expected. Please refer to Section 1.4. Then, refer to **Table J-1**. A row is provided for each combination of matrix and analyte if there was at least one nondetect LOD greater than the minimum screening level. The screening level is provided along with its reference. The number of nondetects, minimum and maximum nondetect, and number of nondetects which exceed the screening level is provided. The number and range of detections are provided as well as the number of detected exceedances. Finally, the number of nondetect exceedances without a related detected exceedance is provided; a related detected exceedance is defined as one within the same sample.

- Nondetect # > project action limit (PAL)
  - It is useful to present the number of nondetect results (for a given analyte in a given matrix) which exceed the PAL because these are instances where one cannot conclude the constituent is not present at the screening level (it is often not necessary to conclude that).
- # ND and # D
  - It is useful to present the number of nondetect results and detected results so that one can determine whether the data set is all nondetect, all detect, or a mixture of the two.
- Min ND and Max ND
  - The minimum nondetect is generally understood as the best the laboratory can achieve given the actual conditions of the site. The maximum nondetect is generally understood as the sample(s) which were affected most by matrix effects, high concentrations, etc.
  - The minimum nondetect should be compared to UFP-SAP requirements to determine if the laboratory met the sensitivity requirements or if there was some issue.
  - If the minimum nondetect is less than the PAL but the maximum nondetect is greater than the PAL, then it is likely that matrix effects, high concentrations, etc. caused some reporting limits to be elevated to greater than the PAL.
  - If the minimum nondetect is greater than the PAL, then it is likely that the PALs are just too low (i.e. established without consideration of current instrumentation technology).
  - If there is a spread between minimum and maximum nondetects, then it should be understood that matrix effects, high concentrations, etc. caused some reporting limits to be elevated.
    - It should be noted that some spread in the reporting limits is due to laboratory capabilities and method requirements as documented in the approved UFP-SAP work plans. For example, Carbon tetrachloride was sometimes analyzed via SW-846 8260B_SIM (LOD = 0.025ug/L) and sometimes via

SW-846 8260B (LOD = 0.5ug/L); this chemical was not eventually identified as a constituent of concern.

- Min D, Max D, and # D greater PAL
  - It is useful to present the range of detections and the frequency of exceedance to get an idea of the actual contamination at the site.
- # ND greater PAL no related exceedance
  - It is useful to present the number of nondetect exceedances without a related detected exceedance because these are locations where the station appears uncontaminated but, for one or more constituent, there is uncertainty surrounding the statement that the constituent is not present at the screening level.

When reviewing **Table J-1**, the following discussion was generated:

1. For the purpose of this exercise, 1,4-Dioxane was considered a VOC rather than an SVOC. This is because its presence, if detected at the site, would be attributed to its use as a stabilizer for chlorinated solvents. There were no other SVOCs analyzed, and 1,4-Dioxane is otherwise considered an SVOC simply due to its analysis method (SW-846 8270D_SIM).
2. Although this is a groundwater project, there are some soils data. For soils, the selected PAL is the SSL in each case. It is inconsequential that the LOD is greater than the SSL because an SSL exceedance suggests the possibility of a groundwater issue, yet the groundwater is assessed directly.
3. For 1,4-Dioxane in groundwater, the reporting limit requirements were met. However, the screening level dropped to less than the reporting limit long after the analysis had been completed.
4. Excluding 1,4-Dioxane (described in Note 3, above), the majority of groundwater LODs greater than the minimum screening level are simply compounds from 2010-2011 which were not identified as contaminants of concern (COCs). Their analysis was included because they are part of a standard target compound list (TCL) of VOCs. It is not necessary to demonstrate their absence at less than the adjusted tap water RSL.
5. For Trichloroethene in groundwater, the majority of data are detected and nearly all detections are exceedances of the minimum screening level. For those data which are nondetect, it should be noted that the LOD (0.4 to 0.5ug/L) is less than the MCL of 5ug/L and the PRWQC Class SG standard of 5ug/L. Although detected exceedances of the adjusted tap water RSL may suggest that a risk assessment should be conducted, site decisions are more likely to be made based on the MCLs.
6. Despite its status as a COC, vinyl chloride was detected in only one groundwater sample (0.23 J ug/L at EPI04-MW27 in September, 2013). The majority of data are nondetects ranging from 0.05ug/L (via 8260B_SIM) to 0.5ug/L (via 8260B). Even with the low-concentration method, this screening level could not be met with the LOD. It should be noted that all of these nondetects are less than the MCL of 2ug/L, and site decisions are more likely to be made based on the MCL. For those instances where the nondetect LOD is greater than the minimum screening level without a related detected exceedance, and the nondetect LOD (0.4ug/L) is greater than the PRWQC Class SG standard (0.25ug/L), the affected samples VEP4-GW31-0914, VEP4-GW32-0914, and VEP4-GW33-0914 were analyzed at a 2X dilution due to foaming and a 1X dilution was not possible.

Reporting limits are hereby defined:

- Limit of Quantitation (LOQ): The smallest concentration that produces a quantitative result with known and recorded precision and bias. The LOQ is set at or at greater than the concentration of the lowest initial calibration standard and within the calibration range.
- Limit of Detection (LOD): The smallest concentration of a substance that must be present in a sample in order to be detected at the DL with 99% confidence. At the LOD, the false negative rate is 1%. Nondetect results are reported as U-values at the LOD.

- Detection Limit (DL): The smallest analyte concentration that can be demonstrated to be different from zero or a blank concentration with 99% confidence. At the DL, the false positive rate is 1%. Detections at less than the DL are screened out (indistinguishable from noise) and reported as nondetect U-values at the LOD.

Refer to **Table J-3** for a discussion of data use depending on relative proximity of results, reporting limits, and screening levels.

1.6 Laboratory Qualifications, Data Validation Qualifiers, Data Validation Reason Codes, Data Availability, and Data Use

Please refer to **Table J-2**. For the complete data set, all combinations of final qualifier and reason code are provided. To help identify trends, for each combination, the count (number of results that possess this combination) is provided as well as the determination of whether such a result is affected by a bias, is available for use as reported, is available for use as qualified, or is not available for use (rejected). Totals for each are provided.

A total of 92% of the data are available for use as reported by the laboratory. Another 4.2% of the data are available for use as qualified by the data validator. Only 4.2% of the data are not available for use. The data set is 95.8% complete and the UFP-SAP project laboratory completeness goal of “95% available data” was met.

An evaluation of trends and biases was performed. All results except those R-qualified as “rejected” are available for use. When reviewing **Table J-2**, the following were noted:

1. All purgeable results were J/R-qualified in VEP04-GW04-0710 (July, 2010 groundwater at EPI04-MW04) due to pea-sized bubbles in the volatile organic analysis (VOA) vials. This may be indicative of an extreme low bias. Although R-qualified (rejected) results are not usable, the data user may work around this data gap. This well was sampled again in May, 2013 and was unaffected by this issue at that time.
2. The overall trend is that data were acceptable because there were not QC exceedances affecting them. Please note that, aside from the rejected results which are not usable, only 2.7% of the data (31 of 1,167 results) are affected by a trend/bias and such trend/bias is not significant enough to affect usability.

SECTION 2

PARCC Considerations

2.1 Precision

Precision is defined as the agreement between duplicate results and was characterized by comparing duplicate matrix spike recoveries, laboratory replicates, and field duplicate sample results. There is no actual significant negative impact on precision because no data points were deemed unusable (rejected) due to precision exceedances. In addition, only 0.69% of the data points were J -qualified due to field duplicate or blank spike/blank spike duplicate precision exceedance.

2.2 Accuracy

Accuracy is a measure of the agreement between an experimental determination and the true value of the parameter being measured. For organic analyses, each sample was spiked with surrogate compounds; and for organic and inorganic analyses, a matrix spike (MS)/matrix spike duplicate (MSD) and laboratory control sample (LCS) were spiked with a known parameter concentration before preparation. Internal standards also provide a measure of accuracy. Internal standards, surrogates, and MS/MSD provide a measure of the matrix effects on the analytical accuracy. LCS demonstrates accuracy of the method and the laboratory's ability to meet the method criteria. Accuracy is also assessed by calibration recoveries. Potential biases and trends were evaluated by first determining whether a QA/QC exceedance may indicate a potential bias or trend. If so, then the exceedance was examined to determine whether the bias or trend was significant enough to warrant rejection of data. A significant negative bias was identified as evidenced by rejection of nondetect VOCs results in VEP04-GW04-0710 due to pea-sized bubbles in the VOA vials (refer to Section 1.6). However, because subsequent groundwater samples were collected from the same well, the rejection is unlikely to negatively affect decision making. Overall, 7.0% of the data points were J/R/UJ-qualified due to pea-sized bubbles in the VOA vials, LCS, calibration, internal standards, or MS/MSD exceedances.

2.3 Representativeness

Representativeness is a qualitative measure of the degree to which sample data accurately and precisely represent a characteristic environmental condition (in this case, nature and extent of contamination). Representativeness is a subjective parameter and is used to evaluate the efficacy of the sample planning design. In terms of data quality, representativeness was assured because the sampling team followed approved standard operating procedures for sample collection and handling, and the laboratory followed approved standard operating procedures for sample handling, preparation, and analysis. Pea-sized bubbles in the VOA vials suggest a representativeness issue, and this is discussed in Section 1.2. Otherwise, all field samples were collected and analyzed as proposed in the UFP-SAP.

2.4 Laboratory Completeness

For purposes of this DQE, laboratory completeness is defined as the percentage of measurements that are judged to be valid; validity being defined by the data quality objectives (DQOs). Therefore, laboratory completeness is calculated as the number of analytically-sound results that are available for use compared to the total number of measurements made. The data validation guidance documents referenced in Section 3 designate all results except those R-qualified as "rejected" to be available for use as analytically-sound results. The R-qualifier is the only qualifier that negatively affects a data point's availability. Laboratory completeness is provided in Section 1.6.

2.5 Comparability

Comparability is a qualitative measure designed to express the confidence with which one data set may be compared to another. Factors that affect comparability are sample collection and handling techniques, sample matrix, and analytical methods. In this case, because approved standard operating procedures were used for sample collection and handling, a common sample matrix was evaluated (groundwater, soil, incremental soil, surface water, and sediment) and EPA SW-846 methods were utilized, the data user may express confidence in the fact that this data set is comparable to others of acceptable data quality. Comparability is controlled by the other PARCC parameters because data sets can be compared with confidence only when precision and accuracy are known. Precision and accuracy were demonstrated to be acceptable, and the data user may be confident that this data set is comparable to others of high data quality.

2.6 Sensitivity

Refer to Sections 1.4 and 1.5.

SECTION 3

References

CH2M HILL (CH2M). 2011. *Supplemental Expanded Site Inspection and Pilot Study Sampling and Analysis Plan Photo-Identified Site 4 (PI 4).* September.

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Environmental Protection Agency (EPA). 1989. *Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual.* EPA/540/1-89/002, Part A, October.

EPA. 2009. *Validating Volatile Organic Compounds by SW-846 Method 8260B.* August.

EPA. 2009. *Validating Semivolatile Organic Compounds by SW-846 Method 8270.* August.

Tables

TABLE J-1
Concentration Range Evaluation
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Matrix	Analyte	CAS	COC	Selected PAL	Units	PAL Ref	Nondetect				Detect				# ND > PAL no Rel. D Exceed	Comment – Refer to Section 1.5.
							# > PAL	#	Min	Max	#	Min	Max	# > PAL		
GW	1,1,2-Trichloroethane	79-00-5		0.041	ug/L	tap RSL	7	7	0.5	0.5					5	Note 4.
GW	1,2,4-Trichlorobenzene	120-82-1		0.4	ug/L	tap RSL	7	7	0.5	0.5					5	Note 4.
GW	1,2-Dibromo-3-chloropropane	96-12-8		0.00033	ug/L	tap RSL	7	7	1	1					5	Note 4.
GW	1,2-Dibromoethane	106-93-4		0.0075	ug/L	tap RSL	7	7	0.5	0.5					5	Note 4.
GW	1,2-Dichloroethane	107-06-2		0.17	ug/L	tap RSL	11	18	0.025	0.5					3	Note 4.
GW	1,2-Dichloropropane	78-87-5		0.44	ug/L	tap RSL	7	7	0.5	0.5					5	Note 4.
GW	1,4-Dioxane	123-91-1		0.46	ug/L	tap RSL	36	36	0.463	0.526					7	Notes 1, 3.
GW	Bromodichloromethane	75-27-4		0.13	ug/L	tap RSL	7	7	0.5	0.5					5	Note 4.
GW	Bromomethane	74-83-9		0.75	ug/L	tap RSL	7	7	1	1					5	Note 4.
GW	Carbon tetrachloride	56-23-5		0.45	ug/L	tap RSL	11	18	0.025	0.5					3	Note 4.
GW	Chloroform	67-66-3		0.22	ug/L	tap RSL	17	17	0.5	0.5	1	0.65	0.65	1	8	Note 4.
GW	cis-1,3-Dichloropropene	10061-01-5		0.47	ug/L	tap RSL	7	7	0.5	0.5					5	Note 4.
GW	Dibromochloromethane	124-48-1		0.17	ug/L	tap RSL	7	7	0.5	0.5					5	Note 4.
GW	trans-1,3-Dichloropropene	10061-02-6		0.47	ug/L	tap RSL	7	7	0.5	0.5					5	Note 4.
GW	Trichloroethene	79-01-6	yes	0.28	ug/L	tap RSL	12	20	0.2	0.5	74	0.265	334	73	11	Note 5.
GW	Vinyl chloride	75-01-4	yes	0.019	ug/L	tap RSL	82	82	0.05	0.5	1	0.23	0.23	1	19	Note 6.
SB	1,1-Dichloroethane	75-34-3		0.78	ug/kg	SSL	6	6	2.22	2.82					6	Note 2.
SB	1,1-Dichloroethene	75-35-4	yes	2.5	ug/kg	SSL	9	13	2.22	4.08					9	Note 2.
SB	1,2-Dichloroethane	107-06-2		1.4	ug/kg	SSL	6	6	2.22	2.82					6	Note 2.
SB	1,4-Dioxane	123-91-1		0.094	ug/kg	SSL	2	2	33.4	34.9					2	Notes 1, 2.
SB	Carbon tetrachloride	56-23-5		1.9	ug/kg	SSL	6	6	2.22	2.82					6	Note 2.
SB	Methylene chloride	75-09-2		1.3	ug/kg	SSL	6	6	4.43	5.64					6	Note 2.
SB	Tetrachloroethene	127-18-4	yes	2.3	ug/kg	SSL	11	13	2.22	4.08					11	Note 2.
SB	Trichloroethene	79-01-6	yes	1.8	ug/kg	SSL	13	13	2.22	4.08					13	Note 2.
SB	Vinyl chloride	75-01-4	yes	0.69	ug/kg	SSL	13	13	2.22	4.08					13	Note 2.
SS	1,1-Dichloroethene	75-35-4	yes	2.5	ug/kg	SSL	6	9	2.27	3.29					6	Note 2.
SS	1,4-Dioxane	123-91-1		0.094	ug/kg	SSL	3	3	34.8	379					3	Notes 1, 2.
SS	Tetrachloroethene	127-18-4	yes	2.3	ug/kg	SSL	8	9	2.27	3.29					8	Note 2.
SS	Trichloroethene	79-01-6	yes	1.8	ug/kg	SSL	9	9	2.27	3.29					9	Note 2.
SS	Vinyl chloride	75-01-4	yes	0.69	ug/kg	SSL	9	9	2.27	3.29					9	Note 2.

TABLE J-2
Qualifiers and Availability
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

Flag	Reason Code	Count	Available as Reported	Available as Qualified	Not Available	Treat As	Potential Bias	Comment – Refer to Section 1.6.
U		934	80%			Nondetect		
		84	7.2%			Detect		
J		51	4.4%			Detect		
R	OT	49			4.2%		Extreme Low	Note 1.
UJ	CCH	9		0.77%		Nondetect	High	Note 2.
J	SSH	7		0.60%		Detect	High	Note 2.
J	FD	6		0.51%		Detect		
U	EBL	6		0.51%		Nondetect		
J	SSL	4		0.34%		Detect	Low	Note 2.
UJ	CCL	4		0.34%		Nondetect	Low	Note 2.
UJ	SSL	4		0.34%		Nondetect	Low	Note 2.
UJ	BD	2		0.17%		Nondetect		
J	OT	2		0.17%		Detect	Extreme Low	Note 1.
U	MBL	2		0.17%		Nondetect		
UJ	ICH	2		0.17%		Nondetect	High	Note 2.
UJ	MSL	1		0.086%		Nondetect	Low	Note 2.
	Total:	1167	92%	4.2%	4.2%			

Reason Codes:

OT: Other
CCH: Continuing Calibration (high)
SSH: Spiked Surrogate (high)
FD: Field Duplicate
EBL: Equipment Blank
SSL: Spiked Surrogate (low)
CCL: Continuing Calibration (low)
BD: Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
MBL: Method Blank
ICH: Initial Calibration (high)
MSL: Matrix Spike (low)

TABLE J-3

Proximity: Results, Reporting Limits, and Screening Levels

SWMU 20 Remedial Investigation

Former Vieques Naval Training Range

Vieques, Puerto Rico

Level of Result	Level of Screening Level (SL)	Add. Info	Added Uncertainty[1]	Conclusion
Result > LOQ	SL > LOQ	Result > SL		Detected exceedance.
		SL > Result		Non-exceedance.
	LOQ > SL	(Result > SL)		Detected exceedance.
Detected results below this level are estimated (may not add uncertainty)				
LOQ > Result > DL	SL > LOQ	(SL > Result)		Non-exceedance.
	LOQ > SL > DL	Result > SL	yes[2]	Although result accuracy is unknown, treat as detected exceedance.
		SL > Result		Although result accuracy is unknown, treat as non-exceedance.
	DL > SL	(Result > SL)		Detected exceedance.
DL > Result	Result cannot be distinguished from noise and is hence reported as nondetect (at LOD). See immediately below.			
Result is Nondetect (U-Value at LOD)	SL > LOQ	(SL > U-Value)		Non-exceedance.
	LOQ > SL > LOD			
	LOD > SL > DL	(U-Value > SL)	yes[3]	Although compound may be present at greater than SL (but not greater than LOD), treat as non-exceedance.
	DL > SL		yes[4]	

Notes:

1: All results have some uncertainty (automatically deemed 'acceptable').

2: In large data sets, both should occur (a conservative decision is made that the site is contaminated).

3: Narrow range of uncertainty (between SL and LOD) where compound could be present yet not detected by instrumentation.

4: In addition to #3, above, there is also a range of uncertainty (between SL and DL) where the compound could be detected by the instrumentation and screened out (indistinguishable from noise).

Appendix K
Human Health Risk Assessment

Final

Human Health Risk Assessment
Solid Waste Management Unit 20

Atlantic Fleet Weapons Training Area – Vieques
Former Vieques Naval Training Range
Vieques, Puerto Rico

Contract Task Order 013

August 2016

Prepared for

Department of the Navy
Naval Facilities Engineering Command
Atlantic

Under the

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Prepared by

Tampa, Florida

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Acronyms and Abbreviations

µg/kg	microgram per kilogram
µg/L	microgram per liter
µg/m^3	microgram per cubic meter
ADAF	age dependent adjustment factor
AF	attenuation factor
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	below ground surface
Cal/EPA	California Environmental Protection Agency
CDI	chronic daily intake
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	contaminant of concern
COPC	constituent of potential concern
CSF	cancer slope factor
CSM	Conceptual Site Model
DABS	dermal absorption fraction from soil
DCE	Dichloroethene
DNA	deoxyribonucleic acid
EBS	Environmental Baseline Survey
EC	exposure concentration
ELCR	excess lifetime cancer risk
EPA	Environmental Protection Agency
EPC	exposure point concentration
ERP	Environmental Restoration Program
HEAST	Health Effects Assessment Summary Tables
HHEM	Human Health Evaluation Manual
HHRA	Human Health Risk Assessment
HI	hazard index
HQ	hazard quotient
IRIS	Integrated Risk Information System
IUR	inhalation unit risk
MCL	maximum contaminant level
mg/kg	milligram per kilogram
mg/kg-day	milligram per kilogram per day
mg/m^3	milligram per cubic meter
MMOA	mutagenic mode of action
MRL	minimal risk level
MW	monitoring well
PA/SI	Preliminary Assessment/Site Investigation
PCE	tetrachloroethene
PEF	particulate emission factor
PPRTV	provisional peer-reviewed toxicity value
PREQB	Puerto Rico Environmental Quality Board
RAGS	Risk Assessment Guidance for Superfund

RfC	reference concentration
RfD	reference dose
RI	Remedial Investigation
RME	reasonable maximum exposure
RSL	regional screening level
SAP	Sampling and Analysis Plan
SL	screening level
SWMU	Solid Waste Management Unit
TCE	trichloroethene
UCL	upper confidence limit
USFWS	United States Fish and Wildlife Service
VF	volatilization factor
VI	vapor intrusion
VISL	vapor intrusion screening level
VNTR	Vieques Naval Training Range
VOC	volatile organic compound

SECTION 1

Introduction

1.1 Overview

This Human Health Risk Assessment (HHRA) was prepared for Solid Waste Management Unit 20 (SWMU 20) ("the Site"), located at the Former Vieques Naval Training Range (VNTR), Vieques, Puerto Rico. The approach and assumptions presented below are consistent with the HHRA protocol contained in the *Master Standard Operating Procedures, Protocols, and Plans* (CH2M, 2010), hereinafter referred to as the Vieques Master HHRA protocol, for sites in the Vieques Environmental Restoration Program (ERP). The Vieques Master HHRA protocol includes a description of the receptors, exposure pathways, and exposure assumptions to be used in typical Vieques ERP HHRAs.

As presented in the Vieques Master HHRA protocol, and in accordance with the United States Environmental Protection Agency (EPA) guidance documents, this HHRA consists of a four-step evaluation process comprised of:

- Data evaluation
- Exposure assessment
- Toxicity assessment
- Risk characterization

1.2 Scope of the Risk Assessment

The protocol is consistent with EPA Region 2 policy and EPA guidance, including: Risk Assessment Guidance for Superfund (RAGS), Volume 1: Human Health Evaluation Manual (HHEM), Parts A, D, E, and F (EPA, 1989; 2001; 2004; 2009a), and HHEM, Update of Standard Default Exposure Factors (EPA, 2014a). In addition, other EPA guidance documents were used and are cited in the text and tables.

1.3 Potential Receptors

SWMU 20 is located on the south side of the main access road leading from the main gate of Camp Garcia. Historical information suggests the site consisted of a former helicopter maintenance area, barracks, mess hall, trenched area, disturbed areas, and bermed area for storage of fuel bladders. There is no known historical information suggesting there were Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) -related releases at the site. Further, during the 2001 Site Inspection of Photo Identified Sites and the 2002 Environmental Baseline Survey (EBS) Site Inspection, no physical evidence of a release was noted. However, as a conservative measure, five potential sources of a release were identified during the Preliminary Assessment/Site Investigation (PA/SI) for sampling:

- Former trenches
- Area of disturbed ground south of the helicopter maintenance area
- Bermed fuel bladder storage area
- Former helicopter maintenance area
- Disturbed area in the southeast part of the trenched area

These site features are shown on Figure 2-3 of the Remedial Investigation (RI) Report. The historical activities at the site no longer occur and there are no structures remaining at the site other than concrete pads (potential relics of building foundations) and concrete vaults believed to have been associated with a sanitary septic system for the barracks and mess hall potentially located at the site.

Currently, there is no continuous human presence at, or use of, the approximately 6-acre site (CH2M, 2013). Groundwater is situated approximately 30 to 40 feet below ground surface (bgs). The receptor groups considered for human health evaluation are:

- Recreational Users/Trespassers/Site Visitors (current/future direct exposure to soil)
- Maintenance Workers[1] (hypothetical future direct exposure to soil)
- Industrial Workers (hypothetical future direct exposure to soil, tap water, and indoor air)
- Construction Workers (hypothetical future direct exposure to soil)
- Residents (hypothetical future direct exposure to soil, tap water, and indoor air)

The human health Conceptual Site Model (CSM) presents potential exposure media, exposure points, receptors (current and future), and exposure routes, and is provided in Table 1 of **Attachment K-1** and graphically in Figure 1 of **Attachment K-5**.

[1] Maintenance workers are assumed to be United States Fish and Wildlife Service (USFWS) workers. However, there is no specific planned future use of the site by USFWS. Therefore, the default maintenance worker presented in the Vieques Master HHRA Protocol (CH2M, 2010) was evaluated in the HHRA for SWMU 20.

SECTION 2

Data Evaluation

2.1 Data Used in the HHRA

Soil samples collected during the PA/SI in 2006 and soil and groundwater samples collected during the RI in 2013 and 2014, as described in the Sampling and Analysis Plan (SAP) (CH2M, 2013), were used in the HHRA. The soil dataset satisfying the surface soil interval consists of 25 samples collected from the 0-1 foot interval (because no land crab habitat is present at the site), whereas the soil dataset for the 0-6 feet interval ("total soil") includes 50 samples collected from three depth intervals (0-1 foot, 2-4 feet, and 4-6 feet intervals). The groundwater dataset consists of 77 samples collected from 38 monitoring wells. A summary of the samples used in the HHRA and their associated data groupings are presented in Table 1 and Table 2 of **Attachment K-2**. The analytical dataset for the samples used in the HHRA is included in **Attachment K-3.**

2.2 Selection of Chemicals of Potential Concern

The constituents of potential concern (COPCs) are those chemicals that have the greatest potential to cause adverse human health effects if receptors come in contact with site media. COPCs were selected in accordance with the Vieques Master HHRA protocol (CH2M, 2010).

2.2.1 COPC Screening Levels

The approach used to screen data is consistent with the Vieques Master HHRA protocol. *EPA Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites* (EPA, 2015a) were used to screen site data. The maximum detected concentrations in surface soil, total soil, and groundwater were compared to regional screening levels (RSLs) to identify COPCs for the HHRA. The RSLs are based on a target excess lifetime cancer risk (ELCR) of $1x10^{-6}$ and a non-cancer hazard quotient (HQ) of 0.1.

EPA considers lead to be a special case because of the difficulty in identifying the classic "threshold" needed to develop a reference dose (RfD). The screening levels used in the COPC screening for lead were obtained from the EPA's *Regional Screening Levels for Chemical Contaminants at Superfund Sites* (EPA, 2015a). The industrial soil RSL for lead is 800 mg/kg and is based upon the Adult Lead Methodology (EPA, 2009b) for blood lead levels in workers. The residential RSL for lead is 400 mg/kg and is based upon the Integrated Exposure Uptake Biokinetic Model (EPA, 1994) for blood lead levels in children.

Site groundwater was evaluated for protection of indoor air. The groundwater screening levels (SLs) for protection of indoor air were calculated using the EPA Vapor Intrusion Screening Level (VISL) calculator (EPA, 2015b); the VISL calculator output is provided as **Attachment K-4**. A default groundwater-to-indoor air attenuation factor of 0.001 and average site groundwater temperature of 29.4^{o}C were used in the calculations. Groundwater VISLs were calculated based on a target excess lifetime cancer risk (ELCR) of $1x10^{-6}$ and non-carcinogenic HQ of 1 due to conservatism incorporated into the default attenuation factor between groundwater and indoor air.

Five Volatile Organic Compounds (VOCs) were detected in groundwater. Inhalation toxicity data are not available for one VOC (cis-1,2-Dichloroethene [DCE]). If VISLs are based on the lower of a HQ of 0.1 and ELCR of $1x10^{-6}$, the VISLs for three VOCs (1,1- Dichloroethene [DCE], Tetrachloroethene [PCE], and TCE) are based on non-cancer effects. However, the target organ/system basis for the non-cancer toxicity values (RfCs) are different for each VOC as indicated below:

- 1,1-DCE – hepatic
- PCE – nervous, and ocular
- TCE – immunological, developmental, and cardiovascular

Since cumulative impacts on target organs are not a concern for these 5 VOCs, VISLs do not need to be adjusted downward to an HQ of 0.1 to account for cumulative effects from multiple chemicals.

Chemicals that were 100 percent non-detected in an exposure medium were not selected as COPCs for that medium/data grouping. For samples with field duplicate analyses, the higher of the two concentrations was used when both values were detects and the lower of the two concentrations was used when both values were non-detects. In cases where one result was detected and the other non-detected, the detected value was used.

In summary, the RSLs used for each receptor/sample population are indicated below:

- **Recreational Users/Trespassers/Site Visitors** – Concentrations detected in surface soil samples were compared to residential soil RSLs.
- **Residents** – Concentrations detected in surface soil and total soil were compared to residential soil RSLs. Note that in accordance with the HHRA Master Protocol, two sets of soil data are evaluated for residents to address the preferred exposure soil depth intervals used for residential scenarios by EPA and Puerto Rico Environmental Quality Board (PREQB) (0-2 feet interval and 0-6 feet interval). Concentrations detected in groundwater (drinking water exposure pathway) were compared to tap water RSLs. Concentrations detected in groundwater (indoor air vapor intrusion pathway) were compared to residential groundwater VISLs.
- **Industrial Workers** – Concentrations detected in total soil were compared to industrial soil RSLs. Concentrations detected in groundwater (drinking water exposure pathway) were compared to tap water RSLs. Concentrations detected in groundwater (indoor air vapor intrusion pathway) were compared to commercial groundwater VISLs.
- **Maintenance Workers/Construction Workers** – Concentrations detected in surface soil (maintenance workers only) and total soil (construction workers only) were compared to industrial soil RSLs.

2.2.2 COPC Screening Results

The analytes with maximum detected concentrations exceeding screening levels were identified as COPCs. Results of the COPC screening process for each receptor group, by exposure scenario, are presented in Tables 2.1 through 2.4a of **Attachment K-1** and are summarized below:

Recreational Users/Trespassers/Site Visitors:

- Seven inorganics (aluminum, arsenic, chromium, cobalt, iron, manganese, and vanadium) and cyanide were identified as COPCs in surface soil (Table 2.1 of **Attachment K-1**).

Maintenance Workers:

- Two inorganics (arsenic and chromium) were identified as COPCs in surface soil (Table 2.1a of **Attachment K-1**).

Residents:

- Surface soil - Seven inorganics (aluminum, arsenic, chromium, cobalt, iron, manganese, and vanadium) and cyanide were identified as COPCs in surface soil (Table 2.1 of **Attachment K-1**).
- Total soil - Seven inorganics (aluminum, arsenic, chromium, cobalt, iron, manganese, and vanadium) and cyanide were identified as COPCs in total soil (Table 2.2 of **Attachment K-1**).
- Groundwater (direct contact) – Three VOCs (PCE, TCE, and vinyl chloride) were identified as COPCs in groundwater (Table 2.3 of **Attachment K-1**).
- Groundwater (indoor air) – Two VOCs (TCE and vinyl chloride) were identified as COPCs in groundwater (Table 2.4 of **Attachment K-1**).

Industrial Workers:

- Total soil - Two inorganics (arsenic and chromium) were identified as COPCs in total soil (Table 2.2a of **Attachment K-1**).

- Groundwater (direct contact) – Three VOCs (PCE, TCE, and vinyl chloride) were identified as COPCs in groundwater (Table 2.3 of **Attachment K-1**).
- Groundwater (indoor air) – One VOC (TCE) was identified as a COPC in groundwater (Table 2.4a of **Attachment K-1**).

Construction Workers:

- Two inorganics (arsenic and chromium) were identified as COPCs in total soil (Table 2.2a of **Attachment K-1**).

2.3 Hot Spot Evaluation

A review of site data was conducted to determine if potential hot spots were present in exposure media that may require a separate exposure evaluation. The detected concentrations were compared to 100 times the RSLs (i.e., resulting in an ELCR of 10^{-4} and HQ = 10) to determine the presence (if any) of a discrete area where concentrations are relatively high. TCE in groundwater was detected at concentrations 100 times its tap water RSL (0.28 µg/L) at six monitoring well locations (MW-13, MW-17, MW-20, MW-23, MW-24, and MW-25), as depicted in Figure 2 of **Attachment K-5**. This information was used to identify the three wells (GW-17, GW-24, and GW-25) with maximum detected TCE concentrations, which were identified as the wells in the "core of the plume."

No detected soil concentrations exceeded 100 times their respective soil RSLs. Therefore, it was concluded that no soil hot spots are present onsite.

2.4 Background Comparisons

The maximum detected concentrations of inorganics in soil were also compared to background soil concentrations established for East Vieques (Soil types KTd and Qa). Among the COPCs identified in soil, the maximum detected concentrations of aluminum, chromium, cobalt, iron, manganese, and vanadium from site surface soil were within background levels (Table 2.2 of **Attachment K-1**); however, these constituents were not eliminated as COPCs based on comparison to background, nor were the other inorganics eliminated as COPCs through a lines-of-evidence approach.

SECTION 3

Exposure Assessment

3.1 Exposure Pathways Quantified

The potential exposure pathways quantified in the HHRA for each receptor group are presented below:

- Recreational Users/Trespassers/Site Visitors - Ingestion, dermal contact, and inhalation exposures to COPCs in surface soil; recreational users/trespassers/site visitors are not likely to be exposed to subsurface soil during site activities. Exposure point concentrations (EPCs) are presented in Table 3.1.RME of **Attachment K-1**.
- Maintenance Workers – Ingestion, dermal contact, and inhalation exposures to COPCs in surface soil; maintenance workers are not likely to be exposed to subsurface soil during routine activities (e.g., occasional landscaping and grounds maintenance, such as cutting grass and clearing brush, not involved with digging). EPCs are presented in Table 3.1a RME of **Attachment K-1**.
- Residents:
  - Soil - Ingestion, dermal contact, and inhalation exposures to COPCs in soil (0-1 foot or 0-6 feet, whichever depth interval has the higher EPC for each COPC); EPCs are presented in Tables 3.1.RME and 3.2.RME, of **Attachment K-1**. A comparison of the EPCs in the two depth intervals is presented in Table 3.2.RME Supplement of **Attachment K-1**.
  - Groundwater (drinking water) – Ingestion, dermal contact, and inhalation exposure (during showering) to COPCs in groundwater; EPCs are presented in Table 3.3.RME of **Attachment K-1**. The groundwater EPCs were calculated based on the data collected in the core of the TCE plume (GW-17, GW-24, and GW-25; see Figure 2 of **Attachment K-5**) in accordance with EPA guidance titled "Determining Groundwater Exposure Point Concentrations, Supplemental Guidance" (EPA, 2014b).
  - Indoor Air (vapor intrusion from groundwater) – Inhalation exposure; EPCs were calculated using EPA's VISL calculator (EPA, 2015b) based on the maximum detected concentration in groundwater using a default groundwater-to-indoor air attenuation factor of 0.001 and average site groundwater temperature of 29.4^{o}C (Table 3.4.RME of **Attachment K-1**). The VISL calculator output presenting the EPCs is provided in **Attachment K-4**.
- Industrial Workers:
  - Total Soil - Ingestion, dermal contact, and inhalation exposures to COPCs in total soil, based on an assumption of soil mixing and regrading under future site redevelopment as an industrial facility. EPCs are presented in Table 3.2a of **Attachment K-1**.
  - Groundwater (drinking water) – Ingestion and dermal contact exposure to COPCs in groundwater; EPCs are presented in Table 3.3.RME of **Attachment K-1**. The groundwater EPCs were calculated based on the data collected in the core of the TCE plume (GW-17, GW-24, and GW-25; see Figure 2 of **Attachment K-5**) in accordance with EPA guidance titled "Determining Groundwater Exposure Point Concentrations, Supplemental Guidance" (EPA, 2014b).
  - Indoor Air (vapor intrusion from groundwater) – Inhalation exposure; the EPC was calculated based on the maximum detected concentration in groundwater using a default groundwater-to-indoor air attenuation factor of 0.001 and average site groundwater temperature of 29.4^{o}C (Table 3.4a.RME of **Attachment K-1**). The VISL calculator output presenting the EPC is provided in **Attachment K-4**.
- Construction Workers – Ingestion, dermal contact, and inhalation exposures to COPCs in total soil, based on an assumption of excavation and construction activities to a depth of 6 feet across the site as part of future site redevelopment. EPCs are presented in Table 3.2a RME of **Attachment K-1**.

3.2 Quantification of Exposure

To evaluate the potentially complete exposure pathways further, the magnitude, frequency, and duration of exposures were estimated and quantified. EPCs were identified and pathway-specific intakes were estimated. EPA guidance (EPA, 1989) recommends selecting intake variable values for a given pathway so that the combination of all intake variable values results in an estimate of the reasonable maximum exposure (RME) for that pathway. EPA recommends using upper-bound parameter values (as opposed to average values) for exposure frequency and exposure duration. EPA guidance also recommends that the contact rate be a value representing the 95th percentile.

3.2.1 Exposure Point Concentrations

Measured EPCs were calculated based on measured COPC concentrations in soil and groundwater, while modeled EPCs were used to estimate air concentrations for potential ambient air exposures (from soil through particulate emissions) and indoor air exposure (via vapor intrusion of volatiles from groundwater to indoor air). The upper confidence limit (UCL) of the mean concentration was calculated for each COPC where at least eight samples were available and at least four detected concentrations observed. The maximum detected concentration was used in place of the UCL as the EPC when (1) the calculated UCL was greater than the maximum detected concentration, or (2) the number of samples or detected concentrations was less than the quantities described above.

EPCs were estimated following the most recent parametric (distributional) and nonparametric EPA recommendations in ProUCL Version 5.0.00 (EPA, 2013). ProUCL provides approaches for calculating UCLs of the mean, particularly when non-detected concentrations are present. These approaches consider a large variety of input including the perceived distribution of the detected results (if no perceived distribution is acceptable, nonparametric alternatives are provided), sample size, variability, and skewness. The estimated EPCs are summarized in Tables 3.1 through 3.4a of **Attachment K-1**, and the ProUCL output is provided in **Attachment K-6**.

3.2.2 Exposure Factors

An RME scenario was quantified for potential receptors under current and future land use scenarios (EPA, 1989). The exposure factors used in the intake calculations are presented in Tables 4.1 through 4.9a of **Attachment K-1.** The primary references for exposure factors are the standard default exposure factors presented in EPA guidance (EPA, 1989; 2002; 2004; 2015a) and HHEM, Update of Standard Default Exposure Factors (EPA, 2014a). The physiological parameter values, body weight and skin surface area, used for adolescent receptors (6 to 16 years old) were estimated based on the data presented in the EPA Exposure Factors Handbook (EPA, 2011). The derivation of estimated exposure factor values is presented in Table 4 Supplement A of **Attachment K-1**. The exposure factors used to quantify exposures for TCE and vinyl chloride, which act with a mutagenic mode of action (MMOA), are provided in Tables 4.7.a, 4.8.a, and Table 9.a of **Attachment K-1**.

In accordance with the methodology used to establish the RSLs for soil (EPA, 2015a), the dermal exposure route for soil was only quantified for constituents with dermal absorption fraction from soil (DABS) values, as presented in Exhibit 3-4 of EPA's Risk Assessment Guidance for Superfund Volume I: HHEM Part E, Supplemental Guidance for Dermal Risk Assessment (EPA, 2004). The DABS values used in the HHRA are presented in Table 4 Supplement B of **Attachment K-1.**

Bathroom air EPCs were calculated for volatile COPCs using the Andelman Model (1990; modified by Schaum et al., 1994) and the associated input assumptions (for example, time in shower, tap water flow rate). The estimated bathroom air EPCs are presented in Table 3-3 Supplement A of **Attachment K-1** for groundwater

Region-specific particulate emission factors (PEFs) were calculated for use in estimation of ambient air concentrations of soil COPCs through fugitive dust emissions (Table 4, Supplement C-1 of **Attachment K-1**). A PEF was calculated for trespassers and industrial workers using Equation 4-5 and Exhibit D-2 from the *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites* (EPA, 2002). Data associated with Climate Zone 9 (based on Miami, FL) and data for a 0.5-acre aerial extent of site contamination were used in the region-specific PEF calculations. EPA's default aerial extent of site contamination (that is, 0.5 acre) was used in the calculation because the number of COPC concentrations exceeding both the RSL and background levels was small. Note that

arsenic and cyanide were the only COPCs exceeding both values: three arsenic and two cyanide detected concentrations among 30 total soil samples exceeded their RSL and background levels. A separate PEF was calculated for construction workers (Table 4 Supplement C-2 of **Attachment K-1**) using Equations 5-5 and 5-6 of the aforementioned EPA document (EPA, 2002). It was assumed that the daily unpaved road traffic consists of three vehicles (one 2-ton car and two 20-ton trucks) generating particulates in the vicinity of a construction worker.

A site-specific volatilization factor (VF) for cyanide was calculated for the inhalation exposure calculations for current/future recreational users/trespassers/site visitors and future residents (Table 4 Supplement D of **Attachment K-1**). The VF was calculated using Equation 4-8 and Exhibit D-1 of the aforementioned EPA document (EPA, 2002). Consistent with the calculation of PEFs, data associated with Climate Zone 9 (based on Miami, FL) and data for a 0.5-acre aerial extent of site contamination were used in the calculation.

SECTION 4

Toxicity Assessment

The oral toxicity values (cancer slope factors [CSF] and RfD) and inhalation toxicity values (inhalation unit risks [IUR] and reference concentrations [RfC]) used in the HHRA were obtained from the EPA standard hierarchy of toxicity value sources (EPA, 2003), as follows:

- Tier 1 Source – Integrated Risk Information System (IRIS; EPA, 2015d).
- Tier 2 Source – EPA Provisional Peer-Reviewed Toxicity Values (PPRTV).
- Tier 3 Sources – Other peer-reviewed federal and state toxicity values
  - California EPA (Cal/EPA) toxicity database (Cal/EPA, 2015)
  - EPA's Health Effects Assessment Summary Tables (HEAST; EPA, 1997)
  - Minimal risk levels (MRL) identified by the Agency for Toxic Substances and Disease Registry (ATSDR, 2009)

Non-cancer toxicity values used in the HHRA are presented in Tables 5.1 and 5.2 of **Attachment K-1**. Cancer toxicity values for COPCs are provided in Tables 6.1 and 6.2 of **Attachment K-1**. Note that based on the geologic nature of chromium and the relatively low concentrations found across the site, the "total" chromium measured in the soils at SWMU 20 is very likely natural and almost solely in the immobile Cr^{3+} state (**Attachment K-8**). Therefore, exposure to chromium in soil was evaluated using the toxicity values for Chromium (III).

4.1 Non-Carcinogenic Toxicity Values

Non-carcinogenic toxicity values (oral RfDs and inhalation RfCs) were used in estimating potential adverse health effects associated with exposure to COPCs. Chronic toxicity data for potential non-carcinogenic effects of COPCs are presented in Tables 5.1 and 5.2 of **Attachment K-1**.

4.2 Carcinogenic Toxicity Values

Carcinogenic toxicity values (CSFs and IURs) were used in evaluating potential carcinogenic effects associated with exposure to known, probable, or possible carcinogens having an EPA weight-of-evidence classification of A, B, or C, respectively. CSFs and IURs were used to estimate upper-bound lifetime statistical probabilities of a hypothetical individual developing cancer as a result of exposure to a potential carcinogen. Toxicity data for potential carcinogenic effects for COPCs are presented in Tables 6.1 and 6.2 of **Attachment K-1**.

4.3 Derivation of Dermal Toxicity Values

Oral RfDs and CSFs were converted to dermal RfDs and CSFs using gastrointestinal absorption factors. The values used for this conversion were obtained from RAGS Part E, Section 4.2, and Exhibit 4-1 (EPA, 2004). Following EPA's recommendation, such a conversion was performed only when a chemical has a gastrointestinal absorption factor of less than 50 percent. If a chemical-specific gastrointestinal absorption factor was not available, gastrointestinal absorption of the chemical was assumed to be 100 percent, and the oral RfD (or oral CSF) was used as the dermal RfD (or dermal CSF) without adjustment.

4.4 Toxicity Values for Mutagenic Chemicals

Consistent with the EPA cancer guidelines and supplemental guidance (EPA, 2005a and 2005b, respectively), COPCs that act through an MMOA for carcinogenicity were evaluated using age-specific toxicity values for receptor groups including children and adolescent ages 16 and under. Vinyl chloride and TCE are two COPCs in site media that are considered to act through an MMOA. Age-specific toxicity values (continuous lifetime exposure during adulthood and continuous lifetime exposure from birth) are available for vinyl chloride, while TCE does not

have age-specific carcinogenic toxicity values. As such, the EPA's default age-dependent adjustment factors (ADAFs) were applied to the CSF and IUR of TCE when carcinogenic risk was estimated for hypothetical future child residents.

SECTION 5

Risk Characterization

Potential human health risks are discussed separately for carcinogenic and non-carcinogenic COPCs due to the different toxicological endpoints, relevant exposure durations, and methods used to estimate risk. EPA Superfund guidance considers an acceptable site ELCR range to be within 1 to 100 in a million ($1x10^{-6}$ to $1x10^{-4}$). Generally, remedial actions are not warranted for site media with an ELCR of $1x10^{-4}$ or below, or a hazard index (HI) of 1 or less, although it may be warranted if a standard (e.g., maximum contaminant level [MCL]) is exceeded, or if other site-specific information suggests to risk managers that action is appropriate.

5.1 Approach for Potential Non-Carcinogenic Effects

The HHRA evaluated the potential for non-carcinogenic effects by comparing exposure intakes of each COPC over a specified time period (chronic) with RfDs derived for similar exposure periods. In EPA methodology, this ratio of exposure to toxicity is referred to as a HQ. The HQ assumes that there is a level of exposure below which it is unlikely for even sensitive populations to experience adverse health effects. If the exposure level exceeds this threshold, there is the potential for non-cancer health effects to occur. The HQ is calculated as follows:

$$HQ = \frac{I}{RfD}$$

Where:

HQ = Hazard quotient
I = Intake level (mg/kg-day)
RfD = Reference dose (mg/kg-day)

Intake and RfD are expressed in the same units (mg/kg-day) and represent the same exposure period. A HQ that exceeds 1 (i.e., intake exceeds the RfD) indicates that there is a potential for adverse health effects associated with exposure to that COPC.

To assess the potential for non-carcinogenic health effects posed by exposure to multiple COPCs and exposure routes, an HI approach was used (EPA, 1989). This approach assumes that non-carcinogenic hazards associated with exposure to more than one COPC and exposure route are additive. Synergistic or antagonistic interactions between COPCs are not quantified. The HI may exceed 1 even if all of the individual HQs are less than 1. The HI is equal to the sum of the HQs and is calculated as follows:

$$HI = \frac{I_1}{RfD_1} + \frac{I_2}{RfD_2} + \ldots \frac{I_i}{RfD_i}$$

Where:

HI = Hazard index
I = Intake level (mg/kg-day)
RfD = Reference dose (mg/kg-day)
I_i = Intake level for the "*i*"th constituent
RfD_i = Reference dose for the "*i*"th constituent

5.2 Approach for Potential Carcinogenic Effects

The potential for carcinogenic effects due to exposure to site media was evaluated by estimating the ELCR. The ELCR is the incremental increase in the probability of developing cancer during one's lifetime (as a result of exposure to site media) above the probability of developing cancer from non-site exposures.

Potential ELCRs associated with exposure to individual carcinogens were calculated using CSFs and chronic daily intakes (CDIs) for oral and dermal contact exposures and IURs and exposure concentrations (ECs) for inhalation exposures. The linear low-dose equation was used to estimate the incremental probability of an individual developing cancer over a lifetime as a result of exposure to potential carcinogens. Estimated ELCRs are calculated by multiplying the CDI by the CSF or EC by the IUR:

$$ELCR = CDI \times CSF \quad \text{or} \quad ELCR = EC \times IUR$$

Where:

ELCR = unitless probability of developing cancer
CDI = chronic daily intake (mg/kg-day)
CSF = cancer slope factor $(mg/kg\text{-}day)^{-1}$
EC = exposure concentration [microgram per cubic meter ($\mu g/m^3$)]
IUR = inhalation unit risk $(\mu g/m^3)^{-1}$

The theoretical probability of developing cancer as a consequence of exposure to two or more COPCs and by two or more exposure pathways was calculated by summing the risk estimates for each COPC in the appropriate scenarios using the following equation:

$$Total\ ELCR = (CDI_1 \times CSF_1) + (CDI_2 \times CSF_2) + \ldots (CDI_i \times CSF_i) + (EC_1 \times IUR_1) + (EC_2 \times IUR_2) + \ldots (EC_i \times IUR_j)$$

Where:

CDI = Chronic daily intake (mg/kg-day)
CSF = Cancer slope factor $(mg/kg\text{-}day)^{-1}$
CDI_i = Chronic daily intake for the '*i*'th constituent
CSF_i = Cancer slope factor for the '*i*'th constituent
EC = Exposure concentration ($\mu g/m^3$)
IUR = Inhalation unit risk $(\mu g/m^3)^{-1}$
EC_j = Exposure concentration for the 'j'th constituent
IUR_j = Inhalation unit risk for the '*j*'th constituent

5.3 Approach for Potential Mutagenic Effects

Consistent with the Cancer Guidelines and Supplemental Guidance (EPA, 2005a; 2005b), for COPCs which act via an MMOA, ELCRs were estimated using ADAFs. Two VOCs, TCE and vinyl chloride, are COPCs at SWMU 20 that are categorized as having an MMOA. The calculations of ELCR using ADAFs are presented in Table 7.7 RME Supplement A of **Attachment K-1** for a future residential scenario. The ELCR was calculated using ADAFs (EPA, 2005a; 2005b) based on the equations provided below:

For oral and dermal exposures:

$$ELCR = (10 \times CDI_{0-2yrs} + 3 \times CDI_{2-6yrs} + 3 \times CDI_{6-16yrs} + CDI_{16-26yrs}) \times CSF$$

For inhalation exposures:

$$ELCR = (10 \times EC_{0-2yrs} + 3 \times EC_{2-6yrs} + 3 \times EC_{6-16yrs} + EC_{16-26yrs}) \times IUR$$

Where:

CDI(i-jyrs)	=	Chronic daily intake (mg/kg-day) from i to j years;
EC(i-jyrs)	=	Inhalation exposure concentration (mg/m^3) from i to j years;
CSF	=	Cancer slope factor $(mg/kg\text{-}day)^{-1}$;
IUR	=	Inhalation unit risk $(mg/m^3)^{-1}$.

5.4 Summary of Risk Estimates

Potential risk associated with exposures to COPCs in soil were quantified for the RME scenarios identified below. The calculated ELCRs and HIs are as follows:

Recreational User/Trespasser/Site Visitor – Current/Future Scenarios

Surface Soil (ingestion, dermal contact, and inhalation)

- Adult: $2x10^{-7}$ cumulative ELCR, all target organ specific HI<1 (Table 7.1 RME, summarized in Table 9.1 RME of **Attachment K-1**)
- Youth: $2x10^{-7}$ cumulative ELCR, all target organ specific HI<1 (Table 7.2 RME, summarized in Table 9.2 RME of **Attachment K-1**)
- Child: $6x10^{-7}$ cumulative ELCR, all target organ specific HI<1 (Table 7.3 RME, summarized in Table 9.3 RME of **Attachment K-1**)

Maintenance Workers – Future Scenarios

Surface Soil (ingestion, dermal contact, and inhalation)

- $1x10^{-7}$ cumulative ELCR, all target organ specific HI<1 (Table 7.4 RME, summarized in Table 9.4 RME of **Attachment K-1**)

Residents – Future Scenarios

Total soil (ingestion, dermal contact, and inhalation)

- Adult: all target organ-specific HI <1 (Table 7.5 RME, summarized in Table 9.5 RME of **Attachment K-1**)
- Child: all target organ-specific HI<1 (Table 7.6 RME, summarized in Table 9.6 RME of **Attachment K-1**)
- Adult/child aggregate: $3x10^{-6}$ ELCR (Table 7.7 RME, summarized in Table 9.7 RME of **Attachment K-1**)

Groundwater (ingestion, dermal contact, inhalation of bathroom air, and inhalation of indoor air)

- Adult: One target organ-specific HI >1 – immunological [HI = 139], due to TCE (Table 7.5 RME, summarized in Table 9.5 RME of **Attachment K-1**)
- Child: all target organ-specific HI >1 – immunological [HI = 130], due to TCE (Table 7.6 RME, summarized in Table 9.6 RME of **Attachment K-1**)
- Adult/child aggregate: $5x10^{-3}$ ELCR, due to TCE (Table 7.7 RME, summarized in Table 9.7 RME of **Attachment K-1**)

Industrial Workers – Future Scenarios

Total Soil (ingestion, dermal contact, and inhalation)

- $5x10^{-7}$ cumulative ELCR, all target organ specific HI<1 (Table 7.8 RME, summarized in Table 9.8 RME of **Attachment K-1**)

Groundwater (ingestion, dermal contact, and inhalation of indoor air)

- $8x10^{-5}$ cumulative ELCR, one target organ-specific HI >1 – immunological [HI = 22], due to TCE (Table 7.8 RME, summarized in **Table 9.8 RME** of **Attachment K-1**)

Construction Workers – Future Scenarios

Total Soil (ingestion, dermal contact, and inhalation)

- $6x10^{-8}$ cumulative ELCR, all target organ specific HI<1 (Table 7.9 RME, summarized in Table 9.9 RME of **Attachment K-1**)

5.5 Contaminants of Concern

In general, contaminants of concern (COCs) are identified when the potential ELCR or HI for a receptor group exceeds EPA threshold values (a total ELCR of $1x10^{-4}$ or a target organ-specific HI of 1) and concentrations are site-related and above background levels. When a potential ELCR of $1x10^{-4}$ is exceeded for an exposure medium for a receptor group, the COPCs above background levels and posing an individual ELCR greater than $1x10^{-6}$ in the environmental medium responsible for the unacceptable risks are identified as COCs. When a potential target organ-specific HI exceeds 1 for an exposure medium for a receptor group, the COPCs above background levels and posing a HQ greater than 0.1 for that target organ in the environmental medium responsible for the unacceptable HI are identified as COCs. Factors such as nature of contamination source, laboratory contamination, and common pesticide use (unrelated to spills, improper storage disposal, or use) are typically considered when identifying COCs.

Risk estimates for soil were less than or within EPA acceptable levels for all current and future receptor groups evaluated in this HHRA. That is, the potential ELCRs for these exposure scenarios evaluated at the site were within the target ELCR range of $1x10^{-6}$ to $1x10^{-4}$ and the estimated target organ-specific HIs were less than the threshold of 1.

Risk estimates for groundwater exceeded EPA acceptable levels for residents (adult and child) and industrial workers. Potential TCE exposures exceeded EPA acceptable levels via ingestion, dermal contact, inhalation of vapors in bathroom air, and inhalation of indoor air for residents. Potential TCE exposures also exceeded EPA acceptable levels via ingestion and inhalation of indoor air by industrial workers. PCE contributes to excess risk levels via inhalation of vapors in bathroom air, while vinyl chloride contributes to excess risk levels via ingestion and inhalation of indoor air. Therefore, TCE, PCE, and vinyl chloride are identified as COCs in site groundwater.

The estimated ELCRs and HIs for the COCs are presented in Tables 10.1 through 10.4 of **Attachment K-1**.

5.6 Uncertainty Analysis

The assumptions used in the HHRA have inherent uncertainty. While it is theoretically possible that this leads to underestimates of potential risk, the use of numerous upper-bound assumptions most likely results in conservative estimates of potential risk. A receptor group's potential exposure and subsequent potential risk are influenced by the exposure scenario and dose/response and vary on a case-by-case basis. The key assumptions in the HHRA and their influence on the numerical risk estimates and specific uncertainties associated with the HHRA are discussed in the following subsections.

5.6.1 Data Evaluation

The purpose of data evaluation is to determine which constituents, if any, are present at the site at concentrations requiring evaluation in the HHRA. Uncertainty with respect to data evaluation can arise from many sources, such as the quality of data used to characterize the site and the process used to select data and COPCs in the HHRA.

The data set for soil at the site represent a compilation of several sampling events. These subsets consist of samples that were collected at various times for different investigations. Combining these data sets introduces some uncertainty in the HHRA. The degree of potential overestimation or underestimation of risk resulting from combining all of the data is unknown but is not expected to be significant since all data were validated prior to use.

The sampling that was conducted at the site generally focused on areas of known or suspected impact from historic site use, based on previous sampling information and observations during previous construction activities. Therefore, the uncertainty in sampling and the possibility of missing a location impacted by site constituents is expected to be minimal. The uncertainty associated with the data analysis is minimal, as the data were fully validated before use in the HHRA.

For chemicals that were not detected in all samples from an environmental matrix (soil or groundwater), the reporting limits were compared to the respective EPA RSLs. The results of the comparison are presented in Table 1 of **Attachment K-7**. For groundwater, one chemical (1,4-dioxane) had reporting limits that exceeded its respective tap water RSL in groundwater. For soil, eight chemicals had sample-specific detection limits that exceeded their respective residential soil RSLs – 1,2-dibromo-3-chloropropane, 2,6-dinitrotoluene, 4,6-dinitro-2-methylphenol, benzo(a)anthracene, bis(2-Chloroethyl)ether, hexachlorobenzene, n-nitroso-di-n-propylamine, and thallium.

To assess the degree of exceedance, ELCR and HQ corresponding to the maximum reporting limits were conservatively estimated by the rations of maximum reporting limits to respective residential RSLs: residential soil and tap water RSLs were used for chemicals in soil and groundwater, respectively (Table 2 of **Attachment K-7**). Estimated individual ELCR ranged from 1×10^{-6} to 5×10^{-6}, while estimated noncarcinogenic HQ ranged from 0.002 to 0.7.

- The degree of screening level exceedance based on the maximum reporting limit was relatively small
- The conservatively estimated risk based on the maximum reporting limit was less than the target level of 10^{-4} and all non-carcinogenic HQs were less than 1
- If these chemicals were actually present at a concentration between the reporting limit and method detection limit, then typically the laboratory would have reported it as an estimated concentration ("J" qualified) instead of a non-detect
- Further, many of these chemicals are not believed to be directly related to historical site activities

Therefore, although the maximum reporting limits of several chemicals exceeded their respective RSLs, this is expected to have little impact on the overall risk conclusions

5.6.2 Exposure Point Concentrations

The HHRA assumed that soil and groundwater EPCs remain constant throughout the exposure period within the exposure area. This assumption results in an overestimation of risk since, because of the lack of a continuous release source, concentrations of volatile COPCs will decrease over the assumed 20 to 25-year exposure durations used in the HHRA.

In accordance with EPA guidance (EPA, 1992), the 95 percent UCL of the arithmetic mean chemical concentration was used as the EPC for each COPC in each exposure medium. This approach likely will lead to an overestimation of exposure because receptors are assumed to be exposed to the 95 percent UCL concentration for the entire exposure duration.

There is some uncertainty regarding the representation of the current VOC concentrations as potential future exposure concentrations. As observed at MW-24, the concentrations of COPCs may fluctuate and could be higher over a short time period. However, the COPC concentrations in the wells (for example, MW-17) approximately 200 feet upgradient of MW-24 are considerably lower; therefore, if higher concentrations are observed in the future, they will likely be short-lived and will not increase the conservatively estimated risk results presented in the HHRA.

The maximum detected concentrations in groundwater were used to estimate future EPCs in indoor air (via vapor intrusion) because future building characteristics and construction locations are unknown. However, using the maximum detected concentrations will likely lead to an overestimation of exposure because receptors are assumed to be exposed to COPCs based on the maximum detected concentration for their entire exposure duration.

The default attenuation factor (AF, 0.001) incorporated into EPA's groundwater VISLs is conservative, particularly for industrial buildings. The screening levels for groundwater are calculated from the target indoor air concentrations using empirically-based conservative "generic" AFs that reflect generally reasonable worst-case conditions (i.e., residential structures) as described in the EPA's Final Vapor Intrusion Guidance (EPA, 2015b,c).

Therefore, the VISLs used in the groundwater screening may overestimate the potential for vapor intrusion (VI) at the site.

5.6.3 Exposure Assumptions

In accordance with EPA guidance and the Vieques Master HHRA Protocol (CH2M, 2010), exposure estimates were calculated for an RME scenario. An RME scenario results in upper-bound exposure estimates and likely overestimates actual site exposures. For example, the industrial worker is assumed to dermally contact soil for 250 days per year for 25 years. Any actual risks are likely to be less than the potential risks presented in this HHRA.

The future soil exposure scenario introduces additional conservatism by assuming that the subsurface soil will become surface soil during future construction activities, and that future receptors may come in contact with the soil currently situated 0 to 6 feet bgs. During many construction projects, clean fill material such as topsoil is placed over the soil that is disturbed during excavation. The topsoil material generally is needed to support growth of grass and other landscape plants. If clean fill material is used, potential future soil exposures by residents and industrial workers were overestimated.

5.6.4 Toxicity Assessment

Significant uncertainties exist in estimated non-carcinogenic toxicity values. Non-carcinogenic toxicity effects are effects with a threshold. For many non-carcinogenic effects, protective mechanisms, which must be overcome before an adverse effect is manifest, are believed to exist in the human body. As a result, humans can tolerate chemical exposures ranging from zero to a certain point (threshold) without expressing adverse effects.

The chemical concentrations to which people potentially are exposed in an environmental setting are usually much lower than the levels used in the studies from which dose-response relationships are developed. Therefore, estimating potential health effects from environmental exposure requires the use of models that allow the extrapolation of health effects.

The lack of a demonstrated threshold in dose-response relationships for carcinogens implies a finite risk of cancer even for low doses of carcinogenic chemicals (EPA, 1989). EPA SFs typically are derived using the 95 percent UCL of the slope predicted by the linearized multistage model. The multistage model assumes that carcinogenesis results from a series of interactions between the carcinogenic chemical and deoxyribonucleic acid (DNA), with the rate of interactions linearly related to dose. EPA recognizes that this method produces conservative risk estimates and that other mathematical models exist. Several other dose-response models are available for low-dose extrapolation. These include the probit (the one-hit), logit, and Weibull models (EPA, 1989). There currently is not enough understanding of the biological mechanisms involved in cancer induction to suggest that any one of these models is able to predict more accurately than another. Because each model is based on different assumptions, the estimates that are derived can differ by several orders of magnitude.

5.6.5 Risk Characterization

The potential risk of adverse health effects is characterized based on potential exposures and potential dose-response relationships. An important additional source of uncertainty is introduced in this phase of the HHRA–the combination of upper-bound intake estimates with upper-bound toxicity estimates.

Generally, the goal of a baseline risk assessment is to estimate an upper-bound, but reasonable, potential risk. Such an upper-bound estimate can be derived in several ways, depending on how conservative one wants the final estimate to be. HHRAs combine several upper-bound assumptions to estimate potential risk.

Most of the assumptions about exposure and toxicity used in this HHRA are representative of statistical upper-bounds for each parameter. The result of combining several such upper-bound assumptions is that the final estimate of potential exposure or potential risk is conservative.

SECTION 6

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Attachment K-1
RAGS Part D Tables

TABLE 1
Selection of Exposure Pathways
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Soil	Surface Soil (0-1 feet)	Surface Soil (0-1 feet)	Recreational User/ Trespasser/	Adult/Youth/Child (3)	Dermal	On-site	Quant	Recreational Users/Trespassers/Site Visitors may contact surface soil while visiting the site.
						Ingestion	On-site	Quant	
		Ambient Air	Emissions from Surface Soil	Recreational User/ Trespasser/ Site Visitor (1)	Adult/Youth/Child (3)	Inhalation	On-site	Quant	Recreational Users/Trespassers/Site Visitors may inhale dust from surface soil while visiting the site.
Future	Soil	Surface Soil (0-1 feet)	Surface Soil (0-1 feet)	Resident (4)	Adult/Child	Dermal	On-site	Quant	The site will not be developed for residential use; however, the residential scenario is included to evaluate unrestricted land use.
						Ingestion	On-site	Quant	
				Maintenance Worker (2)	Adult	Dermal	On-site	Quant	Based on likely occupational duties, it is assumed that maintenance workers may come in contact with surface soil.
						Ingestion	On-site	Quant	
		Ambient Air	Emissions from Surface Soil	Resident	Adult/Child	Inhalation	On-site	Quant	The site will not be developed for residential use; however, the residential scenario is included to evaluate unrestricted land use.
				Maintenance Worker (2)	Adult	Inhalation	On-site	Quant	Based on likely occupational duties, it is assumed that maintenance workers may inhale dust from surface soil.
		Total Soil (0-6 feet)	Total Soil (0-6 feet)	Resident (4)	Adult/Child	Dermal	On-site	Quant	The site will not be developed for residential use; however, the residential scenario is included to evaluate unrestricted land use.
						Ingestion	On-site	Quant	
				Industrial Worker	Adult	Dermal	On-site	Quant	The site will not be developed for industrial use; however, Industrial workers were assumed to contact soil while performing occupational duties at the site.
						Ingestion	On-site	Quant	
				Construction Worker	Adult	Dermal	On-site	Quant	Construction workers may contact soil while performing activities at the site.
						Ingestion	On-site	Quant	
		Ambient Air	Emissions from Total Soil	Resident	Adult/Child	Inhalation	On-site	Quant	The site will not be developed for residential use; however, the residential scenario is included to evaluate unrestricted land use.
				Industrial Worker	Adult	Inhalation	On-site	Quant	The site will not be developed for industrial use; however, Industrial workers were assumed to inhale dust from soil.
				Construction Worker	Adult	Inhalation	On-site	Quant	Site redevelopment is not expected; however, if construction workers were present, they may inhale dust from soil while performing activities at the site.
Future	Groundwater	Groundwater	Groundwater	Resident	Adult	Dermal	On-site	Quant	The site will not be developed for residential use; however, the residential scenario is included to evaluate unrestricted land use, including potable use of groundwater.
						Ingestion	On-site	Quant	
					Child	Dermal	On-site	Quant	
						Ingestion	On-site	Quant	
				Industrial Worker	Adult	Dermal	On-site	Quant	The site will not be developed for industrial use; however, Industrial workers were assumed to use groundwater as a potable water supply. Dermal exposures are assumed to occur from hand and face washing.
						Ingestion	On-site	Quant	The site will not be developed for industrial use; however, Industrial workers were assumed to use groundwater as a potable water supply.
		Bathroom Air	Water Vapors in Bathroom	Resident	Adult	Inhalation	On-site	Quant	The site will not be developed for residential use; however, the residential scenario is included to evaluate unrestricted land use, including inhalation of volatile groundwater constituents during showering (adult) and bathing (child).
					Child	Inhalation	On-site	Quant	
		Indoor Air	Indoor Air	Resident	Adult	Inhalation	On-site	Quant	The site will not be developed for residential use; however, the residential scenario is included to evaluate unrestricted land use, including inhalation of volatile groundwater constituents that have migrated to indoor air via vapor intrusion.
					Child	Inhalation	On-site	Quant	
				Industrial Worker	Adult	Inhalation	On-site	Quant	The site will not be developed for industrial use; however, the industrial scenario evaluation includes inhalation of volatile groundwater constituents that have migrated to indoor air via vapor intrusion.

Notes:
(1) Recreational user scenario is used as an adequate representation of the trespasser and site visitor scenarios.

(2) Maintenance workers are assumed to be USFWS workers. However, there is no specific planned future use of the site by USFWS. Therefore, the default maintenance worker presented in the final HHRA Protocol (CH2M HILL, 2010b) was evaluated in the HHRA for SWMU 20.
(3) The age group for child is 1-6 years old and the age group for youth is 6-16 years old.

(4) For the residential scenario, two soil intervals were evaluated - surface soil (0-1 ft bgs) and total soil (0-6 ft bgs). The intervals were compared to residential soil RSLs; for each chemical of potential concern, the higher exposure point concentration of the two depth intervals was used.
Quant: Quantitative

TABLE 2.1
Occurrence, Distribution and Selection of Chemicals of Potential Concern
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Scenario Timeframe: Current/Future and Future
Medium: Soil
Exposure Medium: Surface Soil (0-1 foot) (Recreational User/Trespasser/Site Visitor and Resident)

Exposure Point	CAS Number	Chemical	Minimum Concentration Qualifier		Maximum Concentration Qualifier		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value KTd (2)	Background Value Qs (2)	Screening Toxicity Value (3)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Selection or Deletion (4)
Surface Soil (0-1 foot)	7429-90-5	Aluminum	5.72E+03	J	1.33E+04		MG/KG	EPI04-SO14	14 / 14	-	1.33E+04	3.50E+04	3.50E+04	7.70E+03	n	NA	NA	Yes	ASL
	7440-36-0	Antimony	5.80E-01	J	8.20E-01	J	MG/KG	EPI04-SO11	3 / 14	6.4 - 6.8	8.20E-01	--	--	3.10E+00	n	NA	NA	No	BSL
	7440-38-2	Arsenic	3.50E-01	J	3.20E+00	J	MG/KG	EPI04-SO01	4 / 14	1.1 - 1.1	3.20E+00	1.60E+00	1.60E+00	6.80E-01	c R	NA	NA	Yes	ASL
	7440-39-3	Barium	3.30E+01	J	1.68E+02		MG/KG	EPI04-SO14	14 / 14	-	1.68E+02	1.47E+02	2.12E+02	1.50E+03	n	NA	NA	No	BSL
	7440-41-7	Beryllium	3.90E-02	J	7.00E-02	J	MG/KG	EPI04-SO12	2 / 14	0.53 - 0.56	7.00E-02	2.70E-01	2.70E-01	1.60E+01	n	NA	NA	No	BSL
	7440-43-9	Cadmium	1.10E-01	J	1.50E-01	J	MG/KG	EPI04-SO08	2 / 14	0.53 - 0.56	1.50E-01	2.20E+00	2.20E+00	7.10E+00	n	NA	NA	No	BSL
	7440-70-2	Calcium	2.77E+03		1.71E+05	J	MG/KG	EPI04-SO01	14 / 14	-	1.71E+05	8.84E+03	1.19E+04	NUT		NA	NA	--	NUT
	7440-47-3	Chromium	8.30E+00		1.43E+01		MG/KG	EPI04-SO14	14 / 14	-	1.43E+01	7.20E+01	7.20E+01	3.00E-01	c	NA	NA	Yes	ASL
	7440-48-4	Cobalt	8.30E+00	J	1.49E+01		MG/KG	EPI04-SO14	13 / 14	5.6 - 5.6	1.49E+01	1.60E+01	1.60E+01	2.30E+00	n	NA	NA	Yes	ASL
	7440-50-8	Copper	1.99E+01	J	5.28E+01		MG/KG	EPI04-SO14	14 / 14	-	5.28E+01	6.60E+01	5.30E+01	3.10E+02	n	NA	NA	No	BSL
	57-12-5	Cyanide	2.30E-01	J	7.20E-01	J	MG/KG	EPI04-SO04	3 / 14	2.7 - 2.8	7.20E-01	3.30E-01	3.30E-01	2.70E-01	n	NA	NA	Yes	ASL
	7439-89-6	Iron	1.36E+04		2.47E+04		MG/KG	EPI04-SO08	14 / 14	-	2.47E+04	3.81E+04	3.81E+04	5.50E+03	n	NA	NA	Yes	ASL
	7439-92-1	Lead	2.30E+00	J	2.88E+01	J	MG/KG	EPI04-SO01	14 / 14	-	2.88E+01	5.40E+00	5.40E+00	4.00E+02	L	NA	NA	No	BSL
	7439-95-4	Magnesium	1.38E+03	J	2.70E+04	J	MG/KG	EPI04-SO01	14 / 14	-	2.70E+04	3.71E+03	2.22E+04	NUT		NA	NA	--	NUT
	7439-96-5	Manganese	2.65E+02	J	9.68E+02		MG/KG	EPI04-SO14	14 / 14	-	9.68E+02	1.63E+03	1.63E+03	1.80E+02	n	NA	NA	Yes	ASL
	7440-02-0	Nickel	4.60E+00	J	8.20E+00		MG/KG	EPI04-SO14	9 / 14	4.3 - 4.5	8.20E+00	2.20E+01	2.20E+01	1.50E+02	n	NA	NA	No	BSL
	7440-09-7	Potassium	7.53E+02	J	2.42E+03	J	MG/KG	EPI04-SO14	14 / 14	-	2.42E+03	5.27E+03	5.27E+03	NUT		NA	NA	--	NUT
	7782-49-2	Selenium	4.40E-01	J	7.80E-01	J	MG/KG	EPI04-SO14	9 / 14	3.7 - 7.8	7.80E-01	5.10E-01	5.10E-01	3.90E+01	n	NA	NA	No	BSL
	7440-62-2	Vanadium	3.79E+01	J	8.61E+01		MG/KG	EPI04-SO14	14 / 14	-	8.61E+01	1.44E+02	1.44E+02	3.90E+01	n	NA	NA	Yes	ASL
	7440-66-6	Zinc	1.38E+01	J	3.87E+01	J	MG/KG	EPI04-SO06	14 / 14	-	3.87E+01	3.20E+01	3.20E+01	2.30E+03	n	NA	NA	No	BSL
	72-54-8	4,4'-DDD	2.10E-03	J	3.10E-03	J	MG/KG	EPI04-SO07	2 / 13	0.0035 - 0.0037	3.10E-03	NA	NA	2.30E+00	c	NA	NA	No	BSL
	72-55-9	4,4'-DDE	1.20E-03	J	6.20E-01		MG/KG	EPI04-SO06	13 / 13	-	6.20E-01	NA	NA	2.00E+00	c	NA	NA	No	BSL
	50-29-3	4,4'-DDT	1.40E-03	J	1.00E-01		MG/KG	EPI04-SO06	10 / 13	0.0035 - 0.0037	1.00E-01	NA	NA	1.90E+00	c	NA	NA	No	BSL
	11096-82-5	Aroclor-1260	2.80E-02	J	2.80E-02	J	MG/KG	EPI04-SO12	1 / 7	0.035 - 0.037	2.80E-02	NA	NA	2.40E-01	c	NA	NA	No	BSL
	319-86-8	delta-BHC	7.50E-04	J	7.50E-04	J	MG/KG	EPI04-SO06	1 / 13	0.0018 - 0.0019	7.50E-04	NA	NA	3.00E-01	c	NA	NA	No	BSL
	959-98-8	Endosulfan I	4.40E-04	J	4.40E-04	J	MG/KG	EPI04-SO10	1 / 13	0.0018 - 0.0037	4.40E-04	NA	NA	4.70E+01	n	NA	NA	No	BSL
	5103-74-2	gamma-Chlordane	5.70E-04	J	1.00E-03	J	MG/KG	EPI04-SO06	4 / 13	0.0018 - 0.0019	1.00E-03	NA	NA	1.70E+00	c	NA	NA	No	BSL
	117-81-7	bis(2-Ethylhexyl)phthalate	1.30E-01	J	1.30E-01	J	MG/KG	EPI04-SO14	1 / 14	0.35 - 0.37	1.30E-01	NA	NA	3.90E+01	c	NA	NA	No	BSL
	67-64-1	Acetone	2.80E-02	J	2.80E-02	J	MG/KG	EPI04-SO03	1 / 14	0.01 - 0.014	2.80E-02	NA	NA	6.10E+03	n	NA	NA	No	BSL
	75-15-0	Carbon disulfide	1.00E-02	J	1.00E-02	J	MG/KG	EPI04-SO03	1 / 14	0.01 - 0.014	1.00E-02	NA	NA	7.70E+01	n	NA	NA	No	BSL

(1) Maximum concentration is used for screening.

(2) East Vieques Surface Soil Type KTd
East Vieques Surface Soil Type Qa.

(3) Regional Screening Levels for Residential Soil (June 2015). Concentrations based on non-carcinogenic health effects are adjusted using an HI=0.1.

The SL for Chromium(VI) was used as SL for Chromium
The SL for Hexachlorocyclohexane, Technical was used as SL for delta-BHC
The SL for Endosulfan was used as SL for Endosulfan I
The SL for Chlordane was used as SL for gamma-Chlordane
The SL for Endrin was used as SL for Endrin aldehyde

(4) Rationale Codes
Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Below Screening Level (BSL)
Essential Nutrient (NUT)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/
To Be Considered

c = Carcinogenic
HI = Hazard index
J = compound was detected below the reporting limit in the sample
L = Screening level for lead is based on EPA's Integrated Exposure Uptake Biokinetic (IEUBK) Model
mg/kg = milligram per kilogram
n = Noncarcinogenic
R = Relative bioavailability absorption was applied
NA = Not available
SL = Screening level

TABLE 2.1a
Occurrence, Distribution and Selection of Chemicals of Potential Concern
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil (0-1 foot) (Maintenance Worker)

Exposure Point	CAS Number	Chemical	Minimum Concentration Qualifier		Maximum Concentration Qualifier		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value KTd (2)	Background Value Qs (2)	Screening Toxicity Value (3)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Selection or Deletion (4)
Surface Soil (0-1 foot)	7429-90-5	Aluminum	5.72E+03	J	1.33E+04		MG/KG	EPI04-SO14	14 / 14	-	1.33E+04	3.50E+04	3.50E+04	1.10E+05	n	NA	NA	No	BSL
	7440-36-0	Antimony	5.80E-01	J	8.20E-01	J	MG/KG	EPI04-SO11	3 / 14	6.4 - 6.8	8.20E-01	--	--	4.70E+01	n	NA	NA	No	BSL
	7440-38-2	Arsenic	3.50E-01	J	3.20E+00	J	MG/KG	EPI04-SO01	4 / 14	1.1 - 1.1	3.20E+00	1.60E+00	1.60E+00	3.00E+00	cR	NA	NA	Yes	ASL
	7440-39-3	Barium	3.30E+01	J	1.68E+02		MG/KG	EPI04-SO14	14 / 14	-	1.68E+02	1.47E+02	2.12E+02	2.20E+04	n	NA	NA	No	BSL
	7440-41-7	Beryllium	3.90E-02	J	7.00E-02	J	MG/KG	EPI04-SO12	2 / 14	0.53 - 0.56	7.00E-02	2.70E-01	2.70E-01	2.30E+02	n	NA	NA	No	BSL
	7440-43-9	Cadmium	1.10E-01	J	1.50E-01	J	MG/KG	EPI04-SO08	2 / 14	0.53 - 0.56	1.50E-01	2.20E+00	2.20E+00	9.80E+01	n	NA	NA	No	BSL
	7440-70-2	Calcium	2.77E+03		1.71E+05	J	MG/KG	EPI04-SO01	14 / 14	-	1.71E+05	8.84E+03	1.19E+04	NUT		NA	NA	--	NUT
	7440-47-3	Chromium	8.30E+00		1.43E+01		MG/KG	EPI04-SO14	14 / 14	-	1.43E+01	7.20E+01	7.20E+01	6.30E+00	c	NA	NA	Yes	ASL
	7440-48-4	Cobalt	8.30E+00	J	1.49E+01		MG/KG	EPI04-SO14	13 / 14	5.6 - 5.6	1.49E+01	1.60E+01	1.60E+01	3.50E+01	n	NA	NA	No	BSL
	7440-50-8	Copper	1.99E+01	J	5.28E+01		MG/KG	EPI04-SO14	14 / 14	-	5.28E+01	6.60E+01	5.30E+01	4.70E+03	n	NA	NA	No	BSL
	57-12-5	Cyanide	2.30E-01	J	7.20E-01	J	MG/KG	EPI04-SO04	3 / 14	2.7 - 2.8	7.20E-01	3.30E-01	3.30E-01	1.20E+00	n	NA	NA	No	BSL
	7439-89-6	Iron	1.36E+04		2.47E+04		MG/KG	EPI04-SO08	14 / 14	-	2.47E+04	3.81E+04	3.81E+04	8.20E+04	n	NA	NA	No	BSL
	7439-92-1	Lead	2.30E+00	J	2.88E+01	J	MG/KG	EPI04-SO01	14 / 14	-	2.88E+01	5.40E+00	5.40E+00	8.00E+02	L	NA	NA	No	BSL
	7439-95-4	Magnesium	1.38E+03	J	2.70E+04	J	MG/KG	EPI04-SO01	14 / 14	-	2.70E+04	3.71E+03	2.22E+04	NUT		NA	NA	--	NUT
	7439-96-5	Manganese	2.65E+02	J	9.68E+02		MG/KG	EPI04-SO14	14 / 14	-	9.68E+02	1.63E+03	1.63E+03	2.60E+03	n	NA	NA	No	BSL
	7440-02-0	Nickel	4.60E+00	J	8.20E+00		MG/KG	EPI04-SO14	9 / 14	4.3 - 4.5	8.20E+00	2.20E+01	2.20E+01	2.20E+03	n	NA	NA	No	BSL
	7440-09-7	Potassium	7.53E+02	J	2.42E+03	J	MG/KG	EPI04-SO14	14 / 14	-	2.42E+03	5.27E+03	5.27E+03	NUT		NA	NA	--	NUT
	7782-49-2	Selenium	4.40E-01	J	7.80E-01	J	MG/KG	EPI04-SO14	9 / 14	3.7 - 7.8	7.80E-01	5.10E-01	5.10E-01	5.80E+02	n	NA	NA	No	BSL
	7440-62-2	Vanadium	3.79E+01	J	8.61E+01		MG/KG	EPI04-SO14	14 / 14	-	8.61E+01	1.44E+02	1.44E+02	5.80E+02	n	NA	NA	No	BSL
	7440-66-6	Zinc	1.38E+01	J	3.87E+01	J	MG/KG	EPI04-SO06	14 / 14	-	3.87E+01	3.20E+01	3.20E+01	3.50E+04	n	NA	NA	No	BSL
	72-54-8	4,4'-DDD	2.10E-03	J	3.10E-03	J	MG/KG	EPI04-SO07	2 / 13	0.0035 - 0.0037	3.10E-03	NA	NA	9.60E+00	c	NA	NA	No	BSL
	72-55-9	4,4'-DDE	1.20E-03	J	6.20E-01		MG/KG	EPI04-SO06	13 / 13	-	6.20E-01	NA	NA	9.30E+00	c	NA	NA	No	BSL
	50-29-3	4,4'-DDT	1.40E-03	J	1.00E-01		MG/KG	EPI04-SO06	10 / 13	0.0035 - 0.0037	1.00E-01	NA	NA	8.50E+00	c	NA	NA	No	BSL
	11096-82-5	Aroclor-1260	2.80E-02	J	2.80E-02	J	MG/KG	EPI04-SO12	1 / 7	0.035 - 0.037	2.80E-02	NA	NA	9.90E-01	c	NA	NA	No	BSL
	319-86-8	delta-BHC	7.50E-04	J	7.50E-04	J	MG/KG	EPI04-SO06	1 / 13	0.0018 - 0.0019	7.50E-04	NA	NA	1.30E+00	c	NA	NA	No	BSL
	959-98-8	Endosulfan I	4.40E-04	J	4.40E-04	J	MG/KG	EPI04-SO10	1 / 13	0.0018 - 0.0037	4.40E-04	NA	NA	7.00E+02	n	NA	NA	No	BSL
	5103-74-2	gamma-Chlordane	5.70E-04	J	1.00E-03	J	MG/KG	EPI04-SO06	4 / 13	0.0018 - 0.0019	1.00E-03	NA	NA	7.50E+00	c	NA	NA	No	BSL
	117-81-7	bis(2-Ethylhexyl)phthalate	1.30E-01	J	1.30E-01	J	MG/KG	EPI04-SO14	1 / 14	0.35 - 0.37	1.30E-01	NA	NA	1.60E+02	c	NA	NA	No	BSL
	67-64-1	Acetone	2.80E-02	J	2.80E-02	J	MG/KG	EPI04-SO03	1 / 14	0.01 - 0.014	2.80E-02	NA	NA	6.70E+04	n	NA	NA	No	BSL
	75-15-0	Carbon disulfide	1.00E-02	J	1.00E-02	J	MG/KG	EPI04-SO03	1 / 14	0.01 - 0.014	1.00E-02	NA	NA	3.50E+02	n	NA	NA	No	BSL

(1) Maximum concentration is used for screening.

(2) East Vieques Surface Soil Type KTd
East Vieques Surface Soil Type Qa.

(3) Regional Screening Levels for Industrial Soil (June 2015). Concentrations based on non-carcinogenic health effects are adjusted using an HI=0.1.

The SL for Chromium(VI) was used as SL for Chromium
The SL for Hexachlorocyclohexane, Technical was used as SL for delta-BHC
The SL for Endosulfan was used as SL for Endosulfan I
The SL for Chlordane was used as SL for gamma-Chlordane
The SL for Endrin was used as SL for Endrin aldehyde

(4) Rationale Codes
Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Below Screening Level (BSL)
Essential Nutrient (NUT)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered

c = Carcinogenic
HI = Hazard index
J = compound was detected below the reporting limit in the sample
L = Screening level for lead is based on EPA's Adult Lead Methodology (ALM) Model
mg/kg = milligram per kilogram
n = Noncarcinogenic
R = Relative bioavailability absorption was applied
NA = Not available
SL = Screening level

TABLE 2.2
Occurrence, Distribution and Selection of Chemicals of Potential Concern
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Total Soil (0-6 feet) (Resident)

Exposure Point	CAS Number	Chemical	Minimum Concentration Qualifier		Maximum Concentration Qualifier		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value KTd (2)	Background Value Qs (2)	Screening Toxicity Value (3)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Selection or Deletion (4)
Total Soil (0-6 feet)	7429-90-5	Aluminum	5.72E+03	J	1.67E+04		MG/KG	EPI04-SO11	30 / 30	-	1.67E+04	3.50E+04	3.50E+04	7.70E+03	n	NA	NA	Yes	ASL
	7440-36-0	Antimony	2.70E-01	J	8.20E-01	J	MG/KG	EPI04-SO11	9 / 30	6.3 - 6.9	8.20E-01	--	--	3.10E+00	n	NA	NA	No	BSL
	7440-38-2	Arsenic	3.50E-01	J	3.20E+00	J	MG/KG	EPI04-SO01	6 / 30	1 - 1.2	3.20E+00	1.60E+00	1.60E+00	6.80E-01	cR	NA	NA	Yes	ASL
	7440-39-3	Barium	3.30E+01	J	1.68E+02		MG/KG	EPI04-SO14	30 / 30	-	1.68E+02	1.47E+02	2.12E+02	1.50E+03	n	NA	NA	No	BSL
	7440-41-7	Beryllium	3.40E-02	J	7.00E-02	J	MG/KG	EPI04-SO12	3 / 30	0.52 - 0.58	7.00E-02	2.70E-01	2.70E-01	1.60E+01	n	NA	NA	No	BSL
	7440-43-9	Cadmium	7.90E-02	J	1.50E-01	J	MG/KG	EPI04-SO08	3 / 30	0.52 - 0.58	1.50E-01	2.20E+00	2.20E+00	7.10E+00	n	NA	NA	No	BSL
	7440-70-2	Calcium	2.05E+03	J	1.71E+05	J	MG/KG	EPI04-SO01	30 / 30	-	1.71E+05	8.84E+03	1.19E+04	NUT		NA	NA	--	NUT
	7440-47-3	Chromium	8.30E+00		1.81E+01		MG/KG	EPI04-SO11	30 / 30	-	1.81E+01	7.20E+01	7.20E+01	3.00E-01	c	NA	NA	Yes	ASL
	7440-48-4	Cobalt	7.40E+00	J	1.58E+01		MG/KG	EPI04-SO11	29 / 30	5.6 - 5.6	1.58E+01	1.60E+01	1.60E+01	2.30E+00	n	NA	NA	Yes	ASL
	7440-50-8	Copper	1.99E+01	J	1.11E+02		MG/KG	EPI04-SO11	30 / 30	-	1.11E+02	6.60E+01	5.30E+01	3.10E+02	n	NA	NA	No	BSL
	57-12-5	Cyanide	2.10E-01	J	7.20E-01	J	MG/KG	EPI04-SO04	4 / 30	2.6 - 2.9	7.20E-01	3.30E-01	3.30E-01	2.70E-01	n	NA	NA	Yes	ASL
	7439-89-6	Iron	1.36E+04		3.00E+04		MG/KG	EPI04-SO11	30 / 30	-	3.00E+04	3.81E+04	3.81E+04	5.50E+03	n	NA	NA	Yes	ASL
	7439-92-1	Lead	1.10E+00	J	2.88E+01	J	MG/KG	EPI04-SO01	29 / 30	1 - 1	2.88E+01	3.30E+00	3.30E+00	4.00E+02	L	NA	NA	No	BSL
	7439-95-4	Magnesium	1.38E+03	J	2.70E+04	J	MG/KG	EPI04-SO01	30 / 30	-	2.70E+04	3.71E+03	2.22E+04	NUT		NA	NA	--	NUT
	7439-96-5	Manganese	2.65E+02	J	9.68E+02		MG/KG	EPI04-SO14	30 / 30	-	9.68E+02	1.63E+03	1.63E+03	1.80E+02	n	NA	NA	Yes	ASL
	7440-02-0	Nickel	4.50E+00	J	1.15E+01	J	MG/KG	EPI04-SO11	25 / 30	4.3 - 4.5	1.15E+01	2.20E+01	2.20E+01	1.50E+02	n	NA	NA	No	BSL
	7440-09-7	Potassium	6.70E+02	J	2.42E+03	J	MG/KG	EPI04-SO14	22 / 30	521 - 577	2.42E+03	2.00E+03	2.00E+03	NUT		NA	NA	--	NUT
	7782-49-2	Selenium	4.40E-01	J	7.80E-01	J	MG/KG	EPI04-SO14	15 / 30	3.7 - 7.8	7.80E-01	5.10E-01	5.10E-01	3.90E+01	n	NA	NA	No	BSL
	7440-23-5	Sodium	4.70E+02	J	6.36E+02	J	MG/KG	EPI04-SO13	2 / 30	521 - 577	6.36E+02	2.25E+03	2.25E+03	NUT		NA	NA	--	NUT
	7440-62-2	Vanadium	3.79E+01	J	1.13E+02		MG/KG	EPI04-SO11	30 / 30	-	1.13E+02	1.44E+02	1.44E+02	3.90E+01	n	NA	NA	Yes	ASL
	7440-66-6	Zinc	1.38E+01	J	3.87E+01	J	MG/KG	EPI04-SO06	30 / 30	-	3.87E+01	3.20E+01	3.20E+01	2.30E+03	n	NA	NA	No	BSL
	72-54-8	4,4'-DDD	8.90E-04	J	3.10E-03	J	MG/KG	EPI04-SO07	4 / 26	0.0034 - 0.0038	3.10E-03	NA	NA	2.30E+00	c	NA	NA	No	BSL
	72-55-9	4,4'-DDE	7.90E-04	J	6.20E-01		MG/KG	EPI04-SO06	21 / 26	0.0034 - 0.0038	6.20E-01	NA	NA	2.00E+00	c	NA	NA	No	BSL
	50-29-3	4,4'-DDT	1.40E-03	J	1.00E-01		MG/KG	EPI04-SO06	15 / 26	0.0034 - 0.0038	1.00E-01	NA	NA	1.90E+00	c	NA	NA	No	BSL
	11096-82-5	Aroclor-1260	2.80E-02	J	2.80E-02	J	MG/KG	EPI04-SO12	1 / 14	0.035 - 0.038	2.80E-02	NA	NA	2.40E-01	c	NA	NA	No	BSL
	319-86-8	delta-BHC	7.50E-04	J	7.50E-04	J	MG/KG	EPI04-SO06	1 / 26	0.0018 - 0.002	7.50E-04	NA	NA	3.00E-01	c	NA	NA	No	BSL
	959-98-8	Endosulfan I	4.40E-04	J	4.40E-04	J	MG/KG	EPI04-SO10	1 / 26	0.0018 - 0.0037	4.40E-04	NA	NA	4.70E+01	n	NA	NA	No	BSL
	7421-93-4	Endrin aldehyde	1.50E-03	J	1.50E-03	J	MG/KG	EPI04-SO08	1 / 26	0.0034 - 0.0073	1.50E-03	NA	NA	1.90E+00	n	NA	NA	No	BSL
	5103-74-2	gamma-Chlordane	4.50E-04	J	1.10E-03	J	MG/KG	EPI04-SO10	10 / 26	0.0018 - 0.002	1.10E-03	NA	NA	1.70E+00	c	NA	NA	No	BSL
	117-81-7	bis(2-Ethylhexyl)phthalate	1.30E-01	J	1.30E-01	J	MG/KG	EPI04-SO14	1 / 30	0.34 - 0.38	1.30E-01	NA	NA	3.90E+01	c	NA	NA	No	BSL
	67-64-1	Acetone	2.80E-02	J	2.80E-02	J	MG/KG	EPI04-SO03	1 / 30	0.01 - 0.014	2.80E-02	NA	NA	6.10E+03	n	NA	NA	No	BSL
	75-15-0	Carbon disulfide	1.00E-02	J	1.00E-02	J	MG/KG	EPI04-SO03	1 / 30	0.01 - 0.014	1.00E-02	NA	NA	7.70E+01	n	NA	NA	No	BSL

(1) Maximum concentration is used for screening.

(2) East Vieques Surface Soil Type KTd
East Vieques Surface Soil Type Qa.

(3) Regional Screening Levels for Residential Soil (June 2015). Concentrations based on non-carcinogenic health effects are adjusted using an HI=0.1.

The SL for Chromium(VI) was used as SL for Chromium
The SL for Hexachlorocyclohexane, Technical was used as SL for delta-BHC
The SL for Endosulfan was used as SL for Endosulfan I
The SL for Chlordane was used as SL for gamma-Chlordane
The SL for Endrin was used as SL for Endrin aldehyde

(4) Rationale Codes
Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Below Screening Level (BSL)
Essential Nutrient (NUT)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/
To Be Considered

c = Carcinogenic
HI = Hazard index
J = compound was detected below the reporting limit in the sample
L = Screening level for lead is based on EPA's Integrated Exposure Uptake Biokinetic (IEUBK) Model
mg/kg = milligram per kilogram
n = Noncarcinogenic
R = Relative bioavailability absorption was applied
NA = Not available
SL = Screening level

TABLE 2.2a
Occurrence, Distribution and Selection of Chemicals of Potential Concern
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Total Soil (0-6 feet) (Industrial and Construction Worker)

Exposure Point	CAS Number	Chemical	Minimum Concentration Qualifier		Maximum Concentration Qualifier		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value KTd (2)	Background Value Qs (2)	Screening Toxicity Value (3)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Selection or Deletion (4)
Total Soil (0-6 feet)	7429-90-5	Aluminum	5.72E+03	J	1.67E+04		MG/KG	EPI04-SO11	30 / 30	-	1.67E+04	3.50E+04	3.50E+04	1.10E+05	n	NA	NA	No	BSL
	7440-36-0	Antimony	2.70E-01	J	8.20E-01	J	MG/KG	EPI04-SO11	9 / 30	6.3 - 6.9	8.20E-01	--	--	4.70E+01	n	NA	NA	No	BSL
	7440-38-2	Arsenic	3.50E-01	J	3.20E+00	J	MG/KG	EPI04-SO01	6 / 30	1 - 1.2	3.20E+00	1.60E+00	1.60E+00	3.00E+00	cR	NA	NA	Yes	ASL
	7440-39-3	Barium	3.30E+01	J	1.68E+02		MG/KG	EPI04-SO14	30 / 30	-	1.68E+02	1.47E+02	2.12E+02	2.20E+04	n	NA	NA	No	BSL
	7440-41-7	Beryllium	3.40E-02	J	7.00E-02	J	MG/KG	EPI04-SO12	3 / 30	0.52 - 0.58	7.00E-02	2.70E-01	2.70E-01	2.30E+02	n	NA	NA	No	BSL
	7440-43-9	Cadmium	7.90E-02	J	1.50E-01	J	MG/KG	EPI04-SO08	3 / 30	0.52 - 0.58	1.50E-01	2.20E+00	2.20E+00	9.80E+01	n	NA	NA	No	BSL
	7440-70-2	Calcium	2.05E+03	J	1.71E+05	J	MG/KG	EPI04-SO01	30 / 30	-	1.71E+05	8.84E+03	1.19E+04	NUT		NA	NA	--	NUT
	7440-47-3	Chromium	8.30E+00		1.81E+01		MG/KG	EPI04-SO11	30 / 30	-	1.81E+01	7.20E+01	7.20E+01	6.30E+00	c	NA	NA	Yes	ASL
	7440-48-4	Cobalt	7.40E+00	J	1.58E+01		MG/KG	EPI04-SO11	29 / 30	5.6 - 5.6	1.58E+01	1.60E+01	1.60E+01	3.50E+01	n	NA	NA	No	BSL
	7440-50-8	Copper	1.99E+01	J	1.11E+02		MG/KG	EPI04-SO11	30 / 30	-	1.11E+02	6.60E+01	5.30E+01	4.70E+03	n	NA	NA	No	BSL
	57-12-5	Cyanide	2.10E-01	J	7.20E-01	J	MG/KG	EPI04-SO04	4 / 30	2.6 - 2.9	7.20E-01	3.30E-01	3.30E-01	1.20E+00	n	NA	NA	No	BSL
	7439-89-6	Iron	1.36E+04		3.00E+04		MG/KG	EPI04-SO11	30 / 30	-	3.00E+04	3.81E+04	3.81E+04	8.20E+04	n	NA	NA	No	BSL
	7439-92-1	Lead	1.10E+00	J	2.88E+01	J	MG/KG	EPI04-SO01	29 / 30	1 - 1	2.88E+01	3.30E+00	3.30E+00	8.00E+02	L	NA	NA	No	BSL
	7439-95-4	Magnesium	1.38E+03	J	2.70E+04	J	MG/KG	EPI04-SO01	30 / 30	-	2.70E+04	3.71E+03	2.22E+04	NUT		NA	NA	--	NUT
	7439-96-5	Manganese	2.65E+02	J	9.68E+02		MG/KG	EPI04-SO14	30 / 30	-	9.68E+02	1.63E+03	1.63E+03	2.60E+03	n	NA	NA	No	BSL
	7440-02-0	Nickel	4.50E+00	J	1.15E+01	J	MG/KG	EPI04-SO11	25 / 30	4.3 - 4.5	1.15E+01	2.20E+01	2.20E+01	2.20E+03	n	NA	NA	No	BSL
	7440-09-7	Potassium	6.70E+02	J	2.42E+03	J	MG/KG	EPI04-SO14	22 / 30	521 - 577	2.42E+03	2.00E+03	2.00E+03	NUT		NA	NA	--	NUT
	7782-49-2	Selenium	4.40E-01	J	7.80E-01	J	MG/KG	EPI04-SO14	15 / 30	3.7 - 7.8	7.80E-01	5.10E-01	5.10E-01	5.80E+02	n	NA	NA	No	BSL
	7440-23-5	Sodium	4.70E+02	J	6.36E+02	J	MG/KG	EPI04-SO13	2 / 30	521 - 577	6.36E+02	2.25E+03	2.25E+03	NUT		NA	NA	--	NUT
	7440-62-2	Vanadium	3.79E+01	J	1.13E+02		MG/KG	EPI04-SO11	30 / 30	-	1.13E+02	1.44E+02	1.44E+02	5.80E+02	n	NA	NA	No	BSL
	7440-66-6	Zinc	1.38E+01	J	3.87E+01	J	MG/KG	EPI04-SO06	30 / 30	-	3.87E+01	3.20E+01	3.20E+01	3.50E+04	n	NA	NA	No	BSL
	72-54-8	4,4'-DDD	8.90E-04	J	3.10E-03	J	MG/KG	EPI04-SO07	4 / 26	0.0034 - 0.0038	3.10E-03	NA	NA	9.60E+00	c	NA	NA	No	BSL
	72-55-9	4,4'-DDE	7.90E-04	J	6.20E-01		MG/KG	EPI04-SO06	21 / 26	0.0034 - 0.0038	6.20E-01	NA	NA	9.30E+00	c	NA	NA	No	BSL
	50-29-3	4,4'-DDT	1.40E-03	J	1.00E-01		MG/KG	EPI04-SO06	15 / 26	0.0034 - 0.0038	1.00E-01	NA	NA	8.50E+00	c	NA	NA	No	BSL
	11096-82-5	Aroclor-1260	2.80E-02	J	2.80E-02	J	MG/KG	EPI04-SO12	1 / 14	0.035 - 0.038	2.80E-02	NA	NA	9.90E-01	c	NA	NA	No	BSL
	319-86-8	delta-BHC	7.50E-04	J	7.50E-04	J	MG/KG	EPI04-SO06	1 / 26	0.0018 - 0.002	7.50E-04	NA	NA	1.30E+00	c	NA	NA	No	BSL
	959-98-8	Endosulfan I	4.40E-04	J	4.40E-04	J	MG/KG	EPI04-SO10	1 / 26	0.0018 - 0.0037	4.40E-04	NA	NA	7.00E+02	n	NA	NA	No	BSL
	7421-93-4	Endrin aldehyde	1.50E-03	J	1.50E-03	J	MG/KG	EPI04-SO08	1 / 26	0.0034 - 0.0073	1.50E-03	NA	NA	2.50E+01	n	NA	NA	No	BSL
	5103-74-2	gamma-Chlordane	4.50E-04	J	1.10E-03	J	MG/KG	EPI04-SO10	10 / 26	0.0018 - 0.002	1.10E-03	NA	NA	7.50E+00	c	NA	NA	No	BSL
	117-81-7	bis(2-Ethylhexyl)phthalate	1.30E-01	J	1.30E-01	J	MG/KG	EPI04-SO14	1 / 30	0.34 - 0.38	1.30E-01	NA	NA	1.60E+02	c	NA	NA	No	BSL
	67-64-1	Acetone	2.80E-02	J	2.80E-02	J	MG/KG	EPI04-SO03	1 / 30	0.01 - 0.014	2.80E-02	NA	NA	6.70E+04	n	NA	NA	No	BSL
	75-15-0	Carbon disulfide	1.00E-02	J	1.00E-02	J	MG/KG	EPI04-SO03	1 / 30	0.01 - 0.014	1.00E-02	NA	NA	3.50E+02	n	NA	NA	No	BSL

(1) Maximum concentration is used for screening.

(2) East Vieques Surface Soil Type KTd
East Vieques Surface Soil Type Qa.

(3) Regional Screening Levels for Industrial Soil (June 2015). Concentrations based on non-carcinogenic health effects are adjusted using an HI=0.1.

The SL for Chromium(VI) was used as SL for Chromium
The SL for Hexachlorocyclohexane, Technical was used as SL for delta-BHC
The SL for Endosulfan was used as SL for Endosulfan I
The SL for Chlordane was used as SL for gamma-Chlordane
The SL for Endrin was used as SL for Endrin aldehyde

(4) Rationale Code: Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Below Screening Level (BSL)
Essential Nutrient (NUT)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered

c = Carcinogenic
HI = Hazard index
J = compound was detected below the reporting limit in the sample
L = Screening level for lead is based on EPA's Adult Lead Methodology (ALM) Model
mg/kg = milligram per kilogram
n = Noncarcinogenic
R = Relative bioavailability absorption was applied
NA = Not available
SL = Screening level

TABLE 2.3
Occurrence, Distribution and Selection of Chemicals of Potential Concern
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater (Resident and Industrial Worker)

Exposure Point	CAS Number	Chemical	Minimum Concentration Qualifier		Maximum Concentration Qualifier		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value KTd (2)	Background Value Qs (2)	Screening Toxicity Value (3)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Selection or Deletion (4)
Groundwater	75-35-4	1,1-Dichloroethene	3.00E-01	J	1.29E+00	J	UG/L	EPI04-MW24	9 / 70	0.5 - 1	1.29E+00	NA	NA	2.80E+01	n	NA	NA	No	BSL
	156-59-2	cis-1,2-Dichloroethene	2.80E-01	J	1.59E+00		UG/L	EPI04-MW23	21 / 70	0.5 - 1	1.59E+00	NA	NA	3.60E+00	n	NA	NA	No	BSL
	127-18-4	Tetrachloroethene	2.70E-01	J	5.87E+00		UG/L	EPI04-MW24	27 / 70	0.5 - 1	5.87E+00	NA	NA	4.10E+00	n	NA	NA	Yes	ASL
	79-01-6	Trichloroethene	3.00E-01	J	3.34E+02		UG/L	EPI04-MW24	59 / 70	0.2 - 0.4	3.34E+02	NA	NA	2.80E-01	n	NA	NA	Yes	ASL
	75-01-4	Vinyl chloride	2.30E-01	J	2.30E-01	J	UG/L	EPI04-MW27	1 / 70	0.2 - 0.4	2.30E-01	NA	NA	1.90E-02	c	NA	NA	Yes	ASL

(1) Maximum concentration is used for screening.

(2) Background Value is not available.

(3) Regional Screening Levels for Tap Water (June 2015). Concentrations based on non-carcinogenic health effects are adjusted using an HI=0.1.

(4) Rationale Coc Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Below Screening Level (BSL)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered

c = Carcinogenic
HI = Hazard index
J = compound was detected below the reporting limit in the sample

ug/L = microgram per liter
n = Noncarcinogenic

NA = Not available
SL = Screening level

TABLE 2.4
Occurrence, Distribution and Selection of Chemicals of Potential Concern
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Indoor Air (Resident)

Exposure Point	CAS Number	Chemical	Minimum Concentration Qualifier		Maximum Concentration Qualifier		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value KTd (2)	Background Value Qs (2)	Screening Toxicity Value (3)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Selection or Deletion (4)
Indoor Air	75-35-4	1,1-Dichloroethene	3.00E-01	J	1.29E+00	J	UG/L	EPI04-MW24	9 / 70	0.5 - 1	1.29E+00	NA	NA	1.68E+02	n	NA	NA	No	BSL
	156-59-2	cis-1,2-Dichloroethene	2.80E-01	J	1.59E+00		UG/L	EPI04-MW23	21 / 70	0.5 - 1	1.59E+00	NA	NA	--		NA	NA	--	NTX
	127-18-4	Tetrachloroethene	2.70E-01	J	5.87E+00		UG/L	EPI04-MW24	27 / 70	0.5 - 1	5.87E+00	NA	NA	1.19E+01	c	NA	NA	No	BSL
	79-01-6	Trichloroethene	3.00E-01	J	3.34E+02		UG/L	EPI04-MW24	59 / 70	0.2 - 0.4	3.34E+02	NA	NA	9.69E-01	c	NA	NA	Yes	ASL
	75-01-4	Vinyl chloride	2.30E-01	J	2.30E-01	J	UG/L	EPI04-MW27	1 / 70	0.2 - 0.4	2.30E-01	NA	NA	1.31E-01	c	NA	NA	Yes	ASL

(1) Maximum concentration is used for screening.

(2) Background Value is not available.

(3) Vapor Intrusion Screening Levels for Residential Scenario (June 2015). Concentrations based on target cancer risk of $1x10^{-6}$ and non-carcinogenic hazard quotient of 1 (due to conservatism incorporated into the default attenuation factor between groundwater and indoor air).

(4) Rationale Codes
Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Below Screening Level (BSL)
No Toxicity Value (NTX)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered

c = Carcinogenic
HI = Hazard index
J = compound was detected below the reporting limit in the sample

ug/L = microgram per liter
n = Noncarcinogenic

NA = Not available
SL = Screening level

TABLE 2.4a
Occurrence, Distribution and Selection of Chemicals of Potential Concern
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Indoor Air (Industrial Worker)

Exposure Point	CAS Number	Chemical	Minimum Concentration Qualifier		Maximum Concentration Qualifier		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (1)	Background Value KTd (2)	Background Value Qs (2)	Screening Toxicity Value (3)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Selection or Deletion (4)
Indoor Air	75-35-4	1,1-Dichloroethene	3.00E-01	J	1.29E+00	J	UG/L	EPI04-MW24	9 / 70	0.5 - 1	1.29E+00	NA	NA	7.04E+02	n	NA	NA	No	BSL
	156-59-2	cis-1,2-Dichloroethene	2.80E-01	J	1.59E+00		UG/L	EPI04-MW23	21 / 70	0.5 - 1	1.59E+00	NA	NA	--		NA	NA	--	NTX
	127-18-4	Tetrachloroethene	2.70E-01	J	5.87E+00		UG/L	EPI04-MW24	27 / 70	0.5 - 1	5.87E+00	NA	NA	5.18E+01	c	NA	NA	No	BSL
	79-01-6	Trichloroethene	3.00E-01	J	3.34E+02		UG/L	EPI04-MW24	59 / 70	0.2 - 0.4	3.34E+02	NA	NA	6.06E+00	c	NA	NA	Yes	ASL
	75-01-4	Vinyl chloride	2.30E-01	J	2.30E-01	J	UG/L	EPI04-MW27	1 / 70	0.2 - 0.4	2.30E-01	NA	NA	2.18E+00	c	NA	NA	No	BSL

(1) Maximum concentration is used for screening.

(2) Background Value is not available.

(3) Vapor Intrusion Screening Levels for Commercial Scenario (June 2015). Concentrations based on target cancer risk of $1x10^{-6}$ and non-carcinogenic hazard quotient of 1 (due to conservatism incorporated into the default attenuation factor between groundwater and indoor air).

(4) Rationale Codes
Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Below Screening Level (BSL)
No Toxicity Value (NTX)

COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/ To Be Considered

c = Carcinogenic
HI = Hazard index
J = compound was detected below the reporting limit in the sample

ug/L = microgram per liter
n = Noncarcinogenic

NA = Not available
SL = Screening level

TABLE 3.1.RME
Medium-Specific Exposure Point Concentration Summary
Reasonable Maximum Exposure
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Scenario Timeframe: Current/Future and Future
Medium: Soil
Exposure Medium: Surface Soil (0-1 foot) (Recreational User/Trespasser/Site Visitor and Resident)

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (N/T/G)		Maximum Concentration (Qualifier)		Exposure Point Concentration			
								Value	Units	Statistic	Rationale
Surface Soil (0-1 foot)	Aluminum	MG/KG	8.86E+03	9.89E+03	N	1.33E+04		9.89E+03	MG/KG	95% Student's-t UCL	(2)
	Arsenic	MG/KG	1.24E+00	1.20E+00		3.20E+00	J	1.20E+00	MG/KG	95% KM (t) UCL	(4)
	Chromium	MG/KG	1.12E+01	1.22E+01	N	1.43E+01		1.22E+01	MG/KG	95% Student's-t UCL	(2)
	Cobalt	MG/KG	1.03E+01	1.26E+01		1.49E+01		1.26E+01	MG/KG	95% KM (Chebyshev) UCL	(4)
	Cyanide	MG/KG	4.97E-01	--		7.20E-01	J	7.20E-01	MG/KG	Maximum Detected Concentration	(6)
	Iron	MG/KG	1.67E+04	1.81E+04	N	2.47E+04		1.81E+04	MG/KG	95% Student's-t UCL	(2)
	Manganese	MG/KG	5.46E+02	6.24E+02	N	9.68E+02		6.24E+02	MG/KG	95% Student's-t UCL	(2)
	Vanadium	MG/KG	5.93E+01	6.49E+01	N	8.61E+01		6.49E+01	MG/KG	95% Student's-t UCL	(2)

Notes:
ProUCL, Version 5.0.00 used to determine distribution of data using the Shapiro-Wilk W Test. ProUCL used to calculate RME EPC, following recommendations based on distribution and standard deviation in users guide (EPA. September 2013. ProUCL, Version 5.0.00 Prepared by Lockheed Martin Environmental Services).
KM (t) - nonparametric UCL based upon Kaplan-Meier estimates using the Student's t-distribution critical value
KM (Chebyshev) - UCL based upon Kaplan-Meier estimates using the Chebyshev inequality
95% Student's-t - parametric UCL based on Student's t statistic assuming normal distribution.

(1) Shapiro-Wilk W/Lilliefors Test indicates data are log-normally distributed.
(2) Shapiro-Wilk W/Lilliefors Test indicates data are normally distributed.
(3) Anderson-Darling and/or Kolmogorov-Smirnov Tests indicate data are gamma distributed.
(4) Distribution tests are inconclusive; therefore, the nonparametric UCL was used as the EPC.
(5) The maximum detected concentration was used because the recommended UCL exceeded the maximum detected concentration.
(6) The maximum detected concentration was used as the EPC because there were less than 8 samples or 4 detected concentrations.

EPC = Exposure Point Concentration
J = compound was detected below the reporting limit in the sample
mg/kg = milligram per kilogram
RME = Reasonable Maximum Exposure
UCL = Upper Confidence Limit
N = normally distributed

TABLE 3.1a.RME
Medium-Specific Exposure Point Concentration Summary
Reasonable Maximum Exposure
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil (0-1 foot) (Maintenance Worker)

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (N/T/G)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Surface Soil (0-1 foot)	Arsenic	MG/KG	1.24E+00	1.20E+00	3.20E+00 J	1.20E+00	MG/KG	95% KM (t) UCL	(4)
	Chromium	MG/KG	1.12E+01	1.22E+01 N	1.43E+01	1.22E+01	MG/KG	95% Student's-t UCL	(2)

Notes:
ProUCL, Version 5.0.00 used to determine distribution of data using the Shapiro-Wilk W Test. ProUCL used to calculate RME EPC, following recommendations based on distribution and standard deviation in users guide (EPA. September 2013. ProUCL, Version 5.0.00 Prepared by Lockheed Martin Environmental Services).
KM (t) - nonparametric UCL based upon Kaplan-Meier estimates using the Student's t-distribution critical value
95% Student's-t - parametric UCL based on Student's t statistic assuming normal distribution.

(1) Shapiro-Wilk W/Lilliefors Test indicates data are log-normally distributed.
(2) Shapiro-Wilk W/Lilliefors Test indicates data are normally distributed.
(3) Anderson-Darling and/or Kolmogorov-Smirnov Tests indicate data are gamma distributed.
(4) Distribution tests are inconclusive; therefore, the nonparametric UCL was used as the EPC.
(5) The maximum detected concentration was used because the recommended UCL exceeded the maximum detected concentration.
(6) The maximum detected concentration was used as the EPC because there were less than 8 samples or 4 detected concentrations.

EPC = Exposure Point Concentration
J = compound was detected below the reporting limit in the sample
mg/kg = milligram per kilogram
RME = Reasonable Maximum Exposure
UCL = Upper Confidence Limit
N = normally distributed

TABLE 3.2.RME Supplement
Medium-Specific Exposure Point Concentration Summary
Reasonable Maximum Exposure
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Total Soil (0-6 feet) (Resident)

			Surface Soil (0-2 feet)				Total Soil (0-6 feet)				The Higher of Two	
Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (N/T/G)		Maximum Concentration (Qualifier)	Arithmetic Mean	95% UCL (N/T/G)		Maximum Concentration (Qualifier)	Exposure Point Concentration	
											Value	Soil Depth
Total Soil (0-6 feet)	Aluminum	MG/KG	8.86E+03	9.89E+03	N	1.33E+04	9.51E+03	1.03E+04	N	1.67E+04	1.03E+04	Total Soil (0-6 feet)
	Arsenic	MG/KG	1.24E+00	1.20E+00		3.20E+00 J	1.06E+00	9.37E-01		3.20E+00 J	1.20E+00	Surface Soil (0-2 feet)
	Chromium	MG/KG	1.12E+01	1.22E+01	N	1.43E+01	1.18E+01	1.25E+01	N	1.81E+01	1.25E+01	Total Soil (0-6 feet)
	Cobalt	MG/KG	1.03E+01	1.26E+01		1.49E+01	9.94E+00	1.05E+01		1.58E+01	1.26E+01	Surface Soil (0-2 feet)
	Cyanide	MG/KG	4.97E-01	--		7.20E-01 J	4.25E-01	6.36E-01	N	7.20E-01 J	7.20E-01	Surface Soil (0-2 feet)
	Iron	MG/KG	1.67E+04	1.81E+04	N	2.47E+04	1.78E+04	1.88E+04	N	3.00E+04	1.88E+04	Total Soil (0-6 feet)
	Manganese	MG/KG	5.46E+02	6.24E+02	N	9.68E+02	4.96E+02	5.42E+02	N	9.68E+02	6.24E+02	Surface Soil (0-2 feet)
	Vanadium	MG/KG	5.93E+01	6.49E+01	N	8.61E+01	6.58E+01	7.04E+01	N	1.13E+02	7.04E+01	Total Soil (0-6 feet)

Notes:

EPC = Exposure Point Concentration
J = compound was detected below the reporting limit in the sample
mg/kg = milligram per kilogram
RME = Reasonable Maximum Exposure
UCL = Upper Confidence Limit
N = normally distributed

TABLE 3.2.RME
Medium-Specific Exposure Point Concentration Summary
Reasonable Maximum Exposure
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Total Soil (0-6 feet) (Resident)

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (N/T/G)		Maximum Concentration (Qualifier)		Exposure Point Concentration			
								Value	Units	Statistic	Rationale
Total Soil (0-6 feet)	Aluminum	MG/KG	9.51E+03	1.03E+04	N	1.67E+04		1.03E+04	MG/KG	95% Student's-t UCL	(2)
	Arsenic	MG/KG	1.06E+00	9.37E-01		3.20E+00	J	9.37E-01	MG/KG	95% KM (t) UCL	(4)
	Chromium	MG/KG	1.18E+01	1.25E+01	N	1.81E+01		1.25E+01	MG/KG	95% Student's-t UCL	(2)
	Cobalt	MG/KG	9.94E+00	1.05E+01	N	1.58E+01		1.05E+01	MG/KG	95% KM (t) UCL	(2)
	Cyanide	MG/KG	4.25E-01	6.36E-01	N	7.20E-01	J	6.36E-01	MG/KG	95% KM (t) UCL	(2)
	Iron	MG/KG	1.78E+04	1.88E+04	N	3.00E+04		1.88E+04	MG/KG	95% Student's-t UCL	(2)
	Manganese	MG/KG	4.96E+02	5.42E+02	N	9.68E+02		5.42E+02	MG/KG	95% Student's-t UCL	(2)
	Vanadium	MG/KG	6.58E+01	7.04E+01	N	1.13E+02		7.04E+01	MG/KG	95% Student's-t UCL	(2)

Notes:
ProUCL, Version 5.0.00 used to determine distribution of data using the Shapiro-Wilk W Test. ProUCL used to calculate RME EPC, following recommendations based on distribution and standard deviation in users guide (EPA. September 2013. ProUCL, Version 5.0.00 Prepared by Lockheed Martin Environmental Services).
KM (t) - nonparametric UCL based upon Kaplan-Meier estimates using the Student's t-distribution critical value
95% Student's-t - parametric UCL based on Student's t statistic assuming normal distribution.

(1) Shapiro-Wilk W/Lilliefors Test indicates data are log-normally distributed.
(2) Shapiro-Wilk W/Lilliefors Test indicates data are normally distributed.
(3) Anderson-Darling and/or Kolmogorov-Smirnov Tests indicate data are gamma distributed.
(4) Distribution tests are inconclusive; therefore, the nonparametric UCL was used as the EPC.
(5) The maximum detected concentration was used because the recommended UCL exceeded the maximum detected concentration.
(6) The maximum detected concentration was used as the EPC because there were less than 8 samples or 4 detected concentrations.

EPC = Exposure Point Concentration
J = compound was detected below the reporting limit in the sample
mg/kg = milligram per kilogram
RME = Reasonable Maximum Exposure
UCL = Upper Confidence Limit
N = normally distributed

TABLE 3.2a.RME
Medium-Specific Exposure Point Concentration Summary
Reasonable Maximum Exposure
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Total Soil (0-6 feet) (Industrial and Construction Worker)

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (N/T/G)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Total Soil (0-6 feet)	Arsenic	MG/KG	1.06E+00	9.37E-01	3.20E+00 J	9.37E-01	MG/KG	95% KM (t) UCL	(4)
	Chromium	MG/KG	1.18E+01	1.25E+01 N	1.81E+01	1.25E+01	MG/KG	95% Student's-t UCL	(2)

Notes:
ProUCL, Version 5.0.00 used to determine distribution of data using the Shapiro-Wilk W Test. ProUCL used to calculate RME EPC, following recommendations based on distribution and standard deviation in users guide (EPA. September 2013. ProUCL, Version 5.0.00 Prepared by Lockheed Martin Environmental Services).
KM (t) - nonparametric UCL based upon Kaplan-Meier estimates using the Student's t-distribution critical value
95% Student's-t - parametric UCL based on Student's t statistic assuming normal distribution.

(1) Shapiro-Wilk W/Lilliefors Test indicates data are log-normally distributed.
(2) Shapiro-Wilk W/Lilliefors Test indicates data are normally distributed.
(3) Anderson-Darling and/or Kolmogorov-Smirnov Tests indicate data are gamma distributed.
(4) Distribution tests are inconclusive; therefore, the nonparametric UCL was used as the EPC.
(5) The maximum detected concentration was used because the recommended UCL exceeded the maximum detected concentration.
(6) The maximum detected concentration was used as the EPC because there were less than 8 samples or 4 detected concentrations.

EPC = Exposure Point Concentration
J = compound was detected below the reporting limit in the sample
mg/kg = milligram per kilogram
RME = Reasonable Maximum Exposure
UCL = Upper Confidence Limit
N = normally distributed

TABLE 3.3.RME
Medium-Specific Exposure Point Concentration Summary
Reasonable Maximum Exposure
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater (Resident and Industrial Worker)

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (N/T/G)		Maximum Concentration (Qualifier)		Exposure Point Concentration			
								Value	Units	Statistic	Rationale
Groundwater	Tetrachloroethene	UG/L	2.54E+00	3.29E+00	N	5.87E+00		3.29E+00	UG/L	95% Student's-t UCL	(2)
	Trichloroethene	UG/L	1.34E+02	1.73E+02	N	3.34E+02		1.73E+02	UG/L	95% Student's-t UCL	(2)
	Vinyl chloride	UG/L	--	--		2.30E-01	J	2.30E-01	UG/L	Max	(6)

Notes:
ProUCL, Version 5.0.00 used to determine distribution of data using the Shapiro-Wilk W Test. ProUCL used to calculate RME EPC, following recommendations based on distribution and standard deviation in users guide (EPA. September 2013. ProUCL, Version 5.0.00 Prepared by Lockheed Martin Environmental Services).
Statistics: Max - Maximum Detected Value
95% Student's-t - parametric UCL based on Student's t statistic assuming normal distribution.

The 95% UCL for tetrachloroethene and trichloroethene were calculated using the data from the core of plume (Monitoring wells GW17, GW24, and GW25).

(1) Shapiro-Wilk W/Lilliefors Test indicates data are log-normally distributed.
(2) Shapiro-Wilk W/Lilliefors Test indicates data are normally distributed.
(3) Anderson-Darling and/or Kolmogorov-Smirnov Tests indicate data are gamma distributed.
(4) Distribution tests are inconclusive; therefore, the nonparametric UCL was used as the EPC.
(5) The maximum detected concentration was used because the recommended UCL exceeded the maximum detected concentration.
(6) The maximum detected concentration was used as the EPC because there were less than 8 samples or 4 detected concentrations.

EPC = Exposure Point Concentration
ug/L = microgram per liter
RME = Reasonable Maximum Exposure
UCL = Upper Confidence Limit
N = normally distributed

TABLE 3.3 Supplement A

Bathroom Air Exposure Concentrations Groundwater, Andelman Model, as Modified by Schaum

SWMU 20 Remedial Investigation

Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Exposure Point Concentration C_{gw} (mg/L)	Adult		Child	
		C_{amax} (mg/m^3)	C_a (mg/m^3)	C_{amax} (mg/m^3)	C_a (mg/m^3)
Tetrachloroethene	3.3E-03	9.9E-02	6.4E-02	7.5E-02	5.5E-02
Trichloroethene	1.7E-01	5.2E+00	3.3E+00	3.9E+00	2.9E+00
Vinyl chloride	2.3E-04	6.9E-03	4.4E-03	5.2E-03	3.8E-03

Variables	Units	Exposure Assumptions
C_a = concentration of chemical in air	mg/m^3	Solved by Eq 1
C_{amax} = maximum concentration of chemical in ai	mg/m^3	Solved by Eq 2
t_1 = Adult time in shower	hr	7.1E-01
t_1 = Child time in shower	hr	5.4E-01
t_2 = Adult time in bathroom after shower	hr	2.9E-01
t_2 = Child time in bathroom after shower	hr	4.6E-01
f = fraction volatilized for chemical	unitless	9.0E-01
F_w = shower water flow rate (1)	L/hr	7.5E+02
V_a = bathroom volume (1)	m^3	1.6E+01

Equation 1:	C_a =	$((C_{amax}/2) * t_1 + C_{amax} * t_2) / (t_1 + t_2)$
Equation 2:	C_{amax} =	$(C_w * f * F_w * t_1) / V_a$

Equations and assumptions from Water Consumption and Health: Integration of Exposure Assessment, Toxicology, and Risk Assessment, edited by Rhoda G.M. Wang. Macel Dekker, Inc., New York. 1994. Exposure to Volatiles in Domestic Water, Schaum et al., Pages 307-320.

TABLE 3.4.RME
Medium-Specific Exposure Point Concentration Summary
Reasonable Maximum Exposure
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Indoor Air (Resident)

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (N/T/G)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Indoor Air	Trichloroethene	--	--	--	--	1.65E+02	ug/m^3	Max	(1)
	Vinyl chloride	--	--	--	--	2.94E-01	ug/m^3	Max	(1)

Notes:

(1) The maximum detected concentration in groundwater was used in the USEPA Groundwater Concentration to Indoor Air Concentration (CGW-IAC) Calculator, Version 3.4, June 2015 RSLs.

ug/m^3 = microgram per cubic meters
UCL = Upper Confidence Limit

TABLE 3.4a.RME
Medium-Specific Exposure Point Concentration Summary
Reasonable Maximum Exposure
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Indoor Air (Industrial Worker)

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL (N/T/G)	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Indoor Air	Trichloroethene	--	--	--	--	1.65E+02	ug/m^3	Max	(1)

Notes:
(1) The maximum detected concentration in groundwater was used in the USEPA Groundwater Concentration to Indoor Air Concentration (CGW-IAC) Calculator,Version 3.4, June 2015 RSLs.

ug/m^3 = microgram per cubic meter
UCL = Upper Confidence Limit

TABLE 4.1.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil (0-1 foot)

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Recreational User/ Trespasser/ Site Visitor	Adult	Surface Soil (0-1 feet)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 2014	CS x IR-S x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	104	days/year	(1)	
				ED	Exposure Duration	20	years	EPA, 2014	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				BW	Body Weight	80	kg	EPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	(3)	
				AT-C	Averaging Time (Cancer)	25,550	days	(4)	
		Youth	Surface Soil (0-1 feet)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	CDI (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 2014	CS x IR-S x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	104	days/year	(1)	
				ED	Exposure Duration	10	years	EPA, 1991	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				BW	Body Weight	44	kg	See Table 4 Supp A	
				AT-N	Averaging Time (Non-Cancer)	3,650	days	(3)	
				AT-C	Averaging Time (Cancer)	25,550	days	(4)	
		Child	Surface Soil (0-1 feet)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	CDI (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	200	mg/day	EPA, 2014	CS x IR-S x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	104	days/year	(1)	
				ED	Exposure Duration	6	years	EPA, 2014	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				BW	Body Weight	15	kg	EPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	(3)	
				AT-C	Averaging Time (Cancer)	25,550	days	(4)	
Dermal	Recreational User/ Trespasser/ Site Visitor	Adult	Surface Soil (0-1 feet)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	6,032	cm^2	EPA, 2014 (5)	CS x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.07	mg/cm^2-day	EPA, 2014	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical-Specific	--	See Table 4 Supp B	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				EF	Exposure Frequency	104	days/year	(1)	
				ED	Exposure Duration	20	years	EPA, 2014	
				BW	Body Weight	80	kg	EPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	(3)	
				AT-C	Averaging Time (Cancer)	25,550	days	(4)	

TABLE 4.1.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Surface Soil (0-1 foot)

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal (cont.)	Recreational User/ Trespasser/ Site Visitor (cont.)	Youth	Surface Soil (0-1 feet)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	4,940	cm^2	See Table 4 Supp A (5)	CS x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical-Specific	--	See Table 4 Supp B	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				EF	Exposure Frequency	104	days/year	(1)	
				ED	Exposure Duration	10	years	EPA, 1991	
				BW	Body Weight	44	kg	See Table 4 Supp A	
				AT-C	Averaging Time (Cancer)	25,550	days	(4)	
				AT-N	Averaging Time (Non-Cancer)	3,650	days	(3)	
		Child	Surface Soil (0-1 feet)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	2,373	cm^2	EPA, 2014 (5)	CS x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	EPA, 2014	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical-Specific	--	See Table 4 Supp B	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				EF	Exposure Frequency	104	days/year	(1)	
				ED	Exposure Duration	6	years	EPA, 2014	
				BW	Body Weight	15	kg	EPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	(4)	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	(3)	

Notes:
(1) Based on best professional judgment; assumed to visit the site twice a week (i.e., 104 days per year).
(2) Adolescents from 6 to 16 years of age. Body weight is average of the mean values for boys and girls for the ages 6 through 16 (See Table 4 Supplement A).
(3) Calculated as the product of ED (years) x 365 days/year.
(4) Calculated as the product of 70 years assumed human lifetime (EPA, 2014) x 365 days/year.
(5) SA includes head, hands, forearms, lower legs, and feet.

Sources:
EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.
EPA, 2004. Risk Assessment Guidance for Superfund (RAGS) Volume I: Human Health Evaluation Manual. Part E Supplemental Guidance for Dermal Risk Assessment) Final.
EPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors, OSWER Directive 9200.1-120, February 6, 2014.

cm^2 = Square centimeter
kg = Kilogram
kg/mg = Kilogram per milligram
mg/kg = Milligram per kilogram
mg/kg-day = Milligram per kilogram per day
mg/cm^2-day = Milligram per square centimeter per day
mg/day = Milligram per day

TABLE 4.2.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Ambient Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Recreational User/ Trespasser/ Site Visitor	Adult	Emissions from Surface Soil	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	Calculated	mg/m^3	EPA, 2002	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emission Factor	7.99E+08	m^3/kg	See Table 4 Supp C-1	
				VF	Volatilization Factor	3.82E+03	m^3/kg	See Table 4 Supp D (4)	CA (mg/m^3) = CS * (1 / PEF + 1 / VF)
				ET	Exposure Time	4	hr/day	(1)	
				EF	Exposure Frequency	104	days/year	(1)	
				ED	Exposure Duration	20	years	EPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	(2)	
				AT-C	Averaging Time (Cancer)	25,550	days	(3)	
				CF	Conversion Factor 1	1/24	day/hr	- -	
		Youth	Emissions from Surface Soil	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	EC (mg/m^3) =
				CA	Chemical Concentration in Air	Calculated	mg/m^3	EPA, 2002	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emission Factor	7.99E+08	m^3/kg	See Table 4 Supp C-1	
				VF	Volatilization Factor	3.82E+03	m^3/kg	See Table 4 Supp D (4)	CA (mg/m^3) = CS * (1 / PEF + 1 / VF)
				ET	Exposure Time	4	hr/day	(1)	
				EF	Exposure Frequency	104	days/year	(1)	
				ED	Exposure Duration	10	years	EPA, 1991	
				AT-N	Averaging Time (Non-Cancer)	3,650	days	(2)	
				AT-C	Averaging Time (Cancer)	25,550	days	(3)	
				CF	Conversion Factor 1	1/24	day/hr	- -	
		Child	Emissions from Surface Soil	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	EC (mg/m^3) =
				CA	Chemical Concentration in Air	Calculated	mg/m^3	EPA, 2002	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emission Factor	7.99E+08	m^3/kg	See Table 4 Supp C-1	
				VF	Volatilization Factor	3.82E+03	m^3/kg	See Table 4 Supp D (4)	CA (mg/m^3) = CS * (1 / PEF + 1 / VF)
				ET	Exposure Time	4	hr/day	(1)	
				EF	Exposure Frequency	104	days/year	(1)	
				ED	Exposure Duration	6	years	EPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	(2)	
				AT-C	Averaging Time (Cancer)	25,550	days	(3)	
				CF	Conversion Factor 1	1/24	day/hr	- -	

TABLE 4.2.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Ambient Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name

Notes:
(1) Based on best professional judgment; assumed to visit the site for 4 hours per event.
(2) Calculated as the product of ED (years) x 365 days/year.
(3) Calculated as the product of 70 years assumed human lifetime (EPA, 2014) x 365 days/year.
(4) VF is chemical-specific and applies only to cyanide.

Sources:
EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24, December, 2002.
EPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors, OSWER Directive 9200.1-120, February 6, 2014.

mg/kg = Milligram per kilogram
mg/m^3 = Milligram per cubic meter
m^3/kg = Cubic meter per kilogram

TABLE 4.3.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil (0-1 foot)

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult	Surface Soil (0-1 feet) (6)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 2014	CS x IR-S x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 2014	
				ED	Exposure Duration	20	years	EPA, 2014	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				BW	Body Weight	80	kg	EPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	(1)	
		Child	Surface Soil (0-1 feet) (6)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	CDI (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	200	mg/day	EPA, 2014	CS x IR-S x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 2014	
				ED	Exposure Duration	6	years	EPA, 2014	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				BW	Body Weight	15	kg	EPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	(1)	
		Child/Adult Aggregate	Surface Soil (0-1 feet) (6)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	CDI (mg/kg-day) =
				IR-S-Adj	Ingestion Rate of Soil, Age-adjusted	105	mg-year/kg-day	Calculated	CS x IR-S-Adj x EF x CF1 x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 2014	IR-S-Adj (mg-year/kd-day) =
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	(ED-C x IR-S-C / BW-C) + (ED-A x IR-S-A / BW-A)
				AT-C	Averaging Time (Cancer)	25,550	days	(2)	
	Maintenance Worker	Adult	Surface Soil (0-1 feet)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	CDI (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 2014	CS x IR-S x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	52	days/year	(3)	
				ED	Exposure Duration	25	years	EPA, 2014	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				BW	Body Weight	80	kg	EPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	(1)	
				AT-C	Averaging Time (Cancer)	25,550	days	(2)	

TABLE 4.3.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil (0-1 foot)

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Resident	Adult	Surface Soil (0-1 feet) (6)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	6,032	cm^2	EPA, 2014 (4)	CS x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.07	mg/cm^2-day	EPA, 2014	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical-Specific	--	See Table 4 Supp B	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				EF	Exposure Frequency	350	days/year	EPA, 2014	
				ED	Exposure Duration	20	years	EPA, 2014	
				BW	Body Weight	80	kg	EPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	(1)	
		Child	Surface Soil (0-1 feet) (6)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	2,373	cm^2	EPA, 2014 (4)	CS x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	EPA, 2014	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical-Specific	--	See Table 4 Supp B	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				EF	Exposure Frequency	350	days/year	EPA, 2014	
				ED	Exposure Duration	6	years	EPA, 2014	
				BW	Body Weight	15	kg	EPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	(1)	
		Child/Adult Aggregate	Surface Soil (0-1 feet) (6)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	CDI (mg/kg-day) =
				DA-Adj	Dermal Absorption, Age-adjusted	295	mg-year/kg-day	Calculated	CS x DA-Adj x DABS x CF1 x EF x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical-Specific	--	See Table 4 Supp B	DA-Adj (mg-year/kg-day) =
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	(ED-C x SA-C x SSAF-C / BW-C) + (ED-A x SA-A x SSAF-A / BW-A)
				EF	Exposure Frequency	350	days/year	EPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	(2)	
	Maintenance Worker	Adult	Surface Soil (0-1 feet)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,527	cm^2	EPA, 2014 (5)	CS x SA x AF x DABS x CF x EF x
				AF	Soil to Skin Adherence Factor	0.12	mg/cm^2-day	EPA, 2014	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	chem-specific	--	See Table 4 Supp B	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				EF	Exposure Frequency	52	days/year	(3)	
				ED	Exposure Duration	25	years	EPA, 2014	
				BW	Body Weight	80	kg	EPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	(2)	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	(1)	

TABLE 4.3.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil (0-1 foot)

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name

Notes:
(1) Calculated as the product of ED (years) x 365 days/year.
(2) Calculated as the product of 70 years assumed human lifetime (EPA, 2014) x 365 days/year.
(3) Based on best professional judgment; assumed to visit the site once per week to perform maintenance activities.
(4) SA includes head, hands, forearms, lower legs, and feet.
(5) SA includes head, hands, and forearms.
(6) The higher of the two EPCs (0-1 ft and 0-6 ft) for each COPC will be used in the risk calculations.

Sources:
EPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors, OSWER Directive 9200.1-120, February 6, 2014.

cm^2 = Square centimeter
kg = Kilogram
kg/mg = Kilogram per milligram
mg/kg = Milligram per kilogram
mg/kg-day = Milligram per kilogram per day
mg/cm^2-day = Milligram per square centimeter per day
mg/day = Milligram per day

TABLE 4.4.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Ambient Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Adult	Emissions from Surface Soil (4)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	Calculated	mg/m^3	EPA, 2002	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emission Factor	7.99E+08	m^3/kg	See Table 4 Supp C-1	
				VF	Volatilization Factor	3.82E+03	m^3/kg	See Table 4 Supp D (5)	CA (mg/m^3) = CS * (1 / PEF + 1 / VF)
				ET	Exposure Time	24	hr/day	EPA, 2014	
				EF	Exposure Frequency	350	days/year	EPA, 2014	
				ED	Exposure Duration	20	years	EPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	(1)	
				CF	Conversion Factor 1	1/24	day/hr	- -	
		Child	Emissions from Surface Soil (4)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	EC (mg/m^3) =
				CA	Chemical Concentration in Air	Calculated	mg/m^3	EPA, 2002	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emission Factor	7.99E+08	m^3/kg	See Table 4 Supp C-1	
				VF	Volatilization Factor	3.82E+03	m^3/kg	See Table 4 Supp D (5)	CA (mg/m^3) = CS * (1 / PEF + 1 / VF)
				ET	Exposure Time	24	hr/day	EPA, 2014	
				EF	Exposure Frequency	350	days/year	EPA, 2014	
				ED	Exposure Duration	6	years	EPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	(1)	
				CF	Conversion Factor 1	1/24	day/hr	- -	
		Child/Adult Aggregate	Emissions from Surface Soil (4)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	EC (mg/m^3) =
				CA	Chemical Concentration in Air	Calculated	mg/m^3	Calculated	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emission Factor	7.99E+08	m^3/kg	See Table 4 Supp C-1	
				VF	Volatilization Factor	3.82E+03	m^3/kg	See Table 4 Supp D (5)	CA (mg/m^3) = CS * (1 / PEF + 1 / VF)
				ET	Exposure Time	24	hr/day	EPA, 2014	
				EF	Exposure Frequency	350	days/year	EPA, 2014	
				ED	Exposure Duration	26	years	EPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	(2)	
				CF	Conversion Factor 1	1/24	day/hr	- -	

TABLE 4.4.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Ambient Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (cont.)	Maintenance Worker	Adult	Emissions from Surface Soil	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	EC (mg/m^3) =
				CA	Chemical Concentration in Air	Calculated	mg/m^3	EPA, 2002	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emission Factor	7.99E+08	m^3/kg	See Table 4 Supp C-1	
				ET	Exposure Time	8	hr/day	EPA, 2014	CA (mg/m^3) = CS / PEF
				EF	Exposure Frequency	52	days/year	(3)	
				ED	Exposure Duration	25	years	EPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	(1)	
				AT-C	Averaging Time (Cancer)	25,550	days	(2)	
				CF	Conversion Factor 1	1/24	day/hr	- -	

Notes:
(1) Calculated as the product of ED (years) x 365 days/year.
(2) Calculated as the product of 70 years assumed human lifetime (EPA, 2014) x 365 days/year.
(3) Based on best professional judgment; assumed to visit the site once per week to perform maintenance activities.
(4) The higher of the two EPCs (0-1 ft and 0-6 ft) for each COPC will be used in the risk calculations.
(5) VF is chemical-specific and applies only to cyanide.

Sources:
EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24, December, 2002.
EPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors, OSWER Directive 9200.1-120, February 6, 2014.

mg/kg = Milligram per kilogram
mg/m^3 = Milligram per cubic meter
m^3/kg = Cubic meter per kilogram

TABLE 4.5.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Total Soil (0-6 feet)

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult	Total Soil (0-6 feet) (5)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 2014	CS x IR-S x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 2014	
				ED	Exposure Duration	20	years	EPA, 2014	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				BW	Body Weight	80	kg	EPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	(1)	
		Child	Total Soil (0-6 feet) (5)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	CDI (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	200	mg/day	EPA, 2014	CS x IR-S x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 2014	
				ED	Exposure Duration	6	years	EPA, 2014	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				BW	Body Weight	15	kg	EPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	(1)	
		Child/Adult Aggregate	Total Soil (0-6 feet) (5)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	CDI (mg/kg-day) =
				IR-S-Adj	Ingestion Rate of Soil, Age-adjusted	105	mg-year/kg-day	Calculated	CS x IR-S-Adj x EF x CF1 x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 2014	IR-S-Adj (mg-year/kd-day) =
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	(ED-C x IR-S-C / BW-C) + (ED-A x IR-S-A / BW-A)
				AT-C	Averaging Time (Cancer)	25,550	days	(2)	
	Construction Worker	Adult	Total Soil (0-6 feet)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	Subchronic Daily Intake (SDI) (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	330	mg/day	EPA, 2002	CS x IR-S x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	250	days/year	EPA, 2014	
				ED	Exposure Duration	1	years	EPA, 2002	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				BW	Body Weight	80	kg	EPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	365	days	(1)	
				AT-C	Averaging Time (Cancer)	25,550	days	(2)	
	Industrial Worker	Adult	Total Soil (0-6 feet)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	CDI (mg/kg-day) =
				IR-S	Ingestion Rate of Soil	100	mg/day	EPA, 2014	CS x IR-S x EF x ED x CF x 1/BW x 1/AT
				EF	Exposure Frequency	250	days/year	EPA, 2014	
				ED	Exposure Duration	25	years	EPA, 2014	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				BW	Body Weight	80	kg	EPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	(1)	
				AT-C	Averaging Time (Cancer)	25,550	days	(2)	

TABLE 4.5.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Total Soil (0-6 feet)

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Resident	Adult	Total Soil (0-6 feet) (5)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	6,032	cm^2	EPA, 2014 (3)	CS x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.07	mg/cm^2-day	EPA, 2014	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical-Specific	--	See Table 4 Supp B	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				EF	Exposure Frequency	350	days/year	EPA, 2014	
				ED	Exposure Duration	20	years	EPA, 2014	
				BW	Body Weight	80	kg	EPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	(1)	
		Child	Total Soil (0-6 feet) (5)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	2,373	cm^2	EPA, 2014 (3)	CS x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.2	mg/cm^2-day	EPA, 2014	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical-Specific	--	See Table 4 Supp B	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				EF	Exposure Frequency	350	days/year	EPA, 2014	
				ED	Exposure Duration	6	years	EPA, 2014	
				BW	Body Weight	15	kg	EPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	(1)	
		Child/Adult Aggregate	Total Soil (0-6 feet) (5)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	CDI (mg/kg-day) =
				DA-Adj	Dermal Absorption, Age-adjusted	321	mg-year/kg-day	Calculated	CS x DA-Adj x DABS x CF1 x EF x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical-Specific	--	See Table 4 Supp B	DA-Adj (mg-year/kg-day) =
				CF1	Conversion Factor 1	0.000001	kg/mg	- -	(ED-C x SA-C x SSAF-C / BW-C) + (ED-A x SA-A x SSAF-A / BW-A)
				EF	Exposure Frequency	350	days/year	EPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	(2)	
	Construction Worker	Adult	Total Soil (0-6 feet)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	SDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,527	cm^2	EPA, 2014 (4)	CS x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.3	mg/cm^2-day	EPA, 2004	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical-Specific	--	See Table 4 Supp B	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				EF	Exposure Frequency	250	days/year	EPA, 2014	
				ED	Exposure Duration	1	years	EPA, 2002	
				BW	Body Weight	80	kg	EPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	365	days	(1)	
				AT-C	Averaging Time (Cancer)	25,550	days	(2)	

TABLE 4.5.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Total Soil (0-6 feet)

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal (cont.)	Industrial Worker	Adult	Total Soil (0-6 feet)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	3,527	cm^2	EPA, 2014 (4)	CS x SA x SSAF x DABS x CF x EF x
				SSAF	Soil to Skin Adherence Factor	0.12	mg/cm^2-day	EPA, 2014	ED x 1/BW x 1/AT
				DABS	Dermal Absorption Factor Solids	Chemical-Specific	--	See Table 4 Supp B	
				CF	Conversion Factor	0.000001	kg/mg	- -	
				EF	Exposure Frequency	250	days/year	EPA, 2014	
				ED	Exposure Duration	25	years	EPA, 2014	
				BW	Body Weight	80	kg	EPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	(1)	
				AT-C	Averaging Time (Cancer)	25,550	days	(2)	

Notes:
(1) Calculated as the product of ED (years) x 365 days/year.
(2) Calculated as the product of 70 years assumed human lifetime (EPA, 2014) x 365 days/year.
(3) SA includes head, hands, forearms, lower legs, and feet.
(4) SA includes head, hands, and forearms.
(5) The higher of the two EPCs (0-1 ft and 0-6 ft) for each COPC will be used in the risk calculations.

Sources:
EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24, December, 2002.
EPA, 2004. Risk Assessment Guidance for Superfund (RAGS) Volume I: Human Health Evaluation Manual. Part E Supplemental Guidance for Dermal Risk Assessment) Final.
EPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors, OSWER Directive 9200.1-120, February 6, 2014.

cm^2 = Square centimeter
kg = Kilogram
kg/mg = Kilogram per milligram
mg/kg = Milligram per kilogram
mg/kg-day = Milligram per kilogram per day
mg/cm^2-day = Milligram per square centimeter per day
mg/day = Milligram per day

TABLE 4.6.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Soil
Exposure Medium:Ambient Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Adult	Emissions from Total Soil (3)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	Calculated	mg/m^3	EPA, 2002	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emission Factor	7.99E+08	m^3/kg	See Table 4 Supp C-1	
				VF	Volatilization Factor	3.82E+03	m^3/kg	See Table 4 Supp D (5)	CA (mg/m^3) = CS * (1 / PEF + 1 / VF)
				ET	Exposure Time	24	hr/day	EPA, 2014	
				EF	Exposure Frequency	350	days/year	EPA, 2014	
				ED	Exposure Duration	20	years	EPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	(1)	
				CF	Conversion Factor 1	1/24	day/hr	- -	
		Child	Emissions from Total Soil (3)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	EC (mg/m^3) =
				CA	Chemical Concentration in Air	Calculated	mg/m^3	EPA, 2002	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emission Factor	7.99E+08	m^3/kg	See Table 4 Supp C-1	
				VF	Volatilization Factor	3.82E+03	m^3/kg	See Table 4 Supp D (5)	CA (mg/m^3) = CS * (1 / PEF + 1 / VF)
				ET	Exposure Time	24	hr/day	EPA, 2014	
				EF	Exposure Frequency	350	days/year	EPA, 2014	
				ED	Exposure Duration	6	years	EPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	(1)	
				CF	Conversion Factor 1	1/24	day/hr	- -	
		Child/Adult Aggregate	Emissions from Total Soil (3)	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	EC (mg/m^3) =
				CA	Chemical Concentration in Air	Calculated	mg/m^3	Calculated	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emission Factor	7.99E+08	m^3/kg	See Table 4 Supp C-1	
				VF	Volatilization Factor	3.82E+03	m^3/kg	See Table 4 Supp D (5)	CA (mg/m^3) = CS * (1 / PEF + 1 / VF)
				ET	Exposure Time	24	hr/day	EPA, 2014	
				EF	Exposure Frequency	350	days/year	EPA, 2014	
				ED	Exposure Duration	26	years	EPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	(2)	
				CF	Conversion Factor 1	1/24	day/hr	- -	

TABLE 4.6.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Soil
Exposure Medium:Ambient Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation (cont.)	Construction Worker	Adult	Emissions from Total Soil	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	EC (mg/m^3) =
				CA	Chemical Concentration in Air	Calculated	mg/m^3	EPA, 2002	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emission Factor	9.97E+06	m^3/kg	See Table 4 Supp C-2	
				ET	Exposure Time	8	hr/day	(4)	CA (mg/m^3) = CS / PEF
				EF	Exposure Frequency	250	days/year	EPA, 2014	
				ED	Exposure Duration	1	years	EPA, 2002	
				AT-N	Averaging Time (Non-Cancer)	365	days	(1)	
				AT-C	Averaging Time (Cancer)	25,550	days	(2)	
				CF	Conversion Factor 1	1/24	day/hr	- -	
	Industrial Worker	Adult	Emissions from Total Soil	CS	Chemical Concentration in Soil	See Table 3s.RME	mg/kg	See Table 3s.RME	EC (mg/m^3) =
				CA	Chemical Concentration in Air	Calculated	mg/m^3	EPA, 2002	CA x ET x EF x ED x CF x 1/AT
				PEF	Particulate Emission Factor	7.99E+08	m^3/kg	See Table 4 Supp C-1	
				ET	Exposure Time	8	hr/day	EPA, 2014	CA (mg/m^3) = CS / PEF
				EF	Exposure Frequency	250	days/year	EPA, 2014	
				ED	Exposure Duration	25	years	EPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	(1)	
				AT-C	Averaging Time (Cancer)	25,550	days	(2)	
				CF	Conversion Factor 1	1/24	day/hr	- -	

Notes:
(1) Calculated as the product of ED (years) x 365 days/year.
(2) Calculated as the product of 70 years assumed human lifetime (EPA, 2014) x 365 days/year.
(3) The higher of the two EPCs (0-1 ft and 0-6 ft) for each COPC will be used in the risk calculations.
(4) Based on best professional judgment; assumed that construction workers are present onsite for 8 hours per workday.
(5) VF is chemical-specific and applies only to cyanide.

Sources:
EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24, December, 2002.
EPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors, OSWER Directive 9200.1-120, February 6, 2014.

mg/kg = Milligram per kilogram
mg/m^3 = milligram per cubic meter

TABLE 4.6.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Soil
Exposure Medium:Ambient Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name

m^3/kg = Cubic meters per kilogram

TABLE 4.7.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Adult	Groundwater	CW	Chemical Concentration in Water	See Table 3s.RME	µg/l	See Table 3s.RME	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-W	Ingestion Rate of Water	2.5	L/day	EPA, 2014	CW x IR-W x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 2014	
				ED	Exposure Duration	20	years	EPA, 2014	
				BW	Body Weight	80	kg	EPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	(1)	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
		Child	Groundwater	CW	Chemical Concentration in Water	See Table 3s.RME	µg/l	See Table 3s.RME	CDI (mg/kg-day) =
				IR-W	Ingestion Rate of Water	0.78	L/day	EPA, 2014	CW x IR-W x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 2014	
				ED	Exposure Duration	6	years	EPA, 2014	
				BW	Body Weight	15	kg	EPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	(1)	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	
		Child/Adult Aggregate	Groundwater	CW	Chemical Concentration in Water	See Table 3s.RME	µg/l	See Table 3s.RME	CDI (mg/kg-day) =
				IR-W-Adj	Ingestion Rate of Water, Age-adjusted	0.94	liter-year/kg-day	Calculated	CW x IR-W-Adj x EF x CF1 x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 2014	IR-W-Adj (liter-year/kd-day) =
				AT-C	Averaging Time (Cancer)	25,550	days	(2)	(ED-C x IR-W-C / BW-C) + (ED-A x IR-W-A / BW-A)
	Industrial Worker	Adult	Groundwater	CW	Chemical Concentration in Water	See Table 3s.RME	µg/l	See Table 3s.RME	CDI (mg/kg-day) =
				IR-W	Ingestion Rate of Water	1	L/day	EPA, 1991	CW x IR-W x EF x ED x CF1 x 1/BW x 1/AT
				EF	Exposure Frequency	250	days/year	EPA, 2014	
				ED	Exposure Duration	25	years	EPA, 2014	
				BW	Body Weight	80	kg	EPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	(2)	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	(1)	
				CF1	Conversion Factor 1	0.001	mg/µg	- -	

TABLE 4.7.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Resident	Adult	Groundwater	CW	Chemical Concentration in Water	See Table 3s.RME	µg/l	See Table 3s.RME	CDI (mg/kg-day) =
				DAevent	Dermally Absorbed Dose per Event	Calculated	mg/cm^2-event	Calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				t_{event}	Event Time	0.71	hr/event	EPA, 2014	
				SA	Skin Surface Area Available for Contact	20,900	cm^2	EPA, 2014	
				EV	Event Frequency	1	events/day	EPA, 2004	
				EF	Exposure Frequency	350	days/year	EPA, 2014	
				ED	Exposure Duration	20	years	EPA, 2014	
				BW	Body Weight	80	kg	EPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	7,300	days	(1)	
		Child	Groundwater	CW	Chemical Concentration in Water	See Table 3s.RME	µg/l	See Table 3s.RME	CDI (mg/kg-day) =
				DAevent	Dermally Absorbed Dose per Event	Calculated	mg/cm^2-event	Calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				t_{event}	Event Time	0.54	hr/event	EPA, 2014	
				SA	Skin Surface Area Available for Contact	6,378	cm^2	EPA, 2014	
				EV	Event Frequency	1	events/day	EPA, 2004	
				EF	Exposure Frequency	350	days/year	EPA, 2014	
				ED	Exposure Duration	6	years	EPA, 2014	
				BW	Body Weight	15	kg	EPA, 2014	
				AT-N	Averaging Time (Non-Cancer)	2190	days	(1)	
		Child/Adult Aggregate	Groundwater	CW	Chemical Concentration in Water	See Table 3s.RME	µg/l	See Table 3s.RME	CDI (mg/kg-day) = DA-Adj x EF x EV x 1/AT
				DA-Adj	Dermally Absorbed Dose, Age-adjusted	Calculated	mg-year/event-kg	Calculated	DA-Adj = (DAevent-A x SA-A x ED-A x 1/BW-A)
				EV	Event Frequency	1	events/day	EPA, 2004	+ (Daevent-C x SA-C x ED-C x 1/BW-C)
				EF	Exposure Frequency	350	days/year	EPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	(2)	

TABLE 4.7.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal (cont.)	Industrial Worker	Adult	Groundwater	CW	Chemical Concentration in Water	See Table 3s.RME	µg/l	See Table 3s.RME	CDI (mg/kg-day) =
				DAevent	Dermally Absorbed Dose per Event	Calculated	mg/cm^2-event	Calculated	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				t_{event}	Event Time	0.2	hr/event	(4)	
				SA	Skin Surface Area Available for Contact	3,470	cm2	EPA, 2014 (3)	
				EV	Event Frequency	1	events/day	EPA, 1991	
				EF	Exposure Frequency	250	days/year	EPA, 2014	
				ED	Exposure Duration	25	years	EPA, 2014	
				BW	Body Weight	80	kg	EPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	(2)	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	(1)	
				FA	Fraction absorbed water	Chemical-Specific	dimensionless	EPA, 2004	
				Kp	Permeability Coefficient	Chemical-Specific	cm/hr	EPA, 2004	Organics :
				τ	Lag Time	Chemical-Specific	hr/event	EPA, 2004	t_{event}<t*: DAevent (mg/cm^2-event) =
				t*	Time to Reach Steady-state	Chemical-Specific	hours	EPA, 2004	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π)) x CF1 x CF2
				B	Ratio of Permeability of Stratum Corneum to Epidermis	Chemical-Specific	dimensionless	EPA, 2004	t_{event}>t*: DAevent (mg/cm^2-event) =
				CF1	Conversion Factor 1	0.001	mg/µg	- -	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				CF2	Conversion Factor 2	0.001	l/cm^3	- -	((1 + 3B + $3B^2$)/$(1+B)^2$)) x CF1 x CF2

Notes:
(1) Calculated as the product of ED (years) x 365 days/year.
(2) Calculated as the product of 70 years assumed human lifetime (EPA, 2014) x 365 days/year.
(3) The SA for an industrial worker exposed to tap water is based on face, forearms, and hands.
(4) Based on best professional judgment; assumed that water is contacted for 12 minutes per day during face, arm, and hand washing.

Sources:
EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.
EPA, 2004: Risk Assessment Guidance for Superfund (RAGS) Volume I: Human Health Evaluation Manual. Part E Supplemental Guidance for Dermal Risk Assessment) Final.
EPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors, OSWER Directive 9200.1-120, February 6, 2014.

cm/hr = Centimeter per hour
cm^2 = Square centimeter
mg/µg = Milligram per microgram
kg = Kilogram
L/cm^3 = Liter per cubic centimeter
L/day = Liter per day
mg/cm^2 -event = Milligram per square centimeter per event
mg/kg-day = Milligram per kilogram per day
µg/L = Microgram per liter

TABLE 4.7.a.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS (MUTAGENIC MODE OF ACTION)
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Exposure Point	Receptor Age	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Resident	Groundwater	Young Child (a) (0-<2 yrs)	CW	Chemical Concentration in Water	See Table 3s.RME	µg/L	See Table 3s.RME	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR-W	Ingestion Rate of Water	0.78	L/day	EPA, 2014	CW x IR-W x EF x ED x CF x 1/BW x 1/AT
				ED	Exposure Duration	2	years	--	
				BW	Body Weight	15	kg	EPA, 2014	
			Older Child (a) (2-<6 yrs)	CW	Chemical Concentration in Water	See Table 3s.RME	µg/L	See Table 3s.RME	
				IR-W	Ingestion Rate of Water	0.78	L/day	EPA, 2014	
				ED	Exposure Duration	4	years	--	
				BW	Body Weight	15	kg	EPA, 2014	
			Adolescent (a) (6-<16 yrs)	CW	Chemical Concentration in Water	See Table 3s.RME	µg/L	See Table 3s.RME	
				IR-W	Ingestion Rate of Water	2.5	L/day	EPA, 2014	
				ED	Exposure Duration	10	years	--	
				BW	Body Weight	80	kg	EPA, 2014	
			Adolescent/Adult (a) Aggregate (16-<26 yrs)	CW	Chemical Concentration in Water	See Table 3s.RME	µg/L	See Table 3s.RME	
				IR-W	Ingestion Rate of Water	2.5	L/day	EPA, 2014	
				ED	Exposure Duration	10	years	--	
				BW	Body Weight	80	kg	EPA, 2014	
		Groundwater (Vinyl Chloride)	Child (b) (0-<6 yrs)	CW	Chemical Concentration in Water	See Table 3s.RME	µg/L	See Table 3s.RME	
				IR-W	Ingestion Rate of Water	0.78	L/day	EPA, 2014	
				ED	Exposure Duration	6	years	--	
				BW	Body Weight	15	kg	EPA, 2014	
			Adolescent/Adult Aggregate (b) (6-<26 yrs)	CW	Chemical Concentration in Water	See Table 3s.RME	µg/L	See Table 3s.RME	
				IR-W	Ingestion Rate of Water	2.5	L/day	EPA, 2014	
				ED	Exposure Duration	20	years	--	
				BW	Body Weight	80	kg	EPA, 2014	
				EF	Exposure Frequency	350	days/year	EPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	(1)	
				CF	Conversion Factor	0.001	mg/µg	- -	

TABLE 4.7.a.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS (MUTAGENIC MODE OF ACTION)
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Exposure Point	Receptor Age	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal	Resident	Groundwater	Young Child (a) (0-<2 yrs)	CW	Chemical Concentration in Water	See Table 3s.RME	µg/L	See Table 3s.RME	CDI (mg/kg-day) =
				SA	Skin Surface Area Available for Contact	6,378	cm^2	EPA, 2014	DAevent x SA x EV x EF x ED x 1/BW x 1/AT
				t_{event}	Event Time	0.54	hr/event	EPA, 2014	
				ED	Exposure Duration	2	years	--	
				BW	Body Weight	15	kg	EPA, 2014	
			Older Child (a) (2-<6 yrs)	CW	Chemical Concentration in Water	See Table 3s.RME	µg/L	See Table 3s.RME	
				SA	Skin Surface Area Available for Contact	6,378	cm^2	EPA, 2014	
				t_{event}	Event Time	0.54	hr/event	EPA, 2014	
				ED	Exposure Duration	4	years	--	
				BW	Body Weight	15	kg	EPA, 2014	
			Adolescent (a) (6-<16 yrs)	CW	Chemical Concentration in Water	See Table 3s.RME	µg/L	See Table 3s.RME	
				SA	Skin Surface Area Available for Contact	20,900	cm^2	EPA, 2014	
				t_{event}	Event Time	0.71	hr/event	EPA, 2014	
				ED	Exposure Duration	10	years	--	
				BW	Body Weight	80	kg	EPA, 2011; EPA, 2014	
			Adolescent/Adult (a) Aggregate (16-<26 yrs)	CW	Chemical Concentration in Water	See Table 3s.RME	µg/L	See Table 3s.RME	
				SA	Skin Surface Area Available for Contact	20,900	cm^2	EPA, 2014	
				t_{event}	Event Time	0.71	hr/event	EPA, 2014	
				ED	Exposure Duration	10	years	--	
				BW	Body Weight	80	kg	EPA, 2014	
		Groundwater (Vinyl Chloride)	Child (b) (0-<6 yrs)	CW	Chemical Concentration in Water	See Table 3s.RME	µg/L	See Table 3s.RME	
				SA	Skin Surface Area Available for Contact	6,378	cm^2	EPA, 2014	
				t_{event}	Event Time	0.54	hr/event	EPA, 2014	
				ED	Exposure Duration	6	years	--	
				BW	Body Weight	15	kg	EPA, 2014	
			Adolescent/Adult Aggregate (b) (6-<26 yrs)	CW	Chemical Concentration in Water	See Table 3s.RME	µg/L	See Table 3s.RME	
				SA	Skin Surface Area Available for Contact	20,900	cm^2	EPA, 2014	
				t_{event}	Event Time	0.71	hr/event	EPA, 2014	
				ED	Exposure Duration	20	years	--	
				BW	Body Weight	80	kg	EPA, 2014	

TABLE 4.7.a.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS (MUTAGENIC MODE OF ACTION)
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Exposure Point	Receptor Age	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Dermal (cont)				DAevent	Dermally Absorbed Dose per Event	Calculated	mg/cm^2-event	Calculated	
				EV	Event Frequency	1	events/day	EPA, 2014	
				EF	Exposure Frequency	350	days/year	EPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	(1)	
				FA	Fraction absorbed water	Chemical-Specific	dimensionless	EPA, 2004	
				Kp	Permeability Coefficient	Chemical-Specific	cm/hr	EPA, 2004	Organics :
				τ	Lag Time	Chemical-Specific	hr/event	EPA, 2004	$t_{event}<t^*$: DAevent (mg/cm^2-event) =
				t*	Time to Reach Steady-state	Chemical-Specific	hours	EPA, 2004	2 x FA x Kp x CW x (sqrt((6 x τ x t_{event})/π)) x CF1 x CF2
				B	Ratio of Permeability of Stratum Corneum to Epidermis	Chemical-Specific	dimensionless	EPA, 2004	$t_{event}>t^*$: DAevent (mg/cm^2-event) =
				CF1	Conversion Factor 1	0.001	mg/µg	- -	FA x Kp x CW x (t_{event}/(1+B) + 2 x τ x
				CF2	Conversion Factor 2	0.001	l/cm^3	- -	((1 + 3B + $3B^2$)/$(1+B)^2$)) x CF1 x CF2

Notes:
(a) Mutagenic chemicals other than vinyl chloride will use these age groups.
(b) Age group specific mutagenic IURs will be used for the Age Groups of 0-6 and 6-26 years for vinyl chloride.
(1) Calculated as the product of 70 years assumed human lifetime (EPA, 2014) x 365 days/year.

Sources:
EPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors, OSWER Directive 9200.1-120, February 6, 2014.

cm/hr = Centimeter per hour
cm^2 = Square centimeter
mg/µg = Milligram per microgram
kg = Kilogram
L/cm^3 = Liter per cubic centimeter
L/day = Liter per day
mg/cm^2 -event = Milligram per square centimeter per event
mg/kg-day = Milligram per kilogram per day
µg/L = Microgram per liter

TABLE 4.8.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Bathroom Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Adult	Water Vapors in Bathroom	CW	Chemical Concentration in Water	See Table 3s.RME	µg/L	See Table 3s.RME	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air from Shower	Calculated	mg/m^3	Calculated	CA x ET x ED x EF x CF1 x 1/AT
				ET	Exposure Time	0.71	hr/day	EPA, 2014	
				EF	Exposure Frequency	350	days/year	EPA, 2014	CA calculated based on CW using Andelman model
				ED	Exposure Duration	20	years	EPA, 2014	as modified by Schaum et al.
				AT-N	Averaging Time (Non-Cancer)	7,300	days	(1)	
				CF1	Conversion Factor 1	1/24	day/hr	- -	
		Child	Water Vapors in Bathroom	CW	Chemical Concentration in Water	See Table 3s.RME	µg/L	See Table 3s.RME	EC (mg/m^3) =
				CA	Chemical Concentration in Air from Shower	Calculated	mg/m^3	Calculated	CA x ET x ED x EF x CF1 x 1/AT
				ET	Exposure Time	0.54	hr/day	EPA, 2014	
				EF	Exposure Frequency	350	days/year	EPA, 2014	CA calculated based on CW using Andelman model
				ED	Exposure Duration	6	years	EPA, 2014	as modified by Schaum et al.
				AT-N	Averaging Time (Non-Cancer)	2,190	days	(1)	
				CF1	Conversion Factor 1	1/24	day/hr	- -	
		Child/Adult Aggregate	Water Vapors in Bathroom	CA	Chemical Concentration in Air	Calculated	mg/m^3	Calculated	EC (mg/m^3) =
				EF	Exposure Frequency	350	days/year	EPA, 2014	(CA-C x ET-C x ED-C + CA-A x ET-A x ED-A) x EF x CF1 x 1/AT
				AT-C	Averaging Time (Cancer)	25,550	days	(2)	
				CF1	Conversion Factor 1	1/24	day/hr	- -	CA calculated based on CW using Andelman model
									as modified by Schaum et al.

Notes:
(1) Calculated as the product of ED (years) x 365 days/year.
(2) Calculated as the product of 70 years assumed human lifetime (EPA, 2014) x 365 days/year.

Sources:
EPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors, OSWER Directive 9200.1-120, February 6, 2014.

mg/m^3 = Milligram per cubic meter
µg/L = Microgram per liter

TABLE 4.8.a.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS (MUTAGENIC MODE OF ACTION)
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Bathroom Air

Exposure Route	Receptor Population	Exposure Point	Receptor Age	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Water Vapors in Bathroom	Young Child (a) (0-<2 yrs)	CW	Chemical Concentration in Water	See Table 3s.RME	µg/L	See Table 3s.RME	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	Calculated	mg/m^3	Calculated	CA x ET x EF x ED x CF x 1/AT
				ET	Exposure Time	0.54	hr/day	EPA, 2014	
				ED	Exposure Duration	2	years	--	CA calculated based on CW using Andelman model as modified by Schaum et al.
			Older Child (a) (2-<6 yrs)	CW	Chemical Concentration in Water	See Table 3s.RME	µg/L	See Table 3s.RME	
				CA	Chemical Concentration in Air	Calculated	mg/m^3	Calculated	
				ET	Exposure Time	0.54	hr/day	EPA, 2014	
				ED	Exposure Duration	4	years	--	
			Adolescent (a) (6-<16 yrs)	CW	Chemical Concentration in Water	See Table 3s.RME	µg/L	See Table 3s.RME	
				CA	Chemical Concentration in Air	Calculated	mg/m^3	Calculated	
				ET	Exposure Time	0.71	hr/day	EPA, 2014	
				ED	Exposure Duration	10	years	--	
			Adolescent/Adult (a) Aggregate (16-<26 yrs)	CW	Chemical Concentration in Water	See Table 3s.RME	µg/L	See Table 3s.RME	
				CA	Chemical Concentration in Air	Calculated	mg/m^3	Calculated	
				ET	Exposure Time	0.71	hr/day	EPA, 2014	
				ED	Exposure Duration	10	years	--	
		Water Vapors in Bathroom (Vinyl Chloride)	Child (b) (0-<6 yrs)	CW	Chemical Concentration in Water	See Table 3s.RME	µg/L	See Table 3s.RME	
				CA	Chemical Concentration in Air	Calculated	mg/m^3	Calculated	
				ET	Exposure Time	0.54	hr/day	EPA, 2014	
				ED	Exposure Duration	6	years	--	
			Adolescent/Adult Aggregate (b) (6-<26 yrs)	CW	Chemical Concentration in Water	See Table 3s.RME	µg/L	See Table 3s.RME	
				CA	Chemical Concentration in Air	Calculated	mg/m^3	Calculated	
				ET	Exposure Time	0.71	hr/day	EPA, 2014	
				ED	Exposure Duration	20	years	--	
				EF	Exposure Frequency	350	days/year	EPA, 2014	
				AT-C	Averaging Time (Cancer)	25,550	days	(1)	
				CF	Conversion Factor	1/24	day/hr	- -	

Notes:
(a) Mutagenic chemicals other than vinyl chloride will use these age groups.
(b) Age group specific mutagenic IURs will be used for the Age Groups of 0-6 and 6-26 years for vinyl chloride.
(1) Calculated as the product of 70 years assumed human lifetime (EPA, 2014) x 365 days/year.
Sources:
EPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors, OSWER Directive 9200.1-120, February 6, 2014.
mg/m^3 = Milligram per cubic meter
µg/L = Microgram per liter

TABLE 4.9.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Indoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Adult	Indoor Air	CW	Chemical Concentration in Soil Gas	See Table 3s.RME	mg/m^3	See Table 3s.RME	Exposure Concentration (EC) (mg/m^3) =
				CA	Chemical Concentration in Air	Calculated	mg/m^3	Calculated	CA x ET x EF x ED x CF1 x 1/AT
				ET	Exposure Time	24	hr/day	EPA, 2014	
				EF	Exposure Frequency	350	days/year	EPA, 2014	CA calculated for groundwater gas to indoor air using an
				ED	Exposure Duration	20	years	EPA, 2014	attenuation factor of 0.001 and the temperature specific-
				CF1	Conversion Factor 1	1/24	day/hour	- -	Henry's Law Constant.
				AT-N	Averaging Time (Non-Cancer)	7,300	days	(1)	
		Child	Indoor Air	CW	Chemical Concentration in Water	See Table 3s.RME	mg/m^3	See Table 3s.RME	EC (mg/m^3) =
				CA	Chemical Concentration in Air	Calculated	mg/m^3	Calculated	CA x ET x EF x ED x CF1 x 1/AT
				ET	Exposure Time	24	hr/day	EPA, 2014	
				EF	Exposure Frequency	350	days/year	EPA, 2014	CA calculated for groundwater gas to indoor air using an
				ED	Exposure Duration	6	years	EPA, 2014	attenuation factor of 0.001 and the temperature specific-
				CF1	Conversion Factor 1	1/24	day/hour	- -	Henry's Law Constant.
				AT-N	Averaging Time (Non-Cancer)	2,190	days	(1)	
		Child/Adult Aggregate	Indoor Air	CW	Chemical Concentration in Water	See Table 3s.RME	mg/m^3	See Table 3s.RME	EC (mg/m^3) =
				CA	Chemical Concentration in Air	Calculated	mg/m^3	Calculated	CA x ET x EF x ED x CF1 x 1/AT
				ET	Exposure Time	24	hr/day	EPA, 2014	
				EF	Exposure Frequency	350	days/year	EPA, 2014	CA calculated for groundwater gas to indoor air using an
				ED	Exposure Duration, Resident	26	years	EPA, 2014	attenuation factor of 0.001 and the temperature specific-
				CF1	Conversion Factor 1	1/24	day/hour	- -	Henry's Law Constant.
				AT-C	Averaging Time (Cancer)	25,550	days	(2)	
	Industrial Worker	Adult	Indoor Air	CW	Chemical Concentration in Water	See Table 3s.RME	mg/m^3	See Table 3s.RME	(EC) (mg/m^3) =
				CA	Chemical Concentration in Air	Calculated	mg/m^3	Calculated	CA x ET x EF x ED x CF1 x 1/AT
				ET	Exposure Time	8	hr/day	(3)	
				EF	Exposure Frequency	250	days/year	EPA, 2014	CA calculated for groundwater gas to indoor air using an
				ED	Exposure Duration	25	years	EPA, 2014	attenuation factor of 0.001 and the temperature specific-
				CF1	Conversion Factor 1	1/24	day/hour	- -	Henry's Law Constant.
				AT-N	Averaging Time (Non-Cancer)	9,125	days	(1)	
				AT-C	Averaging Time (Cancer)	25,550	days	(2)	

TABLE 4.9.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Indoor Air

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name

Notes:
(1) Calculated as the product of ED (years) x 365 days/year.
(2) Calculated as the product of 70 years assumed human lifetime (EPA, 2014) x 365 days/year.
(3) Based on best professional judgment; assumed that workers are present in an industrial building for 8 hours per day.

Sources:
EPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors, OSWER Directive 9200.1-120, February 6, 2014.

mg/m^3 = Milligram per cubic meter
µg/L = Microgram per liter

TABLE 4.9.a.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS (MUTAGENIC MODE OF ACTION)
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Indoor Air

Exposure Route	Receptor Population	Exposure Point	Receptor Age	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Resident	Indoor Air	Child (a) (0-<2 yrs)	CW CA ED	Chemical Concentration in Water Chemical Concentration in Air Exposure Duration	See Table 3s.RME Calculated 2	µg/L mg/m^3 years	See Table 3s.RME Calculated --	Exposure Concentration (EC) (mg/m^3) = CA x ET x EF x ED_{0-2} x CF x 1/AT CA calculated for groundwater gas to indoor air using an attenuation factor of 0.001 and the temperature specific-Henry's Law Constant.
			Child/Adolescent (a) (2-<16 yrs)	CW CA ED	Chemical Concentration in Water Chemical Concentration in Air Exposure Duration	See Table 3s.RME Calculated 14	µg/L mg/m^3 years	See Table 3s.RME Calculated --	
			Adolescent/Adult (a) (16-<26 yrs)	CW CA ED	Chemical Concentration in Water Chemical Concentration in Air Exposure Duration	See Table 3s.RME Calculated 10	µg/L mg/m^3 years	See Table 3s.RME Calculated --	
		Indoor Air (Vinyl Chloride)	Child (b) (0-<6 yrs)	CW CA ED	Chemical Concentration in Water Chemical Concentration in Air Exposure Duration	See Table 3s.RME Calculated 6	µg/L mg/m^3 years	See Table 3s.RME Calculated --	
			Adolescent/Adult Aggregate (b) (6-<26 yrs)	CW CA ED	Chemical Concentration in Water Chemical Concentration in Air Exposure Duration	See Table 3s.RME Calculated 20	µg/L mg/m^3 years	See Table 3s.RME Calculated --	
				ET EF CF AT	Exposure Time Exposure Frequency Conversion Factor Averaging Time (Cancer)	24 350 1/24 25,550	hr/day days/year day/hr days	EPA, 2014 EPA, 2014 -- (1)	

Notes:
(a) Mutagenic chemicals other than vinyl chloride will use these age groups.
(b) Age group specific mutagenic IURs will be used for the Age Groups of 0-6 and 6-26 years for vinyl chloride.
(1) Calculated as the product of 70 years assumed human lifetime (EPA, 2014) x 365 days/year.

Sources:
EPA, 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors, OSWER Directive 9200.1-120, February 6, 2014.

mg/m^3 = Milligram per cubic meter
µg/L = Microgram per liter

TABLE 4 Supplement A
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Age Group	Years	Body Weight (kg) [1]	Skin Surface Area (m^2) [2]							Exposed Skin Surface (m^2) (Head, Hands, Forearms, Lower Legs, and Feet)	
			Head	Hands	Feet	Forearms/Arms Ratio [3]	Forearms	Legs/Lower Legs Ratio [3]	Lower Legs	Sum	Weighted
6 to <11 years	5	31.8	0.066	0.051	0.073	0.61	0.09211	0.39	0.12129	0.4034	2.017
11 to <16 years	5	56.8	0.073	0.072	0.105	0.62	0.14074	0.4	0.1932	0.58394	2.9197
Weighted Average (kg)		44.3						Weighted Average (m^2)			0.4937
								Weighted Average (cm^2) [4]			4940

Note:
1) Recommended Values for Body Weight (male and female combined)
2) Recommended Values for Surface Area of Body Parts (male and female combined)
3) Ratio was estimated based on Mean Proportion (%) of Children's Total Skin Surface Area, by Body Part.
4) Rounded up with three significant figure.

Reference:
EPA. 2011. Exposure Factors Handbook: 2011 Edition. EPA/600/R-090/052F.

TABLE 4 Supplement B
DERMAL ABSORPTION FRACTION FROM SOIL
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Chemical Group	CAS Number	Chemical	Dermal Absorption Fraction	Note
Metal	7429-90-5	Aluminum	NA	(1)
Metal	7440-38-2	Arsenic	0.03	EPA, 2004
Metal	7440-47-3	Chromium	NA	(1)
Metal	7440-48-4	Cobalt	NA	(1)
Inorganic	57-12-5	Cyanide	NA	(1)
Metal	7439-89-6	Iron	NA	(1)
Metal	7439-96-5	Manganese	NA	(1)
Metal	7440-62-2	Vanadium	NA	(1)

Notes:
(1) No default dermal absorption values are currently available for inorganics due to the lack of speciation-specific absorption data.
Therefore, consistent with EPA RAGS Part E (EPA, 2004) and RSL Table (EPA, 2015), dermal exposure is not assessed for these constituents.

Sources:
EPA, 2004: Risk Assessment Guidance for Superfund (RAGS) Volume I: Human Health Evaluation Manual.
(Part E, Supplemental Guidance for Dermal Risk Assessment (Final). EPA/540/R/99/005. July 2004.
EPA, 2015: Regional Screening Levels for Chemical Contaminants at Superfund Sites. June.

NA = Not Available/Not Applicable

TABLE 4 Supplement C-1
PARTICULATE EMISSION FACTOR
RECREATIONAL USER/TRESPASSER/SITE VISITOR, RESIDENT, MAINTENANCE WORKER, AND INDUSTRIAL WORKER
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former VNTR, Vieques, Puerto Rico

PEF Equations:

$$Q/C_{wind} = A \times \exp\left[\frac{(\ln A_{site} - B)^2}{C}\right]$$

Exhibit D-2 (EPA, 2002)

$$PEF = Q/C_{wind} \times \frac{3{,}600\,\text{sec/hr}}{0.036 \times (1-V) \times \left(U_m/U_t\right)^3 \times F(x)}$$

Equation 4-5 (EPA, 2002)

PEF and Box Model Input Parameters

Parameter	Definition	Value	Units	Source
Q/C_{wind}	inverse ratio of the geometric mean air concentration to the emission flux at the center of a square source	**75**	m	calculated
A	Constant for Zone 9 (Miami, FL)	12.1960	unitless	Exhibit D-2 (EPA, 2002)
B	Constant for Zone 9 (Miami, FL)	19.0645	unitless	Exhibit D-2 (EPA, 2002)
C	Constant for Zone 9 (Miami, FL)	215.3923	unitless	Exhibit D-2 (EPA, 2002)
A_{site}	Areal extent of site contamination	0.5	acres	site-specific
PEF	particulate emission factor	**7.99E+08**	m^3/kg	calculated
V	fraction of vegetative cover	0.5	unitless	Default (Eqn. 4-5)
Um	mean annual windspeed	5.19	m/s	Note 1 (Dept. of Navy, 1979)
Ut	equivalent threshold value of windspeed at 7 m	11.32	m/s	Default (Eqn. 4-5)
F(x)	function dependent on Um/Ut derived using Cowherd et al. (1985)	0.194	unitless	Default (Eqn. 4-5)

Note 1 - The daily average windspeed from measurements at Observation Post 5 on Vieques (10.1 knots = 5.19 m/s) was used.
Sources:

Department of the Navy. 1979. Draft Environmental Impact Statement: Volume I – Continued Use of the Atlantic Fleet Weapons Training Facility Inner Range (Vieques). December.
EPA, 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, EPA Office of Solid Waste and Emergency Response. OSWER 9355.4-24. December.

m = meter
m^3/kg = cubic meter per kilogram
m/s = meter per second

TABLE 4 Supplement C-2
PARTICULATE EMISSION FACTOR
CONSTRUCTION WORKER
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former VNTR, Vieques, Puerto Rico

PEF Equations:

$$Q/C_{Sr} = A \times \exp\left[\frac{(\ln A_{site} - B)^2}{C}\right]$$

Equation 5-6 (EPA, 2002)

$$PEF_{SC} = Q/C_{Sr} \times \frac{1}{F_D} \frac{T \times A_R}{556 \times (W/3)^{0.4} \times \left(\frac{365\ d/yr - p}{365\ d/yr}\right) \times \sum VKT}$$

Equation 5-5 (EPA, 2002)

$$F_D = 0.1852 + \frac{5.3537}{t_c} + \frac{-9.6318}{t_c^{\ 2}}$$

Equation E-16 (EPA, 2002)

PEF and Box Model Input Parameters

Parameter	Definition	Value	Units	Source
Q/C_{Sr}	inverse ratio of the geometric mean air concentration to the emission flux at the center of a square source	**23.0**	m	calculated
A	Constant	12.9351	unitless	default (Eqn. 5-6)
B	Constant	5.7383	unitless	default (Eqn. 5-6)
C	Constant	71.7711	unitless	default (Eqn. 5-6)
A_{site}	Areal extent of site contamination	0.5	acres	site-specific
PEF_{SC}	subchronic road particulate emission factor	**9.97E+06**	m^3/kg	calculated
F_D	Dispersion correction factor	0.188	unitless	calculated
t_c	duration of construction (250 days for 8 hr/day)	2,000	hr	assumed
T	total time over which construction occurs (t_c x 3600 s/hr)	7,200,000	s	assumed
A_R	surface area of contaminated road segment (square root of site surface contamination configured as a square x default width of road segment of 20 ft)	274.18	m^2	calculated
W	mean weight of vehicle [(1 car @ 2 tons/car) + (2 trucks @ 20 tons/truck)] / 3 vehicles)	14	tons	assumed
p	number of days with at least 0.01 inches of precipitation (based on measured 2005 data)	110	days/yr	Exhibit 5-2. (EPA, 2002)
VKT	sum of fleet vehicle kilometers traveled during the exposure duration (assumed 3 vehicles x 0.045 km/day x 250 days)	33.7	km	assumed

Source:
EPA, 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, EPA
Office of Solid Waste and Emergency Response. OSWER 9355.4-24. December.

TABLE 4 Supplement D
VOLATILIZATION FACTOR
RECREATIONAL USER/TRESPASSER/SITE VISITOR AND RESIDENT
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former VNTR, Vieques, Puerto Rico

Chemical	Diffusivity in Air (D_i) (cm^2/s)	Henry's Law Constant (H') (unitless)	Diffusivity in Water (D_w) (cm^2/s)	Soil Organic Carbon Partition Coeff. (K_{oc}) (cm^3/g)	Soil Water Partition Coeff. ($K_d = K_{oc} \times F_{oc}$) ($g/cm^3$)	Solubility in Water (S) (mg/L)	Apparent Diffusivity (D_A) (cm^2/s)	Volatilization Factor (VF) (m^3/kg)
Cyanide	2.11E-01	9.89E-01	2.46E-05	n/a	9.90E+00	9.54E+04	1.09E-03	3.82E+03

$$Q/C_{vol} = A \times \exp\left[\frac{(\ln A_c - B)^2}{C}\right]$$

Equation D-1 (EPA, 2002)

$$VF_{SC} = Q/C_{vol} \times \left[\frac{(3.14 \times D_A \times T)^{1/2}}{2 \times \rho_b \times D_A}\right] \times 10^{-4}\left(m^2/cm^2\right)$$

Equation 4-8 (EPA, 2002)

$$D_A = \frac{\left(\theta_a^{10/3} \times D_i \times H' + \theta_w^{10/3} \times D_w\right)/n^2}{\rho_b \times K_d + \theta_w + \theta_a \times H'}$$

Equation 4-8 (EPA, 2002)

Parameter	Definition	Value	Units	Source
Q/C_{sa}	Inverse ratio of the geometric mean air concentration to the emission flux at the center of a square source	**74.70**	m	calculated
A	Constant	12.1960	unitless	Exhibit D-3
B	Constant	19.0645	unitless	Exhibit D-3
C	Constant	215.3923	unitless	Exhibit D-3
A_c	Areal extent of site contamination	0.5	acres	assumed
T	Exposure Interval	8.2E+08	s	assumed
ρ_b	Soil bulk density	1.5	g/cm^3	default (Eqn. 4-8)
Θ_a	Air-filled soil porosity (L_{air}/L_{water}	0.28	$(L_{air}/L_{water}) = n - Q_w$	calculated
n	Total soil porosity (Lpore/Lsoil)	0.43	(Lpore/Lsoil) = 1 - (r_b/r_s)	calculated
Θ_w	Water-filled soil porosity	0.15	Lwater/Lsoil	default (Eqn. 4-8)
ρ_s	Soil particle density	2.65	g/cm^3	default (Eqn. 4-8)
f_{oc}	Fraction organic carbon in soil	0.006	g/g	default (Eqn. 4-8)

Note:

Physical and chemical properties are obtained from EPA, RSL Table (June 2015).

Source:

EPA, 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, EPA Office of Solid Waste and Emergency Response. OSWER 9355.4-24. December.

EPA, 2015: Regional Screening Levels for Chemical Contaminants at Superfund Sites. June.

TABLE 5.1
NON-CANCER TOXICITY DATA -- ORAL/DERMAL
SWMU 20
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal (1)	Absorbed RfD for Dermal (2)		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Aluminum	Chronic	1.0E+00	mg/kg/day	100%	1.0E+00	mg/kg/day	Neurological	100	PPRTV	10/23/2006
Aluminum	Subchronic	1.0E+00	mg/kg/day	100%	1.0E+00	mg/kg/day	Neurological	30	ATSDR	12/2014
Arsenic	Chronic	3.0E-04	mg/kg/day	95%	3.0E-04	mg/kg/day	Skin and Blood	3/1	IRIS	4/6/2015
Arsenic	Subchronic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	Chronic	1.5E+00	mg/kg/day	1.3%	2.0E-02	mg/kg/day	NOE	100/10	IRIS	4/6/2015
Chromium	Subchronic	1.5E+00	mg/kg/day	1.3%	2.0E-02	mg/kg/day	NOE	1000	HEAST	7/1997
Cobalt	Chronic	3.0E-04	mg/kg/day	100%	3.0E-04	mg/kg/day	Thyroid	3000	PPRTV	8/25/2008
Cobalt	Subchronic	3.0E-03	mg/kg/day	100%	3.0E-03	mg/kg/day	Thyroid	300	PPRTV	8/25/2008
Cyanide	Chronic	6.3E-04	mg/kg/day	100%	6.3E-04	mg/kg/day	Testes	NA	IRIS	9/30/2015
Cyanide	Subchronic	2.0E-02	mg/kg/day	100%	2.0E-02	mg/kg/day	Thyroid and CNS	500	HEAST	7/1997
Iron	Chronic	7.0E-01	mg/kg/day	100%	7.0E-01	mg/kg/day	GI Tract	1.5	PPRTV	9/11/2006
Iron	Subchronic	7.0E-01	mg/kg/day	100%	7.0E-01	mg/kg/day	GI Tract	1.5	PPRTV	9/11/2006
Manganese	Chronic	2.4E-02	mg/kg/day	4%	9.6E-04	mg/kg/day	CNS	1/1	IRIS	4/6/2015
Manganese	Subchronic	1.4E-01	mg/kg/day	100%	1.4E-01	mg/kg/day	CNS	1	HEAST	7/1997
Vanadium	Chronic	5.0E-03	mg/kg/day	2.6%	1.3E-04	mg/kg/day	Hair	100/1	IRIS	4/6/2015
Vanadium	Subchronic	1.0E-02	mg/kg/day	2.6%	2.6E-04	mg/kg/day	Blood	10	ATSDR	12/2014
Tetrachloroethene	Chronic	6.0E-03	mg/kg/day	100%	6.0E-03	mg/kg/day	Neurological	1000	IRIS	4/6/2015
Trichloroethene	Chronic	5.0E-04	mg/kg/day	100%	5.0E-04	mg/kg/day	Immunological	10 - 1000	IRIS	4/6/2015
Vinyl chloride	Chronic	3.0E-03	mg/kg/day	100%	3.0E-03	mg/kg/day	Liver	30	IRIS	4/6/2015

Note:
(1) Source: Risk Assessment Guidance for Superfund. Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. Section 4.2 and Exhibit 4-1. EPA recommends that the oral RfD should not be adjusted to estimate the absorbed dose for compounds when the absorption efficiency is greater than 50%. Constituents that do not have oral absorption efficiencies reported on this table were assumed to have an oral absorption efficiency of 100%.
(2) Adjusted based on RAGS Part E.

The toxicity values for Chromium (III) will be used for Chromium in soil and sediment.

Definitions:
ATSDR = Agency for Toxic Substances & Disease Registry Minimal Risk Levels
HEAST = Health Effects Assessment Summary Tables
IRIS = Integrated Risk Information System
PPRTV = Provisional Peer-Reviewed Toxicity Value

CNS = Central Nervous System
GI = Gastrointestinal
NOE = No Observed Effect
NA = Not Available

TABLE 5.2
NON-CANCER TOXICITY DATA -- INHALATION
SWMU 20
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units			Source(s)	Date(s) (MM/DD/YYYY)
Aluminum	Chronic	5.0E-03	mg/m^3	Neurological	300	PPRTV	10/23/2006
Aluminum	Subchronic	NA	NA	NA	NA	NA	NA
Arsenic	Chronic	1.5E-05	mg/m^3	Reproductive, Developmental, Cardiovascular, Nervous, Respiratory, Skin	30	Cal/EPA	4/6/2015
Arsenic	Subchronic	NA	NA	NA	NA	NA	NA
Chromium	Chronic	NA	NA	NA	NA	NA	NA
Chromium	Subchronic	5.0E-03	mg/m^3	Respiratory	90	ATSDR	12/2014
Cobalt	Chronic	6.0E-06	mg/m^3	Respiratory	300	PPRTV	8/25/2008
Cobalt	Subchronic	2.0E-05	mg/m^3	Respiratory	100	PPRTV	8/25/2008
Cyanide	Chronic	8.0E-04	mg/m^3	Thyroid	3000	IRIS	9/30/2015
Cyanide	Subchronic	NA	NA	NA	NA	NA	NA
Iron	Chronic/Subchronic	NA	NA	NA	NA	NA	NA
Manganese	Chronic	5.0E-05	mg/m^3	Neurological	1000/1	IRIS	4/6/2015
Manganese	Subchronic	NA	NA	NA	NA	NA	NA
Vanadium	Chronic	1.0E-04	mg/m^3	Respiratory	30	ATSDR	12/2014
Vanadium	Subchronic	NA	NA	NA	NA	NA	NA
Tetrachloroethene	Chronic	4.0E-02	mg/m^3	Neurological	1000	IRIS	4/6/2015
Trichloroethene	Chronic	2.0E-03	mg/m^3	Immunological	10 - 100	IRIS	4/6/2015
Vinyl chloride	Chronic	1.0E-01	mg/m^3	Liver	30	IRIS	4/6/2015

Note:
The toxicity values for Chromium (III) were used for Chromium.

Definitions:
ATSDR = Agency for Toxic Substances & Disease Registry Minimal Risk Levels
Cal/EPA = California Environmental Protection Agency
IRIS = Integrated Risk Information System
PPRTV = Provisional Peer-Reviewed Toxicity Value
NA = Not Available

TABLE 6.1
CANCER TOXICITY DATA -- ORAL/DERMAL
SWMU 20
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal (1)	Absorbed Cancer Slope Factor for Dermal (2)		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units		Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	1.5E+00	$(mg/kg/day)^{-1}$	95%	1.5E+00	$(mg/kg/day)^{-1}$	A	IRIS	4/6/2015
Chromium	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	NA	NA	NA	NA	NA	D	IRIS	9/30/2015
Iron	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	D	IRIS	4/6/2015
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	2.1E-03	$(mg/kg/day)^{-1}$	100%	2.1E-03	$(mg/kg/day)^{-1}$	Likely to be carcinogenic to humans	IRIS	4/6/2015
Trichloroethene (3)	4.6E-02	$(mg/kg/day)^{-1}$	100%	4.6E-02	$(mg/kg/day)^{-1}$	Carcinogenic to humans	IRIS	4/6/2015
Vinyl chloride (exposure during adulthood)	7.2E-01	$(mg/kg/day)^{-1}$	100%	7.2E-01	$(mg/kg/day)^{-1}$	A	IRIS	4/6/2015
Vinyl chloride (exposure from birth)	1.5E+00	$(mg/kg/day)^{-1}$	100%	1.5E+00	$(mg/kg/day)^{-1}$	A	IRIS	4/6/2015

(1) Source: Risk Assessment Guidance for Superfund. Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. Section 4.2 and Exhibit 4-1. EPA recommends that the oral slope factor should not be adjusted to estimate the absorbed dose for compounds when the absorption efficiency is greater than 50%. Constituents that do not have oral absorption efficiencies reported on this table were assumed to have an oral absorption efficiency of 100%.

Definitions: IRIS = Integrated Risk Information System
NA = Not Available

(2) Adjusted based on RAGS Part E.

(3) This chemical operates with a mutagenic mode of action (EPA 2005) and would exhibit a greater effect in early-life versus later-life exposure.
Chemical-specific toxicity data are not availablefor childhood and early-life exposures; thus, EPA (2005) default age-dependant adjustment factors (ADAF) will be applied to the slope factor as follows:

AGE	AGE ADAF
0-<2	10
2-<16	3
16-<26	1

The toxicity values for Chromium (III) were used for Chromium in soil and sediment.

Weight of Evidence definitions:
Group A chemicals (known human carcinogens) are agents for which there is sufficient evidence to support the causal association between exposure to the agents in humans and cancer.
Group B1 chemicals (probable human carcinogens) are agents for which there is limited evidence of possible carcinogenicity in humans.
Group B2 chemicals (probable human carcinogens) are agents for which there is sufficient evidence of carcinogenicity in animals but inadequate or a lack of evidence in humans.
Group C chemicals (possible human carcinogens) are agents for which there is limited evidence of carcinogenicity in animals and inadequate or a lack of human data.
Group D chemicals (not classifiable as to human carcinogenicity) are agents with inadequate human and animal evidence of carcinogenicity or for which no data are available.
Group E chemicals (evidence of noncarcinogenicity in humans) are agents for which there is no evidence of carcinogenicity from human or animal studies, or both.

TABLE 6.2
CANCER TOXICITY DATA -- INHALATION
SWMU 20
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical of Potential Concern	Unit Risk		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units		Source(s)	Date(s) (MM/DD/YYYY)
Aluminum	NA	NA	NA	NA	NA
Arsenic	4.3E-03	$(ug/m^3)^{-1}$	A	IRIS	4/6/2015
Chromium	NA	NA	NA	NA	NA
Cobalt	9.0E-03	$(ug/m^3)^{-1}$	Likely to be carcinogenic to humans	PPRTV	8/25/2008
Cyanide	NA	NA	D	IRIS	9/30/2015
Iron	NA	NA	NA	NA	NA
Manganese	NA	NA	D	IRIS	4/6/2015
Vanadium	NA	NA	NA	NA	NA
Tetrachloroethene	2.6E-07	$(ug/m^3)^{-1}$	Likely to be carcinogenic to humans	IRIS	4/6/2015
Trichloroethene (1)	4.1E-06	$(ug/m^3)^{-1}$	Carcinogenic to humans	IRIS	4/6/2015
Vinyl chloride (exposure during adulthood)	4.4E-06	$(ug/m^3)^{-1}$	A	IRIS	4/6/2015
Vinyl chloride (exposure from birth)	8.8E-06	$(ug/m^3)^{-1}$	A	IRIS	4/6/2015

Definitions:

IRIS = Integrated Risk Information System
PPRTV = Provisional Peer-Reviewed Toxicity Value
NA = Not Available

(1) This chemical operates with a mutagenic mode of action (EPA 2005) and would exhibit a greater effect in early-life versus later-life exposure.
Chemical-specific toxicity data are not availablefor childhood and early-life exposures; thus, EPA (2005) default age-dependant adjustment factors (ADAF) will be applied to the slope factor as follows:

AGE	AGE ADAF
0-<2	10
2-<16	3
16-<26	1

The toxicity values for Chromium (III) were used for Chromium.

Weight of Evidence definitions:
Group A chemicals (known human carcinogens) are agents for which there is sufficient evidence to support the causal association between exposure to the agents in humans and cancer.
Group B1 chemicals (probable human carcinogens) are agents for which there is limited evidence of possible carcinogenicity in humans.
Group B2 chemicals (probable human carcinogens) are agents for which there is sufficient evidence of carcinogenicity in animals but inadequate or a lack of evidence in humans.
Group C chemicals (possible human carcinogens) are agents for which there is limited evidence of carcinogenicity in animals and inadequate or a lack of human data.
Group D chemicals (not classifiable as to human carcinogenicity) are agents with inadequate human and animal evidence of carcinogenicity or for which no data are available.
Group E chemicals (evidence of noncarcinogenicity in humans) are agents for which there is no evidence of carcinogenicity from human or animal studies, or both.

TABLE 7.1.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Current/Future
Receptor Population: Recreational User/Trespasser/Site Visitor
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/ Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	Surface Soil	Ingestion	Aluminum	9.9E+03	mg/kg	1.0E-03	mg/kg/day	NA	NA	NA	3.5E-03	mg/kg/day	1.0E+00	mg/kg/day	3.5E-03
	(0 - 1 foot)	(0 - 1 foot)		Arsenic	1.2E+00	mg/kg	1.2E-07	mg/kg/day	1.5E+00	1/(mg/kg/day)	2E-07	4.3E-07	mg/kg/day	3.0E-04	mg/kg/day	1.4E-03
				Chromium	1.2E+01	mg/kg	1.2E-06	mg/kg/day	NA	NA	NA	4.3E-06	mg/kg/day	1.5E+00	mg/kg/day	2.9E-06
				Cobalt	1.3E+01	mg/kg	1.3E-06	mg/kg/day	NA	NA	NA	4.5E-06	mg/kg/day	3.0E-04	mg/kg/day	1.5E-02
				Cyanide	7.2E-01	mg/kg	7.3E-08	mg/kg/day	NA	NA	NA	2.6E-07	mg/kg/day	6.3E-04	mg/kg/day	4.1E-04
				Iron	1.8E+04	mg/kg	1.8E-03	mg/kg/day	NA	NA	NA	6.4E-03	mg/kg/day	7.0E-01	mg/kg/day	9.2E-03
				Manganese	6.2E+02	mg/kg	6.3E-05	mg/kg/day	NA	NA	NA	2.2E-04	mg/kg/day	2.4E-02	mg/kg/day	9.3E-03
				Vanadium	6.5E+01	mg/kg	6.6E-06	mg/kg/day	NA	NA	NA	2.3E-05	mg/kg/day	5.0E-03	mg/kg/day	4.6E-03
			Exp. Route Total								2E-07					4.3E-02
Soil	Surface Soil	Surface Soil	Dermal	Aluminum	9.9E+03	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	mg/kg/day	1.0E+00	mg/kg/day	NA
	(0 - 1 foot)	(0 - 1 foot)		Arsenic	1.2E+00	mg/kg	1.5E-08	mg/kg/day	1.5E+00	1/(mg/kg/day)	2E-08	5.4E-08	mg/kg/day	3.0E-04	mg/kg/day	1.8E-04
				Chromium	1.2E+01	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	mg/kg/day	2.0E-02	mg/kg/day	NA
				Cobalt	1.3E+01	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	mg/kg/day	3.0E-04	mg/kg/day	NA
				Cyanide	7.2E-01	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	mg/kg/day	6.3E-04	mg/kg/day	NA
				Iron	1.8E+04	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	mg/kg/day	7.0E-01	mg/kg/day	NA
				Manganese	6.2E+02	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	mg/kg/day	9.6E-04	mg/kg/day	NA
				Vanadium	6.5E+01	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	mg/kg/day	1.3E-04	mg/kg/day	NA
			Exp. Route Total								2E-08					1.8E-04
		Exposure Point Total									2E-07					4.4E-02
Exposure Medium Total											2E-07					4.4E-02

TABLE 7.1.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Current/Future
Receptor Population: Recreational User/Trespasser/Site Visitor
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/ Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Ambient Air	Emissions from Surface Soil	Inhalation	Aluminum	1.2E-05	mg/m^3	1.7E-07	mg/m^3	NA	NA	NA	5.9E-07	mg/m^3	5.0E-03	mg/m3	1.2E-04
				Arsenic	1.5E-09	mg/m^3	2.0E-11	mg/m^3	4.3E-03	1/(ug/m3)	9E-11	7.1E-11	mg/m^3	1.5E-05	mg/m3	4.8E-06
				Chromium	1.5E-08	mg/m^3	2.1E-10	mg/m^3	NA	NA	NA	7.2E-10	mg/m^3	NA	NA	NA
				Cobalt	1.6E-08	mg/m^3	2.1E-10	mg/m^3	9.0E-03	1/(ug/m3)	2E-09	7.5E-10	mg/m^3	6.0E-06	mg/m3	1.2E-04
				Cyanide	1.9E-04	mg/m^3	2.6E-06	mg/m^3	NA	NA	NA	8.9E-06	mg/m^3	8.0E-04	mg/m3	1.1E-02
				Iron	2.3E-05	mg/m^3	3.1E-07	mg/m^3	NA	NA	NA	1.1E-06	mg/m^3	NA	NA	NA
				Manganese	7.8E-07	mg/m^3	1.1E-08	mg/m^3	NA	NA	NA	3.7E-08	mg/m^3	5.0E-05	mg/m3	7.4E-04
				Vanadium	8.1E-08	mg/m^4	1.1E-09	mg/m^4	NA	NA	NA	3.9E-09	mg/m^4	1.0E-04	mg/m3	3.9E-05
			Exp. Route Total								2E-09					1.2E-02
		Exposure Point Total									2E-09					1.2E-02
	Exposure Medium Total										2E-09					1.2E-02
Surface Soil Total											2E-07					5.6E-02
Receptor Total											2E-07					5.6E-02

Notes:
CSF = Cancer slope factor
EPC = Exposure point concentration
NA = Not applicable/Not available
RfD = Reference dose
mg/kg = milligram per kilogram
mg/kg/day = milligram per kilogram per day

TABLE 7.2.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Current/Future
Receptor Population: Recreational User/Trespasser/Site Visitor
Receptor Age: Youth

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil (0 - 1 foot)	Surface Soil (0 - 1 foot)	Ingestion	Aluminum	9.9E+03	mg/kg	9.1E-04	mg/kg/day	NA	NA	NA	6.4E-03	mg/kg/day	1.0E+00	mg/kg/day	6.4E-03
				Arsenic	1.2E+00	mg/kg	1.1E-07	mg/kg/day	1.5E+00	1/(mg/kg/day)	2E-07	7.8E-07	mg/kg/day	3.0E-04	mg/kg/day	2.6E-03
				Chromium	1.2E+01	mg/kg	1.1E-06	mg/kg/day	NA	NA	NA	7.9E-06	mg/kg/day	1.5E+00	mg/kg/day	5.2E-06
				Cobalt	1.3E+01	mg/kg	1.2E-06	mg/kg/day	NA	NA	NA	8.2E-06	mg/kg/day	3.0E-04	mg/kg/day	2.7E-02
				Cyanide	7.2E-01	mg/kg	6.7E-08	mg/kg/day	NA	NA	NA	4.7E-07	mg/kg/day	6.3E-04	mg/kg/day	7.4E-04
				Iron	1.8E+04	mg/kg	1.7E-03	mg/kg/day	NA	NA	NA	1.2E-02	mg/kg/day	7.0E-01	mg/kg/day	1.7E-02
				Manganese	6.2E+02	mg/kg	5.8E-05	mg/kg/day	NA	NA	NA	4.0E-04	mg/kg/day	2.4E-02	mg/kg/day	1.7E-02
				Vanadium	6.5E+01	mg/kg	6.0E-06	mg/kg/day	NA	NA	NA	4.2E-05	mg/kg/day	5.0E-03	mg/kg/day	8.4E-03
			Exp. Route Total								2E-07					7.9E-02
Soil	Surface Soil (0 - 1 foot)	Surface Soil (0 - 1 foot)	Dermal	Aluminum	9.9E+03	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	mg/kg/day	1.0E+00	mg/kg/day	NA
				Arsenic	1.2E+00	mg/kg	3.3E-08	mg/kg/day	1.5E+00	1/(mg/kg/day)	5E-08	2.3E-07	mg/kg/day	3.0E-04	mg/kg/day	7.7E-04
				Chromium	1.2E+01	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	mg/kg/day	2.0E-02	mg/kg/day	NA
				Cobalt	1.3E+01	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	mg/kg/day	3.0E-04	mg/kg/day	NA
				Cyanide	7.2E-01	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	mg/kg/day	6.3E-04	mg/kg/day	NA
				Iron	1.8E+04	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	mg/kg/day	7.0E-01	mg/kg/day	NA
				Manganese	6.2E+02	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	mg/kg/day	9.6E-04	mg/kg/day	NA
				Vanadium	6.5E+01	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	mg/kg/day	1.3E-04	mg/kg/day	NA
			Exp. Route Total								5E-08					7.7E-04
		Exposure Point Total									2E-07					8.0E-02
	Exposure Medium Total										2E-07					8.0E-02
Soil	Ambient Air	Emissions from Surface Soil	Inhalation	Aluminum	1.2E-05	mg/m^3	8.4E-08	mg/m^3	NA	NA	NA	5.9E-07	mg/m^3	5.0E-03	mg/m3	1.2E-04
				Arsenic	1.5E-09	mg/m^3	1.0E-11	mg/m^3	4.3E-03	1/(ug/m3)	4E-11	7.1E-11	mg/m^3	1.5E-05	mg/m3	4.8E-06
				Chromium	1.5E-08	mg/m^3	1.0E-10	mg/m^3	NA	NA	NA	7.2E-10	mg/m^3	NA	NA	NA
				Cobalt	1.6E-08	mg/m^3	1.1E-10	mg/m^3	9.0E-03	1/(ug/m3)	1E-09	7.5E-10	mg/m^3	6.0E-06	mg/m3	1.2E-04
				Cyanide	1.9E-04	mg/m^3	1.3E-06	mg/m^3	NA	NA	NA	8.9E-06	mg/m^3	8.0E-04	mg/m3	1.1E-02
				Iron	2.3E-05	mg/m^3	1.5E-07	mg/m^3	NA	NA	NA	1.1E-06	mg/m^3	NA	NA	NA
				Manganese	7.8E-07	mg/m^3	5.3E-09	mg/m^3	NA	NA	NA	3.7E-08	mg/m^3	5.0E-05	mg/m3	7.4E-04
				Vanadium	8.1E-08	mg/m^4	5.5E-10	mg/m^4	NA	NA	NA	3.9E-09	mg/m^4	1.0E-04	mg/m3	3.9E-05
			Exp. Route Total								1E-09					1.2E-02
		Exposure Point Total									1E-09					1.2E-02
	Exposure Medium Total										1E-09					1.2E-02
Surface Soil Total											2E-07					9.2E-02
Receptor Total											2E-07					9.2E-02

TABLE 7.2.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Current/Future
Receptor Population: Recreational User/Trespasser/Site Visitor
Receptor Age: Youth

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	

Notes:
CSF = Cancer slope factor
EPC = Exposure point concentration
NA = Not applicable/Not available
RfD = Reference dose
mg/kg = milligram per kilogram
mg/kg/day = milligram per kilogram per day

TABLE 7.3.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Current/Future
Receptor Population: Recreational User/Trespasser/Site Visitor
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/ Exposure		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil (0 - 1 foot)	Surface Soil (0 - 1 foot)	Ingestion	Aluminum	9.9E+03	mg/kg	3.2E-03	mg/kg/day	NA	NA	NA	3.8E-02	mg/kg/day	1.0E+00	mg/kg/day	3.8E-02
				Arsenic	1.2E+00	mg/kg	3.9E-07	mg/kg/day	1.5E+00	1/(mg/kg/day)	6E-07	4.6E-06	mg/kg/day	3.0E-04	mg/kg/day	1.5E-02
				Chromium	1.2E+01	mg/kg	4.0E-06	mg/kg/day	NA	NA	NA	4.6E-05	mg/kg/day	1.5E+00	mg/kg/day	3.1E-05
				Cobalt	1.3E+01	mg/kg	4.1E-06	mg/kg/day	NA	NA	NA	4.8E-05	mg/kg/day	3.0E-04	mg/kg/day	1.6E-01
				Cyanide	7.2E-01	mg/kg	2.3E-07	mg/kg/day	NA	NA	NA	2.7E-06	mg/kg/day	6.3E-04	mg/kg/day	4.3E-03
				Iron	1.8E+04	mg/kg	5.9E-03	mg/kg/day	NA	NA	NA	6.9E-02	mg/kg/day	7.0E-01	mg/kg/day	9.8E-02
				Manganese	6.2E+02	mg/kg	2.0E-04	mg/kg/day	NA	NA	NA	2.4E-03	mg/kg/day	2.4E-02	mg/kg/day	9.9E-02
				Vanadium	6.5E+01	mg/kg	2.1E-05	mg/kg/day	NA	NA	NA	2.5E-04	mg/kg/day	5.0E-03	mg/kg/day	4.9E-02
			Exp. Route Total								6E-07					4.6E-01
Soil	Surface Soil (0 - 1 foot)	Surface Soil (0 - 1 foot)	Dermal	Aluminum	9.9E+03	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	mg/kg/day	1.0E+00	mg/kg/day	NA
				Arsenic	1.2E+00	mg/kg	2.8E-08	mg/kg/day	1.5E+00	1/(mg/kg/day)	4E-08	3.2E-07	mg/kg/day	3.0E-04	mg/kg/day	1.1E-03
				Chromium	1.2E+01	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	mg/kg/day	2.0E-02	mg/kg/day	NA
				Cobalt	1.3E+01	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	mg/kg/day	3.0E-04	mg/kg/day	NA
				Cyanide	7.2E-01	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	mg/kg/day	6.3E-04	mg/kg/day	NA
				Iron	1.8E+04	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	mg/kg/day	7.0E-01	mg/kg/day	NA
				Manganese	6.2E+02	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	mg/kg/day	9.6E-04	mg/kg/day	NA
				Vanadium	6.5E+01	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	mg/kg/day	1.3E-04	mg/kg/day	NA
			Exp. Route Total								4E-08					1.1E-03
		Exposure Point Total									6E-07					4.6E-01
	Exposure Medium Total										6E-07					4.6E-01
Soil	Ambient Air	Emissions from Surface Soil	Inhalation	Aluminum	1.2E-05	mg/m^3	5.0E-08	mg/m^3	NA	NA	NA	5.9E-07	mg/m^3	5.0E-03	mg/m3	1.2E-04
				Arsenic	1.5E-09	mg/m^3	6.1E-12	mg/m^3	4.3E-03	1/(ug/m3)	3E-11	7.1E-11	mg/m^3	1.5E-05	mg/m3	4.8E-06
				Chromium	1.5E-08	mg/m^3	6.2E-11	mg/m^3	NA	NA	NA	7.2E-10	mg/m^3	NA	NA	NA
				Cobalt	1.6E-08	mg/m^3	6.4E-11	mg/m^3	9.0E-03	1/(ug/m3)	6E-10	7.5E-10	mg/m^3	6.0E-06	mg/m3	1.2E-04
				Cyanide	1.9E-04	mg/m^3	7.7E-07	mg/m^3	NA	NA	NA	8.9E-06	mg/m^3	8.0E-04	mg/m3	1.1E-02
				Iron	2.3E-05	mg/m^3	9.2E-08	mg/m^3	NA	NA	NA	1.1E-06	mg/m^3	NA	NA	NA
				Manganese	7.8E-07	mg/m^3	3.2E-09	mg/m^3	NA	NA	NA	3.7E-08	mg/m^3	5.0E-05	mg/m3	7.4E-04
				Vanadium	8.1E-08	mg/m^4	3.3E-10	mg/m^4	NA	NA	NA	3.9E-09	mg/m^4	1.0E-04	mg/m3	3.9E-05
			Exp. Route Total								6E-10					1.2E-02
		Exposure Point Total									6E-10					1.2E-02
	Exposure Medium Total										6E-10					1.2E-02
Surface Soil Total											6E-07					4.8E-01
Receptor Total											6E-07					4.8E-01

TABLE 7.3.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Current/Future
Receptor Population: Recreational User/Trespasser/Site Visitor
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/ Exposure		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	

Notes:
CSF = Cancer slope factor
EPC = Exposure point concentration
NA = Not applicable/Not available
RfD = Reference dose
mg/kg = milligram per kilogram
mg/kg/day = milligram per kilogram per day

TABLE 7.4.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Receptor Population: Maintenance Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil (0 - 1 foot)	Surface Soil (0 - 1 foot)	Ingestion	Arsenic	1.2E+00	mg/kg	7.6E-08	mg/kg/day	1.5E+00	1/(mg/kg/day)	1E-07	2.1E-07	mg/kg/day	3.0E-04	mg/kg/day	7.1E-04
				Chromium	1.2E+01	mg/kg	7.7E-07	mg/kg/day	NA	NA	NA	2.2E-06	mg/kg/day	1.5E+00	mg/kg/day	1.4E-06
			Exp. Route Total								1E-07					7.1E-04
Soil	Surface Soil (0 - 1 foot)	Surface Soil (0 - 1 foot)	Dermal	Arsenic	1.2E+00	mg/kg	9.7E-09	mg/kg/day	1.5E+00	1/(mg/kg/day)	1E-08	2.7E-08	mg/kg/day	3.0E-04	mg/kg/day	9.0E-05
				Chromium	1.2E+01	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	mg/kg/day	2.0E-02	mg/kg/day	NA
			Exp. Route Total								1E-08					9.0E-05
		Exposure Point Total									1E-07					8.0E-04
	Exposure Medium Total										1E-07					8.0E-04
Soil	Ambient Air	Emissions from Surface Soil	Inhalation	Arsenic	1.5E-09	mg/m^3	2.5E-11	mg/m^3	4.3E-03	1/(ug/m3)	1E-10	7.1E-11	mg/m^3	1.5E-05	mg/m3	4.8E-06
				Chromium	1.5E-08	mg/m^3	2.6E-10	mg/m^3	NA	NA	NA	7.2E-10	mg/m^3	NA	NA	NA
			Exp. Route Total								1E-10					4.8E-06
		Exposure Point Total									1E-10					4.8E-06
	Exposure Medium Total										1E-10					4.8E-06
Surface Soil Total											1E-07					8.1E-04
Receptor Total											1E-07					8.1E-04

Notes:
CSF = Cancer slope factor
EPC = Exposure point concentration
NA = Not applicable/Not available
RfD = Reference dose
mg/kg = milligram per kilogram
mg/kg/day = milligram per kilogram per day

TABLE 7.5.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Total Soil (0 - 6 feet)	Total Soil (0 - 6 feet)	Ingestion	Aluminum	1.0E+04	mg/kg	NA	NA	NA	NA	NA	1.2E-02	mg/kg/day	1.0E+00	mg/kg/day	1.2E-02
				Arsenic	1.2E+00	mg/kg	NA	NA	NA	NA	NA	1.4E-06	mg/kg/day	3.0E-04	mg/kg/day	4.8E-03
				Chromium	1.2E+01	mg/kg	NA	NA	NA	NA	NA	1.5E-05	mg/kg/day	1.5E+00	mg/kg/day	1.0E-05
				Cobalt	1.3E+01	mg/kg	NA	NA	NA	NA	NA	1.5E-05	mg/kg/day	3.0E-04	mg/kg/day	5.0E-02
				Cyanide	7.2E-01	mg/kg	NA	NA	NA	NA	NA	8.6E-07	mg/kg/day	6.3E-04	mg/kg/day	1.4E-03
				Iron	1.9E+04	mg/kg	NA	NA	NA	NA	NA	2.3E-02	mg/kg/day	7.0E-01	mg/kg/day	3.2E-02
				Manganese	6.2E+02	mg/kg	NA	NA	NA	NA	NA	7.5E-04	mg/kg/day	2.4E-02	mg/kg/day	3.1E-02
				Vanadium	7.0E+01	mg/kg	NA	NA	NA	NA	NA	8.4E-05	mg/kg/day	5.0E-03	mg/kg/day	1.7E-02
			Exp. Route Total								NA					1.5E-01
Soil	Total Soil (0 - 6 feet)	Total Soil (0 - 6 feet)	Dermal	Aluminum	1.0E+04	mg/kg	NA	NA	NA	NA	NA	NA	mg/kg/day	1.0E+00	mg/kg/day	NA
				Arsenic	1.2E+00	mg/kg	NA	NA	NA	NA	NA	1.8E-07	mg/kg/day	3.0E-04	mg/kg/day	6.1E-04
				Chromium	1.2E+01	mg/kg	NA	NA	NA	NA	NA	NA	mg/kg/day	2.0E-02	mg/kg/day	NA
				Cobalt	1.3E+01	mg/kg	NA	NA	NA	NA	NA	NA	mg/kg/day	3.0E-04	mg/kg/day	NA
				Cyanide	7.2E-01	mg/kg	NA	NA	NA	NA	NA	NA	mg/kg/day	6.3E-04	mg/kg/day	NA
				Iron	1.9E+04	mg/kg	NA	NA	NA	NA	NA	NA	mg/kg/day	7.0E-01	mg/kg/day	NA
				Manganese	6.2E+02	mg/kg	NA	NA	NA	NA	NA	NA	mg/kg/day	9.6E-04	mg/kg/day	NA
				Vanadium	7.0E+01	mg/kg	NA	NA	NA	NA	NA	NA	mg/kg/day	1.3E-04	mg/kg/day	NA
			Exp. Route Total								NA					6.1E-04
		Exposure Point Total									NA					1.5E-01
	Exposure Medium Total										NA					1.5E-01
Soil	Ambient Air	Emissions from Total Soil	Inhalation	Aluminum	1.3E-05	mg/m^3	NA	NA	NA	NA	NA	1.2E-05	mg/m^3	5.0E-03	mg/m^3	2.5E-03
				Arsenic	1.5E-09	mg/m^3	NA	NA	NA	NA	NA	1.4E-09	mg/m^3	1.5E-05	mg/m^3	9.6E-05
				Chromium	1.6E-08	mg/m^3	NA	NA	NA	NA	NA	1.5E-08	mg/m^3	NA	NA	NA
				Cobalt	1.6E-08	mg/m^3	NA	NA	NA	NA	NA	1.5E-08	mg/m^3	6.0E-06	mg/m^3	2.5E-03
				Cyanide	1.9E-04	mg/m^3	NA	NA	NA	NA	NA	1.8E-04	mg/m^3	8.0E-04	mg/m^3	2.3E-01
				Iron	2.4E-05	mg/m^3	NA	NA	NA	NA	NA	2.3E-05	mg/m^3	NA	NA	NA
				Manganese	7.8E-07	mg/m^3	NA	NA	NA	NA	NA	7.5E-07	mg/m^3	5.0E-05	mg/m^3	1.5E-02
				Vanadium	8.8E-08	mg/m^4	NA	NA	NA	NA	NA	8.4E-08	mg/m^4	1.0E-04	mg/m^3	8.4E-04
			Exp. Route Total								NA					2.5E-01
		Exposure Point Total									NA					2.5E-01
	Exposure Medium Total										NA					2.5E-01
Total Soil Total											NA					4.0E-01

TABLE 7.5.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	Groundwater	Ingestion	Tetrachloroethene	3.3E+00	µg/L	NA	NA	NA	NA	NA	9.9E-05	mg/kg/day	6.0E-03	mg/kg/day	1.6E-02
				Trichloroethene	1.7E+02	µg/L	NA	NA	NA	NA	NA	5.2E-03	mg/kg/day	5.0E-04	mg/kg/day	1.0E+01
				Vinyl chloride	2.3E-01	µg/L	NA	NA	NA	NA	NA	6.9E-06	mg/kg/day	3.0E-03	mg/kg/day	2.3E-03
			Exp. Route Total								NA					1.0E+01
Groundwater	Groundwater	Groundwater	Dermal	Tetrachloroethene	3.3E+00	µg/L	NA	NA	NA	NA	NA	6.0E-05	mg/kg/day	6.0E-03	mg/kg/day	1.0E-02
				Trichloroethene	1.7E+02	µg/L	NA	NA	NA	NA	NA	9.2E-04	mg/kg/day	5.0E-04	mg/kg/day	1.8E+00
				Vinyl chloride	2.3E-01	µg/L	NA	NA	NA	NA	NA	5.7E-07	mg/kg/day	3.0E-03	mg/kg/day	1.9E-04
			Exp. Route Total								NA					1.8E+00
		Exposure Point Total									NA					1.2E+01
	Exposure Medium Total										NA					1.2E+01
Groundwater	Bathroom Air	Water Vapors in Bathroom Air	Inhalation	Tetrachloroethene	6.4E-02	mg/m^3	NA	NA	NA	NA	NA	1.8E-03	mg/m^3	4.0E-02	mg/m^3	4.5E-02
				Trichloroethene	3.3E+00	mg/m^3	NA	NA	NA	NA	NA	9.5E-02	mg/m^3	2.0E-03	mg/m^3	4.7E+01
				Vinyl chloride	4.4E-03	mg/m^3	NA	NA	NA	NA	NA	1.3E-04	mg/m^3	1.0E-01	mg/m^3	1.3E-03
			Exp. Route Total								NA					4.8E+01
		Exposure Point Total									NA					4.8E+01
	Exposure Medium Total										NA					4.8E+01
Groundwater	Indoor Air	Indoor Air	Inhalation	Trichloroethene	1.7E-01	mg/m^3	NA	NA	NA	NA	NA	1.6E-01	mg/m^3	2.0E-03	mg/m^3	7.9E+01
				Vinyl chloride	2.9E-04	mg/m^3	NA	NA	NA	NA	NA	2.8E-04	mg/m^3	1.0E-01	mg/m^3	2.8E-03
			Exp. Route Total								NA					7.9E+01
		Exposure Point Total									NA					7.9E+01
	Exposure Medium Total										NA					7.9E+01
Groundwater Total											NA					1.4E+02
Receptor Total											NA					1.4E+02

Notes:
CSF = Cancer slope factor
EPC = Exposure point concentration
NA = Not applicable/Not available
RfC = Reference concentration
RfD = Reference dose

$\mu g/m^3$= microgram per cubic meter
mg/m^3= milligram per cubic meter
mg/kg = milligram per kilogram
mg/kg/day = milligram per kilogram per day

TABLE 7.5.RME SUPPLEMENT A
CALCULATION OF DAEVENT
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Chemical of Potential Concern	Groundwater Concentration (CW) (ug/L)	Permeability Coefficient (Kp) (cm/hr)	B (dimensionless)	Lag Time (τ_{event}) (hr)	t* (hr)	Fraction Absorbed Water (FA) (dimensionless)	Duration of Event (tevent) (hr)	DAevent (mg/cm^2-event)	Eq
Tetrachloroethene	3.3E+00	3.3E-02	1.7E-01	8.9E-01	2.1E+00	1.0E+00	0.71	2.4E-07	1
Trichloroethene	1.7E+02	1.2E-02	5.1E-02	5.7E-01	1.4E+00	1.0E+00	0.71	3.7E-06	1
Vinyl chloride	2.3E-01	8.4E-03	2.5E-02	2.4E-01	5.7E-01	1.0E+00	0.71	2.3E-09	2

Organics: DAevent (mg/cm^2-event) =

DA_{event} = $t_{event} \leq t^*$: DA_{event} (mg/cm^2-event) =

$2 \times FA \times Kp \times Cw \times (\text{sqrt}((6 \times \tau \times t_{event}) / (3.1415))) \times CF1 \times CF2$ (Eq 1)

$t_{event} > t^*$: DA_{event} (mg/cm^2-event) =

$FA \times Kp \times CW \times (t_{event}/(1+B) + 2 \times \tau \times ((1 + 3B + 3B^2)/(1+B)^2)) \times CF1 \times CF2$ (Eq 2)

Notes:

Values for permeability constants, B, tau, t*, and FA are from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final).* EPA/540/R/99/005.

B - Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (dimensionless).

cm/hr - centimeter per hour

hr - hour

mg/cm^2-event - milligram per square centimeter per event

µg/L - microgram per liter

NA - Not applicable

t* - Time to reach steady-state

CF1 - Conversion Factor 1 (0.001 mg/µg), CF2 - Conversion Factor 2 (0.001 L/cm^3)

TABLE 7.6.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Total Soil (0 - 6 feet)	Total Soil (0 - 6 feet)	Ingestion	Aluminum	1.0E+04	mg/kg	NA	NA	NA	NA	NA	1.3E-01	mg/kg/day	1.0E+00	mg/kg/day	1.3E-01
				Arsenic	1.2E+00	mg/kg	NA	NA	NA	NA	NA	1.5E-05	mg/kg/day	3.0E-04	mg/kg/day	5.1E-02
				Chromium	1.2E+01	mg/kg	NA	NA	NA	NA	NA	1.6E-04	mg/kg/day	1.5E+00	mg/kg/day	1.1E-04
				Cobalt	1.3E+01	mg/kg	NA	NA	NA	NA	NA	1.6E-04	mg/kg/day	3.0E-04	mg/kg/day	5.4E-01
				Cyanide	7.2E-01	mg/kg	NA	NA	NA	NA	NA	9.2E-06	mg/kg/day	6.3E-04	mg/kg/day	1.5E-02
				Iron	1.9E+04	mg/kg	NA	NA	NA	NA	NA	2.4E-01	mg/kg/day	7.0E-01	mg/kg/day	3.4E-01
				Manganese	6.2E+02	mg/kg	NA	NA	NA	NA	NA	8.0E-03	mg/kg/day	2.4E-02	mg/kg/day	3.3E-01
				Vanadium	7.0E+01	mg/kg	NA	NA	NA	NA	NA	9.0E-04	mg/kg/day	5.0E-03	mg/kg/day	1.8E-01
			Exp. Route Total								NA					1.6E+00
Soil	Total Soil (0 - 6 feet)	Total Soil (0 - 6 feet)	Dermal	Aluminum	1.0E+04	mg/kg	NA	NA	NA	NA	NA	NA	mg/kg/day	1.0E+00	mg/kg/day	NA
				Arsenic	1.2E+00	mg/kg	NA	NA	NA	NA	NA	1.1E-06	mg/kg/day	3.0E-04	mg/kg/day	3.6E-03
				Chromium	1.2E+01	mg/kg	NA	NA	NA	NA	NA	NA	mg/kg/day	2.0E-02	mg/kg/day	NA
				Cobalt	1.3E+01	mg/kg	NA	NA	NA	NA	NA	NA	mg/kg/day	3.0E-04	mg/kg/day	NA
				Cyanide	7.2E-01	mg/kg	NA	NA	NA	NA	NA	NA	mg/kg/day	6.3E-04	mg/kg/day	NA
				Iron	1.9E+04	mg/kg	NA	NA	NA	NA	NA	NA	mg/kg/day	7.0E-01	mg/kg/day	NA
				Manganese	6.2E+02	mg/kg	NA	NA	NA	NA	NA	NA	mg/kg/day	9.6E-04	mg/kg/day	NA
				Vanadium	7.0E+01	mg/kg	NA	NA	NA	NA	NA	NA	mg/kg/day	1.3E-04	mg/kg/day	NA
			Exp. Route Total								NA					3.6E-03
		Exposure Point Total									NA					1.6E+00
	Exposure Medium Total										NA					1.6E+00
Total Soil	Ambient Air	Emissions from Total Soil	Inhalation	Aluminum	1.3E-05	mg/m^3	NA	NA	NA	NA	NA	1.2E-05	mg/m^3	5.0E-03	mg/m^3	2.5E-03
				Arsenic	1.5E-09	mg/m^3	NA	NA	NA	NA	NA	1.4E-09	mg/m^3	1.5E-05	mg/m^3	9.6E-05
				Chromium	1.6E-08	mg/m^3	NA	NA	NA	NA	NA	1.5E-08	mg/m^3	NA	NA	NA
				Cobalt	1.6E-08	mg/m^3	NA	NA	NA	NA	NA	1.5E-08	mg/m^3	6.0E-06	mg/m^3	2.5E-03
				Cyanide	1.9E-04	mg/m^3	NA	NA	NA	NA	NA	1.8E-04	mg/m^3	8.0E-04	mg/m^3	2.3E-01
				Iron	2.4E-05	mg/m^3	NA	NA	NA	NA	NA	2.3E-05	mg/m^3	NA	NA	NA
				Manganese	7.8E-07	mg/m^3	NA	NA	NA	NA	NA	7.5E-07	mg/m^3	5.0E-05	mg/m^3	1.5E-02
				Vanadium	8.8E-08	mg/m^4	NA	NA	NA	NA	NA	8.4E-08	mg/m^4	1.0E-04	mg/m^3	8.4E-04
			Exp. Route Total								NA					2.5E-01
		Exposure Point Total									NA					2.5E-01
	Exposure Medium Total										NA					2.5E-01
Total Soil Total											NA					1.8E+00

TABLE 7.6.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	Groundwater	Ingestion	Tetrachloroethene	3.3E+00	µg/L	NA	NA	NA	NA	NA	1.6E-04	mg/kg/day	6.0E-03	mg/kg/day	2.7E-02
				Trichloroethene	1.7E+02	µg/L	NA	NA	NA	NA	NA	8.6E-03	mg/kg/day	5.0E-04	mg/kg/day	1.7E+01
				Vinyl chloride	2.3E-01	µg/L	NA	NA	NA	NA	NA	1.1E-05	mg/kg/day	3.0E-03	mg/kg/day	3.8E-03
			Exp. Route Total								NA					1.7E+01
Groundwater	Groundwater	Groundwater	Dermal	Tetrachloroethene	3.3E+00	µg/L	NA	NA	NA	NA	NA	8.5E-05	mg/kg/day	6.0E-03	mg/kg/day	1.4E-02
				Trichloroethene	1.7E+02	µg/L	NA	NA	NA	NA	NA	1.3E-03	mg/kg/day	5.0E-04	mg/kg/day	2.6E+00
				Vinyl chloride	2.3E-01	µg/L	NA	NA	NA	NA	NA	7.8E-07	mg/kg/day	3.0E-03	mg/kg/day	2.6E-04
			Exp. Route Total								NA					2.6E+00
		Exposure Point Total									NA					2.0E+01
	Exposure Medium Total										NA					2.0E+01
Groundwater	Bathroom Air	Water Vapors in Bathroom Air	Inhalation	Tetrachloroethene	5.5E-02	mg/m^3	NA	NA	NA	NA	NA	1.2E-03	mg/m^3	4.0E-02	mg/m^3	3.0E-02
				Trichloroethene	2.9E+00	mg/m^3	NA	NA	NA	NA	NA	6.2E-02	mg/m^3	2.0E-03	mg/m^3	3.1E+01
				Vinyl chloride	3.8E-03	mg/m^3	NA	NA	NA	NA	NA	8.3E-05	mg/m^3	1.0E-01	mg/m^3	8.3E-04
			Exp. Route Total								NA					3.1E+01
		Exposure Point Total									NA					3.1E+01
	Exposure Medium Total										NA					3.1E+01
Groundwater	Indoor Air	Indoor Air	Inhalation	Trichloroethene	1.7E-01	mg/m^3	NA	NA	NA	NA	NA	1.6E-01	mg/m^3	2.0E-03	mg/m^3	7.9E+01
				Vinyl chloride	2.9E-04	mg/m^3	NA	NA	NA	NA	NA	2.8E-04	mg/m^3	1.0E-01	mg/m^3	2.8E-03
			Exp. Route Total								NA					7.9E+01
		Exposure Point Total									NA					7.9E+01
	Exposure Medium Total										NA					7.9E+01
Groundwater Total											NA					1.3E+02
Receptor Total											NA					1.3E+02

Notes:
CSF = Cancer slope factor
EPC = Exposure point concentration
NA = Not applicable/Not available
RfC = Reference concentration
RfD = Reference dose

$\mu g/m^3$= microgram per cubic meter
mg/m^3= milligram per cubic meter
mg/kg = milligram per kilogram
mg/kg/day = milligram per kilogram per day

TABLE 7.6.RME SUPPLEMENT A
CALCULATION OF DAEVENT
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Chemical of Potential Concern	Groundwater Concentration (CW) (ug/L)	Permeability Coefficient (Kp) (cm/hr)	B (dimensionless)	Lag Time (τ_{event}) (hr)	t* (hr)	Fraction Absorbed Water (FA) (dimensionless)	Duration of Event (tevent) (hr)	DAevent mg/cm^2-event	Eq
Tetrachloroethene	3.3E+00	3.3E-02	1.7E-01	8.9E-01	2.1E+00	1.0E+00	0.54	2.1E-07	1
Trichloroethene	1.7E+02	1.2E-02	5.1E-02	5.7E-01	1.4E+00	1.0E+00	0.54	3.2E-06	1
Vinyl chloride	2.3E-01	8.4E-03	2.5E-02	2.4E-01	5.7E-01	1.0E+00	0.54	1.9E-09	1

Organics: DAevent (mg/cm^2-event) =

DA_{event} = $t_{event} \leq t^*$: DA_{event} (mg/cm^2-event) =

$2 \times FA \times Kp \times Cw \times (\text{sqrt}((6 \times \tau \times t_{event}) / (3.1415))) \times CF1 \times CF2$ (Eq 1)

$t_{event} > t^*$: DA_{event} (mg/cm^2-event) =

$FA \times Kp \times CW \times (t_{event}/(1+B) + 2 \times \tau \times ((1 + 3B + 3B^2)/(1+B)^2)) \times CF1 \times CF2$ (Eq 2)

Notes:

Values for permeability constants, B, tau, t*, and FA are from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final).* EPA/540/R/99/005.

B - Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (dimensionless).

cm/hr - centimeter per hour

hr - hour

mg/cm^2-event - milligram per square centimeter per event

µg/L - microgram per liter

NA - Not applicable

t* - Time to reach steady-state

CF1 - Conversion Factor 1 (0.001 mg/µg), CF2 - Conversion Factor 2 (0.001 L/cm^3)

TABLE 7.7.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child Aggregate

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Total Soil (0 - 6 feet)	Total Soil (0 - 6 feet)	Ingestion	Aluminum	1.0E+04	mg/kg	1.5E-02	mg/kg/day	NA	NA	NA	NA	NA	NA	NA	NA
				Arsenic	1.2E+00	mg/kg	1.7E-06	mg/kg/day	1.5E+00	1/(mg/kg/day)	3E-06	NA	NA	NA	NA	NA
				Chromium	1.2E+01	mg/kg	1.8E-05	mg/kg/day	NA	NA	NA	NA	NA	NA	NA	NA
				Cobalt	1.3E+01	mg/kg	1.8E-05	mg/kg/day	NA	NA	NA	NA	NA	NA	NA	NA
				Cyanide	7.2E-01	mg/kg	1.0E-06	mg/kg/day	NA	NA	NA	NA	NA	NA	NA	NA
				Iron	1.9E+04	mg/kg	2.7E-02	mg/kg/day	NA	NA	NA	NA	NA	NA	NA	NA
				Manganese	6.2E+02	mg/kg	9.0E-04	mg/kg/day	NA	NA	NA	NA	NA	NA	NA	NA
				Vanadium	7.0E+01	mg/kg	1.0E-04	mg/kg/day	NA	NA	NA	NA	NA	NA	NA	NA
			Exp. Route Total								3E-06					NA
Soil	Total Soil (0 - 6 feet)	Total Soil (0 - 6 feet)	Dermal	Aluminum	1.0E+04	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	NA	NA	NA	NA
				Arsenic	1.2E+00	mg/kg	1.5E-07	mg/kg/day	1.5E+00	1/(mg/kg/day)	2E-07	NA	NA	NA	NA	NA
				Chromium	1.2E+01	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	NA	NA	NA	NA
				Cobalt	1.3E+01	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	NA	NA	NA	NA
				Cyanide	7.2E-01	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	NA	NA	NA	NA
				Iron	1.9E+04	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	NA	NA	NA	NA
				Manganese	6.2E+02	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	NA	NA	NA	NA
				Vanadium	7.0E+01	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	NA	NA	NA	NA
			Exp. Route Total								2E-07					NA
		Exposure Point Total									3E-06					NA
	Exposure Medium Total										3E-06					NA
Total Soil	Ambient Air	Emissions from Total Soil	Inhalation	Aluminum	1.3E-05	mg/m^3	4.6E-06	mg/m^3	NA	NA	NA	NA	NA	NA	NA	NA
				Arsenic	1.5E-09	mg/m^3	5.3E-10	mg/m^3	4.3E-03	1/(ug/m3)	2E-09	NA	NA	NA	NA	NA
				Chromium	1.6E-08	mg/m^3	5.6E-09	mg/m^3	NA	NA	NA	NA	NA	NA	NA	NA
				Cobalt	1.6E-08	mg/m^3	5.6E-09	mg/m^3	9.0E-03	1/(ug/m3)	5E-08	NA	NA	NA	NA	NA
				Cyanide	1.9E-04	mg/m^3	6.7E-05	mg/m^3	NA	NA	NA	NA	NA	NA	NA	NA
				Iron	2.4E-05	mg/m^3	8.4E-06	mg/m^3	NA	NA	NA	NA	NA	NA	NA	NA
				Manganese	7.8E-07	mg/m^3	2.8E-07	mg/m^3	NA	NA	NA	NA	NA	NA	NA	NA
				Vanadium	8.8E-08	mg/m^4	3.1E-08	mg/m^4	NA	NA	NA	NA	NA	NA	NA	NA
			Exp. Route Total								5E-08					NA

TABLE 7.7.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child Aggregate

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
		Exposure Point Total									5E-08					NA
	Exposure Medium Total										5E-08					NA
Total Soil Total											3E-06					NA

TABLE 7.7.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child Aggregate

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Groundwater	Groundwater	Ingestion	Tetrachloroethene	3.3E+00	µg/L	4.2E-05	mg/kg/day	2.1E-03	1/(mg/kg/day)	9E-08	NA	NA	NA	NA	NA
			(1)	Trichloroethene	1.7E+02	µg/L	2.2E-03	mg/kg/day	3.7E-02	1/(mg/kg/day)	2E-04	NA	NA	NA	NA	NA
			(2)	Vinyl chloride	2.3E-01	µg/L	3.0E-06	mg/kg/day	7.2E-01	1/(mg/kg/day)	3E-06	NA	NA	NA	NA	NA
			Exp. Route Total								2E-04					NA
Groundwater	Groundwater	Groundwater	Dermal	Tetrachloroethene	3.3E+00	µg/L	2.4E-05	mg/kg/day	2.1E-03	1/(mg/kg/day)	5E-08	NA	NA	NA	NA	NA
			(1)	Trichloroethene	1.7E+02	µg/L	3.7E-04	mg/kg/day	3.7E-02	1/(mg/kg/day)	2E-05	NA	NA	NA	NA	NA
			(2)	Vinyl chloride	2.3E-01	µg/L	2.3E-07	mg/kg/day	7.2E-01	1/(mg/kg/day)	1E-06	NA	NA	NA	NA	NA
			Exp. Route Total								2E-05					NA
		Exposure Point Total									2E-04					NA
	Exposure Medium Total										2E-04					NA
Groundwater	Bathroom Air	Water Vapors in Bathroom Air	Inhalation	Tetrachloroethene	6.4E-02	mg/m^3	1.5E-02	mg/m^3	2.6E-07	1/(µg/m3)	4E-06	NA	NA	NA	NA	NA
			(1)	Trichloroethene	3.3E+00	mg/m^3	7.8E-01	mg/m^3	3.1E-06	1/(µg/m3)	3E-03	NA	NA	NA	NA	NA
			(2)	Vinyl chloride	4.4E-03	mg/m^3	1.0E-03	mg/m^3	4.4E-06	1/(µg/m3)	9E-07	NA	NA	NA	NA	NA
			Exp. Route Total								3E-03					NA
		Exposure Point Total									3E-03					NA
	Exposure Medium Total										3E-03					NA
Groundwater	Indoor Air	Indoor Air	Inhalation	Trichloroethene	1.7E-01	mg/m^3	5.9E-02	mg/m^3	3.1E-06	1/(ug/m3)	1E-03	NA	NA	NA	NA	NA
				Vinyl chloride	2.9E-04	mg/m^3	1.0E-04	mg/m^3	4.4E-06	1/(ug/m3)	3E-06	NA	NA	NA	NA	NA
			Exp. Route Total								1E-03					NA
		Exposure Point Total									1E-03					NA
	Exposure Medium Total										1E-03					NA
Groundwater Total											5E-03					NA
Receptor Total											5E-03					NA

TABLE 7.7.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child Aggregate

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	

Notes:
(1) Trichloroethene risk estimates represent the sum of the Liver and Non-Hodgkin's Lymphoma risk estimate and the mutagenic mode of action kidney contribution derived on Table 7.7 Supplement A.
(2) Risk estimates for vinyl chloride were calculated using "continuous lifetime exposure during adulthood" and "continuous lifetime exposure from birth" slope factors and inhalation unit risks and are displayed on Table 7.7 Supplement A.

EPC = Exposure point concentration
NA = Not applicable/Not available
RfC = Reference concentration
RfD = Reference dose
$\mu g/m^3$= microgram per cubic meter
mg/m^3= milligram per cubic meter
mg/kg = milligram per kilogram
mg/kg/day = milligram per kilogram per day

TABLE 7.7.RME SUPPLEMENT A
CALCULATION OF CHEMICAL CANCER RISKS FOR COPC WITH MUTAGENIC MODE OF ACTION
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child Aggregate

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations													
							Intake							CSF/Unit Risk						Cancer Risk
							Value						Units	Value					Units	
					Value	Units	0-6 yrs	6-26 yrs	0-2 yrs	2-6 yrs	6-16 yrs	16-26 yrs		0-6 yrs	6-30 yrs	0-2 yrs (ADAF = 10)	2-16 yrs (ADAF = 3)	16-26 yrs (ADAF = 1)		
Groundwater	Groundwater	Groundwater	Ingestion	Trichloroethene (1)	1.7E+02	ug/L	--	--	2.5E-04	4.9E-04	2.6E-03	2.6E-03	mg/kg-day	--	--	9.3E-02	2.8E-02	9.3E-03	1/(mg/kg-day)	1.3E-04
				Vinyl Chloride	2.3E-01	ug/L	9.8E-07	2.0E-06	--	--	--	--	mg/kg-day	1.5E+00	7.2E-01	--	--	--	1/(mg/kg-day)	2.9E-06
			Dermal	Trichloroethene (1)	1.7E+02	ug/L	--	--	2.8E-05	5.7E-05	3.0E-05	3.0E-05	mg/kg-day	--	--	9.3E-02	2.8E-02	9.3E-03	1/(mg/kg-day)	5.3E-06
				Vinyl Chloride	2.3E-01	ug/L	7.8E-07	1.6E-07	--	--	--	--	mg/kg-day	1.5E+00	7.2E-01	--	--	--	1/(mg/kg-day)	1.3E-06
	Bathroom Air	Water Vapors in Bathroom Air	Inhalation	Trichloroethene (1)	2.9E+00	mg/m^3 (2)	--	--	2.1E-02	4.1E-02	4.7E-02	4.7E-02	mg/m^3	--	--	1.0E-05	3.0E-06	1.0E-06	$1/(ug/m^3)$	5.2E-04
					3.3E+00	mg/m^3 (3)														
				Vinyl Chloride	3.8E-03	mg/m^3 (4)	8.3E-05	3.6E-05	--	--	--	--	mg/m^3	8.8E-06	4.4E-06	--	--	--	$1/(ug/m^3)$	8.8E-07
					4.4E-03	mg/m^3 (5)														
	Indoor Air	Indoor Air	Inhalation	Trichloroethene (1)	1.7E-01	mg/m^3	--	--	5.3E-02	1.1E-01	7.9E-02	7.9E-02	mg/m^3	--	--	1.0E-05	3.0E-06	1.0E-06	$1/(ug/m^3)$	1.2E-03
				Vinyl Chloride	2.9E-04	mg/m^3	2.8E-04	8.1E-05	--	--	--	--	mg/m^3	8.8E-06	4.4E-06	--	--	--	$1/(ug/m^3)$	2.8E-06

Note:
(1) Risk estimates for Trichloroethene take into account the mutagenic mode of action on the kidney and will be added to the risk estimates for liver and non-Hodgkin's Lymphoma.
(2) EPC for the child exposure used to quantify intakes for 0 - 2 and 2 - 6 years.
(3) EPC for the adult exposure used to quantify intakes for 6 - 16 and 16 - 26 years.
(4) EPC for the child exposure used to quantify intakes for 0 - 6 years.
(5) EPC for the adult exposure used to quantify intakes for 6 - 26 years.

TABLE 7.8.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Total Soil (0 - 6 feet)	Total Soil (0 - 6 feet)	Ingestion	Arsenic	9.4E-01	mg/kg	2.9E-07	mg/kg/day	1.5E+00	1/(mg/kg/day)	4E-07	8.0E-07	mg/kg/day	3.0E-04	mg/kg/day	2.7E-03
				Chromium	1.2E+01	mg/kg	3.8E-06	mg/kg/day	NA	NA	NA	1.1E-05	mg/kg/day	1.5E+00	mg/kg/day	7.1E-06
			Exp. Route Total								4E-07					2.7E-03
Soil	Total Soil (0 - 6 feet)	Total Soil (0 - 6 feet)	Dermal	Arsenic	9.4E-01	mg/kg	3.6E-08	mg/kg/day	1.5E+00	1/(mg/kg/day)	5E-08	1.0E-07	mg/kg/day	3.0E-04	mg/kg/day	3.4E-04
				Chromium	1.2E+01	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	mg/kg/day	2.0E-02	mg/kg/day	NA
			Exp. Route Total								5E-08					3.4E-04
		Exposure Point Total									5E-07					3.0E-03
	Exposure Medium Total										5E-07					3.0E-03
Total Soil	Ambient Air	Emissions from Total Soil	Inhalation	Arsenic	1.2E-09	mg/m^3	9.6E-11	mg/m^3	4.3E-03	1/(ug/m3)	4E-10	2.7E-10	mg/m^3	1.5E-05	mg/m3	1.8E-05
				Chromium	1.6E-08	mg/m^3	1.3E-09	mg/m^3	NA	NA	NA	3.6E-09	mg/m^3	NA	NA	NA
			Exp. Route Total								4E-10					1.8E-05
		Exposure Point Total									4E-10					1.8E-05
	Exposure Medium Total										4E-10					1.8E-05
Total Soil Total											5E-07					3.0E-03
Groundwater	Groundwater	Groundwater	Ingestion	Tetrachloroethene	3.3E+00	µg/L	1.0E-05	mg/kg/day	2.1E-03	1/(mg/kg/day)	2E-08	2.8E-05	mg/kg/day	6.0E-03	mg/kg/day	4.7E-03
				Trichloroethene	1.7E+02	µg/L	5.3E-04	mg/kg/day	4.6E-02	1/(mg/kg/day)	2E-05	1.5E-03	mg/kg/day	5.0E-04	mg/kg/day	3.0E+00
				Vinyl chloride	2.3E-01	µg/L	7.0E-07	mg/kg/day	7.2E-01	1/(mg/kg/day)	5E-07	2.0E-06	mg/kg/day	3.0E-03	mg/kg/day	6.6E-04
			Exp. Route Total								2E-05					3E+00
Groundwater	Groundwater	Groundwater	Dermal	Tetrachloroethene	3.3E+00	µg/L	1.3E-06	mg/kg/day	2.1E-03	1/(mg/kg/day)	3E-09	3.8E-06	mg/kg/day	6.0E-03	mg/kg/day	6.3E-04
				Trichloroethene	1.7E+02	µg/L	2.1E-05	mg/kg/day	4.6E-02	1/(mg/kg/day)	9E-07	5.8E-05	mg/kg/day	5.0E-04	mg/kg/day	1.2E-01
				Vinyl chloride	2.3E-01	µg/L	1.2E-08	mg/kg/day	7.2E-01	1/(mg/kg/day)	9E-09	3.5E-08	mg/kg/day	3.0E-03	mg/kg/day	1.2E-05
			Exp. Route Total								1E-06					1E-01
		Exposure Point Total									3E-05					3E+00
	Exposure Medium Total										3E-05					3.1E+00

TABLE 7.8.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Groundwater	Indoor Air	Indoor Air	Inhalation	Trichloroethene	1.7E-01	mg/m^3	1.3E-02	mg/m^3	4.1E-06	1/(ug/m3)	6E-05	3.8E-02	mg/m^3	2.0E-03	mg/m3	1.9E+01
			Exp. Route Total								6E-05					2E+01
		Exposure Point Total									6E-05					1.9E+01
	Exposure Medium Total										6E-05					1.9E+01
Groundwater Total											8E-05					2.2E+01
Receptor Total											8E-05					2E+01

Notes:
CSF = Cancer slope factor
EPC = Exposure point concentration
NA = Not applicable/Not available
RfD = Reference dose
mg/kg = milligram per kilogram
mg/kg/day = milligram per kilogram per day

TABLE 7.8.RME SUPPLEMENT A
CALCULATION OF DAEVENT
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Chemical of Potential Concern	Groundwater Concentration (CW) (ug/L)	Permeability Coefficient (Kp) (cm/hr)	B (dimensionless)	Lag Time (τ_{event}) (hr)	t* (hr)	Fraction Absorbed Water (FA) (dimensionless)	Duration of Event (tevent) (hr)	DAevent (mg/cm^2-event)	Eq
Tetrachloroethene	3.3E+00	3.3E-02	1.7E-01	8.9E-01	2.1E+00	1.0E+00	0.20	1.3E-07	1
Trichloroethene	1.7E+02	1.2E-02	5.1E-02	5.7E-01	1.4E+00	1.0E+00	0.20	1.9E-06	1
Vinyl chloride	2.3E-01	8.4E-03	2.5E-02	2.4E-01	5.7E-01	1.0E+00	0.20	1.2E-09	1

Organics: DAevent (mg/cm^2-event) =

DA_{event} = $t_{event} \leq t^*$: DA_{event} (mg/cm^2-event) =

$2 \times FA \times Kp \times Cw \times (\mathrm{sqrt}((6 \times \tau \times t_{event}) / (3.1415))) \times CF1 \times CF2$ (Eq 1)

$t_{event} > t^*$: DA_{event} (mg/cm^2-event) =

$FA \times Kp \times CW \times (t_{event}/(1+B) + 2 \times \tau \times ((1 + 3B + 3B^2)/(1+B)^2)) \times CF1 \times CF2$ (Eq 2)

Notes:

Values for permeability constants, B, tau, t*, and FA are from EPA 2004, *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment - Final).* EPA/540/R/99/005.

B - Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (dimensionless).

cm/hr - centimeter per hour

hr - hour

mg/cm^2-event - milligram per square centimeter per event

µg/L - microgram per liter

NA - Not applicable

t* - Time to reach steady-state

CF1 - Conversion Factor 1 (0.001 mg/µg), CF2 - Conversion Factor 2 (0.001 L/cm^3)

TABLE 7.9.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake/Exposure Concentration		CSF/Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD/RfC		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Total Soil (0 - 6 feet)	Total Soil (0 - 6 feet)	Ingestion	Arsenic	9.4E-01	mg/kg	3.8E-08	mg/kg/day	1.5E+00	1/(mg/kg/day)	6E-08	2.6E-06	mg/kg/day	3.0E-04	mg/kg/day	8.8E-03
				Chromium	1.2E+01	mg/kg	5.0E-07	mg/kg/day	NA	NA	NA	3.5E-05	mg/kg/day	1.5E+00	mg/kg/day	2.4E-05
			Exp. Route Total								6E-08					8.8E-03
Soil	Total Soil (0 - 6 feet)	Total Soil (0 - 6 feet)	Dermal	Arsenic	9.4E-01	mg/kg	3.6E-09	mg/kg/day	1.5E+00	1/(mg/kg/day)	5E-09	2.5E-07	mg/kg/day	3.0E-04	mg/kg/day	8.5E-04
				Chromium	1.2E+01	mg/kg	NA	mg/kg/day	NA	NA	NA	NA	mg/kg/day	2.0E-02	mg/kg/day	NA
			Exp. Route Total								5E-09					8.5E-04
		Exposure Point Total									6E-08					9.7E-03
	Exposure Medium Total										6E-08					9.7E-03
Soil	Ambient Air	Emissions from Total Soil	Inhalation	Arsenic	9.4E-08	mg/m^3	3.1E-10	mg/m^3	4.3E-03	1/(ug/m3)	1E-09	2.1E-08	mg/m^3	1.5E-05	mg/m3	1.4E-03
				Chromium	1.3E-06	mg/m^3	4.1E-09	mg/m^3	NA	NA	NA	2.9E-07	mg/m^3	5.0E-03	mg/m3	5.7E-05
			Exp. Route Total								1E-09					1.5E-03
		Exposure Point Total									1E-09					1.5E-03
	Exposure Medium Total										1E-09					1.5E-03
Total Soil Total											6E-08					1.1E-02
Receptor Total											6E-08					1.1E-02

Notes:
BAP TEQ = Benzo(a)pyrene toxic equivalent
CSF = Cancer slope factor
EPC = Exposure point concentration
NA = Not applicable/Not available
RfD = Reference dose
mg/kg = milligram per kilogram
mg/kg/day = milligram per kilogram per day

TABLE 9.1.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

SWMU 20

Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Current/Future
Receptor Population: Recreational User/Trespasser/Site Visitor
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Surface Soil (0 - 1 foot)	Aluminum	NA	NA	NA	NA	Neurological	4E-03	NA	NA	4E-03
			Arsenic	2E-07	NA	2E-08	2E-07	Skin and Blood	1E-03	NA	2E-04	2E-03
			Chromium	NA	NA	NA	NA	NOE	3E-06	NA	NA	3E-06
			Cobalt	NA	NA	NA	NA	Thyroid	1E-02	NA	NA	1E-02
			Cyanide	NA	NA	NA	NA	Testes	4E-04	NA	NA	4E-04
			Iron	NA	NA	NA	NA	GI Tract	9E-03	NA	NA	9E-03
			Manganese	NA	NA	NA	NA	Neurological	9E-03	NA	NA	9E-03
			Vanadium	NA	NA	NA	NA	Hair	5E-03	NA	NA	5E-03
		Exposure Point Total		2E-07	NA	2E-08	2E-07		4E-02	NA	2E-04	4E-02
	Exposure Medium Total			2E-07	NA	2E-08	2E-07		4E-02	NA	2E-04	4E-02
	Ambient Air	Emissions from Surface Soil	Aluminum	NA	NA	NA	NA	Neurological	NA	1E-04	NA	1E-04
			Arsenic	NA	9E-11	NA	9E-11	Reproductive, Developmental, Cardiovascular, Neurological, Respiratory, Skin	NA	5E-06	NA	5E-06
			Chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Cobalt	NA	2E-09	NA	2E-09	Respiratory	NA	1E-04	NA	1E-04
			Cyanide	NA	NA	NA	NA	Thyroid	NA	1E-02	NA	1E-02
			Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Manganese	NA	NA	NA	NA	Neurological	NA	7E-04	NA	7E-04
			Vanadium	NA	NA	NA	NA	Respiratory	NA	4E-05	NA	4E-05
		Exposure Point Total		NA	2E-09	NA	2E-09		NA	1E-02	NA	1E-02
	Exposure Medium Total			NA	2E-09	NA	2E-09		NA	1E-02	NA	1E-02
Soil Total				2E-07	2E-09	2E-08	2E-07		4E-02	1E-02	2E-04	6E-02
Receptor Total				2E-07	2E-09	2E-08	2E-07		4E-02	1E-02	2E-04	6E-02

Notes:
HI = Hazard Index
NA = Not applicable or not available
GI = Gastrointestinal
NOE = no observed effect

Total Neurological HI Across Media =	0.01
Total Skin HI Across Media =	0.002
Total Blood HI Across Media =	0.002
Total NOE HI Across Media =	0.000003
Total Testes HI Across Media =	0.0004
Total Thyroid HI Across Media =	0.03
Total GI Tract HI Across Media =	0.01
Total Hair HI Across Media =	0.005
Total Reproductive HI Across Media =	0.000005
Total Developmental HI Across Media =	0.000005
Total Cardiovascular HI Across Media =	0.000005
Total Respiratory HI Across Media =	0.0002

TABLE 9.2.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

SWMU 20

Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Current/Future
Receptor Population: Recreational User/Trespasser/Site Visitor
Receptor Age: Youth

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Surface Soil (0 - 1 foot)	Aluminum	NA	NA	NA	NA	Neurological	6E-03	NA	NA	6E-03
			Arsenic	2E-07	NA	5E-08	2E-07	Skin and Blood	3E-03	NA	8E-04	3E-03
			Chromium	NA	NA	NA	NA	NOE	5E-06	NA	NA	5E-06
			Cobalt	NA	NA	NA	NA	Thyroid	3E-02	NA	NA	3E-02
			Cyanide	NA	NA	NA	NA	Testes	7E-04	NA	NA	7E-04
			Iron	NA	NA	NA	NA	GI Tract	2E-02	NA	NA	2E-02
			Manganese	NA	NA	NA	NA	Neurological	2E-02	NA	NA	2E-02
			Vanadium	NA	NA	NA	NA	Hair	8E-03	NA	NA	8E-03
		Exposure Point Total		2E-07	NA	5E-08	2E-07		8E-02	NA	8E-04	8E-02
	Exposure Medium Total			2E-07	NA	5E-08	2E-07		8E-02	NA	8E-04	8E-02
	Ambient Air	Emissions from Surface Soil	Aluminum	NA	NA	NA	NA	Neurological	NA	1E-04	NA	1E-04
			Arsenic	NA	4E-11	NA	4E-11	Reproductive, Developmental, Cardiovascular, Neurological, Respiratory, Skin	NA	5E-06	NA	5E-06
			Chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Cobalt	NA	1E-09	NA	1E-09	Respiratory	NA	1E-04	NA	1E-04
			Cyanide	NA	NA	NA	NA	Thyroid	NA	1E-02	NA	1E-02
			Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Manganese	NA	NA	NA	NA	Neurological	NA	7E-04	NA	7E-04
			Vanadium	NA	NA	NA	NA	Respiratory	NA	4E-05	NA	4E-05
		Exposure Point Total		NA	1E-09	NA	1E-09		NA	1E-02	NA	1E-02
	Exposure Medium Total			NA	1E-09	NA	1E-09		NA	1E-02	NA	1E-02
Soil Total				2E-07	1E-09	5E-08	2E-07		8E-02	1E-02	8E-04	9E-02
Receptor Total				2E-07	1E-09	5E-08	2E-07		8E-02	1E-02	8E-04	9E-02

Notes:
HI = Hazard Index
NA = Not applicable or not available
GI = Gastrointestinal
NOE = no observed effect

Total Neurological HI Across Media =	0.02
Total Skin HI Across Media =	0.003
Total Blood HI Across Media =	0.003
Total NOE HI Across Media =	0.000005
Total Thyroid HI Across Media =	0.04
Total Testes HI Across Media =	0.0007
Total GI Tract HI Across Media =	0.02
Total Hair HI Across Media =	0.008
Total Reproductive HI Across Media =	0.000005
Total Developmental HI Across Media =	0.000005
Total Cardiovascular HI Across Media =	0.000005
Total Respiratory HI Across Media =	0.0002

TABLE 9.3.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Current/Future
Receptor Population: Recreational User/Trespasser/Site Visitor
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Surface Soil (0 - 1 foot)	Aluminum	NA	NA	NA	NA	Neurological	4E-02	NA	NA	4E-02
			Arsenic	6E-07	NA	4E-08	6E-07	Skin and Blood	2E-02	NA	1E-03	2E-02
			Chromium	NA	NA	NA	NA	NOE	3E-05	NA	NA	3E-05
			Cobalt	NA	NA	NA	NA	Thyroid	2E-01	NA	NA	2E-01
			Cyanide	NA	NA	NA	NA	Testes	4E-03	NA	NA	4E-03
			Iron	NA	NA	NA	NA	GI Tract	1E-01	NA	NA	1E-01
			Manganese	NA	NA	NA	NA	Neurological	1E-01	NA	NA	1E-01
			Vanadium	NA	NA	NA	NA	Hair	5E-02	NA	NA	5E-02
		Exposure Point Total		6E-07	NA	4E-08	6E-07		5E-01	NA	1E-03	5E-01
	Exposure Medium Total			6E-07	NA	4E-08	6E-07		5E-01	NA	1E-03	5E-01
	Ambient Air	Emissions from Surface Soil	Aluminum	NA	NA	NA	NA	Neurological	NA	1E-04	NA	1E-04
			Arsenic	NA	3E-11	NA	3E-11	Reproductive, Developmental, Cardiovascular, Neurological, Respiratory, Skin	NA	5E-06	NA	5E-06
			Chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Cobalt	NA	6E-10	NA	6E-10	Respiratory	NA	1E-04	NA	1E-04
			Cyanide	NA	NA	NA	NA	Thyroid	NA	1E-02	NA	1E-02
			Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Manganese	NA	NA	NA	NA	Neurological	NA	7E-04	NA	7E-04
			Vanadium	NA	NA	NA	NA	Respiratory	NA	4E-05	NA	4E-05
		Exposure Point Total		NA	6E-10	NA	6E-10		NA	1E-02	NA	1E-02
	Exposure Medium Total			NA	6E-10	NA	6E-10		NA	1E-02	NA	1E-02
Soil Total				6E-07	6E-10	4E-08	6E-07		5E-01	1E-02	1E-03	5E-01
Receptor Total				6E-07	6E-10	4E-08	6E-07		5E-01	1E-02	1E-03	5E-01

Notes:
HI = Hazard Index
NA = Not applicable or not available
GI = Gastrointestinal
NOE = no observed effect

Total Neurological HI Across Media =	0.1
Total Skin HI Across Media =	0.02
Total Blood HI Across Media =	0.02
Total NOE HI Across Media =	0.00003
Total Thyroid HI Across Media =	0.2
Total Testes HI Across Media =	0.004
Total GI Tract HI Across Media =	0.1
Total Hair HI Across Media =	0.05
Total Reproductive HI Across Media =	0.000005
Total Developmental HI Across Media =	0.000005
Total Cardiovascular HI Across Media =	0.000005
Total Respiratory HI Across Media =	0.0002

TABLE 9.4.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

SWMU 20

Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future

Receptor Population: Maintenance Worker

Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Surface Soil (0 - 1 foot)	Arsenic	1E-07	NA	1E-08	1E-07	Skin and Blood	7E-04	NA	9E-05	8E-04
			Chromium	NA	NA	NA	NA	NOE	1E-06	NA	NA	1E-06
		Exposure Point Total		1E-07	NA	1E-08	1E-07		7E-04	NA	9E-05	8E-04
	Exposure Medium Total			1E-07	NA	1E-08	1E-07		7E-04	NA	9E-05	8E-04
	Ambient Air	Emissions from Surface Soil	Arsenic	NA	1E-10	NA	1E-10	Reproductive, Developmental, Cardiovascular, Neurological, Respiratory, Skin	NA	5E-06	NA	5E-06
			Chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Exposure Point Total		NA	1E-10	NA	1E-10		NA	5E-06	NA	5E-06
	Exposure Medium Total			NA	1E-10	NA	1E-10		NA	5E-06	NA	5E-06
Soil Total				1E-07	1E-10	1E-08	1E-07		7E-04	5E-06	9E-05	8E-04
Receptor Total				1E-07	1E-10	1E-08	1E-07		7E-04	5E-06	9E-05	8E-04

Notes:

HI = Hazard Index

NA = Not applicable or not available

NOE = no observed effect

Total Neurological HI Across Media =	0.000005
Total Skin HI Across Media =	0.001
Total Blood HI Across Media =	0.001
Total NOE HI Across Media =	0.000001
Total Reproductive HI Across Media =	0.000005
Total Developmental HI Across Media =	0.000005
Total Cardiovascular HI Across Media =	0.000005
Total Respiratory HI Across Media =	0.000005

TABLE 9.5.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Total Soil	Total Soil (0 - 6 feet)	Aluminum	NA	NA	NA	NA	Neurological	1E-02	NA	NA	1E-02
			Arsenic	NA	NA	NA	NA	Skin and Blood	5E-03	NA	6E-04	5E-03
			Chromium	NA	NA	NA	NA	NOE	1E-05	NA	NA	1E-05
			Cobalt	NA	NA	NA	NA	Thyroid	5E-02	NA	NA	5E-02
			Cyanide	NA	NA	NA	NA	Testes	1E-03	NA	NA	1E-03
			Iron	NA	NA	NA	NA	GI Tract	3E-02	NA	NA	3E-02
			Manganese	NA	NA	NA	NA	Neurological	3E-02	NA	NA	3E-02
			Vanadium	NA	NA	NA	NA	Hair	2E-02	NA	NA	2E-02
		Exposure Point Total		NA	NA	NA	NA		1E-01	NA	6E-04	1E-01
	Exposure Medium Total			NA	NA	NA	NA		1E-01	NA	6E-04	1E-01
Soil	Ambient Air	Emissions from Total Soil	Aluminum	NA	NA	NA	NA	Neurological	NA	2E-03	NA	2E-03
			Arsenic	NA	NA	NA	NA	Reproductive, Developmental, Cardiovascular, Neurological, Respiratory, Skin	NA	1E-04	NA	1E-04
			Chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Cobalt	NA	NA	NA	NA	Respiratory	NA	3E-03	NA	3E-03
			Cyanide	NA	NA	NA	NA	Thyroid	NA	2E-01	NA	2E-01
			Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Manganese	NA	NA	NA	NA	Neurological	NA	1E-02	NA	1E-02
			Vanadium	NA	NA	NA	NA	Respiratory	NA	8E-04	NA	8E-04
		Exposure Point Total		NA	NA	NA	NA		NA	2E-01	NA	2E-01
	Exposure Medium Total			NA	NA	NA	NA		NA	2E-01	NA	2E-01
Soil Total				NA	NA	NA	NA		1E-01	2E-01	6E-04	4E-01
Groundwater	Groundwater	Groundwater	Tetrachloroethene	NA	NA	NA	NA	Neurological	2E-02	NA	1E-02	3E-02
			Trichloroethene	NA	NA	NA	NA	Immunological	1E+01	NA	2E+00	1E+01
			Vinyl chloride	NA	NA	NA	NA	Liver	2E-03	NA	2E-04	2E-03
		Exposure Point Total		NA	NA	NA	NA		1E+01	NA	2E+00	1E+01
	Exposure Medium Total			NA	NA	NA	NA		1E+01	NA	2E+00	1E+01

TABLE 9.5.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Bathroom Air	Water Vapors in Bathroom Air	Tetrachloroethene	NA	NA	NA	NA	Neurological	NA	5E-02	NA	5E-02
			Trichloroethene	NA	NA	NA	NA	Immunological	NA	5E+01	NA	5E+01
			Vinyl chloride	NA	NA	NA	NA	Liver	NA	1E-03	NA	1E-03
		Exposure Point Total		NA	NA	NA	NA		NA	5E+01	NA	5E+01
	Exposure Medium Total			NA	NA	NA	NA		NA	5E+01	NA	5E+01
Groundwater	Indoor Air	Indoor Air	Trichloroethene	NA	NA	NA	NA	Immunological	NA	8E+01	NA	8E+01
			Vinyl chloride	NA	NA	NA	NA	Liver	NA	3E-03	NA	3E-03
		Exposure Point Total		NA	NA	NA	NA		NA	8E+01	NA	8E+01
	Exposure Medium Total			NA	NA	NA	NA		NA	8E+01	NA	8E+01
Groundwater Total				NA	NA	NA	NA		1E+01	1E+02	2E+00	1E+02
Receptor Total				NA	NA	NA	NA		1E+01	1E+02	2E+00	1E+02

Notes:
HI = Hazard Index
NA = Not applicable or not available
GI = Gastrointestinal
NOE = no observed effect

Total Neurological HI Across Media =	0.1
Total Skin HI Across Media =	0.005
Total Blood HI Across Media =	0.005
Total NOE HI Across Media =	0.00001
Total Thyroid HI Across Media =	0.28
Total Testes HI Across Media =	0.001
Total GI Tract HI Across Media =	0.03
Total Hair HI Across Media =	0.02
Total Immunological HI Across Media =	**139**
Total Liver HI Across Media =	0.007
Total Reproductive HI Across Media =	0.0001
Total Developmental HI Across Media =	0.0001
Total Cardiovascular HI Across Media =	0.0001
Total Respiratory HI Across Media =	0.003

TABLE 9.6.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Total Soil	Total Soil (0 - 6 feet)	Aluminum	NA	NA	NA	NA	Neurological	1E-01	NA	NA	1E-01
			Arsenic	NA	NA	NA	NA	Skin and Blood	5E-02	NA	4E-03	5E-02
			Chromium	NA	NA	NA	NA	NOE	1E-04	NA	NA	1E-04
			Cobalt	NA	NA	NA	NA	Thyroid	5E-01	NA	NA	5E-01
			Cyanide	NA	NA	NA	NA	Testes	1E-02	NA	NA	1E-02
			Iron	NA	NA	NA	NA	GI Tract	3E-01	NA	NA	3E-01
			Manganese	NA	NA	NA	NA	Neurological	3E-01	NA	NA	3E-01
			Vanadium	NA	NA	NA	NA	Hair	2E-01	NA	NA	2E-01
		Exposure Point Total		NA	NA	NA	NA		2E+00	NA	4E-03	2E+00
	Exposure Medium Total			NA	NA	NA	NA		2E+00	NA	4E-03	2E+00
Total Soil	Ambient Air	Emissions from Total Soil	Aluminum	NA	NA	NA	NA	Neurological	NA	2E-03	NA	2E-03
			Arsenic	NA	NA	NA	NA	Reproductive, Developmental, Cardiovascular, Neurological, Respiratory, Skin	NA	1E-04	NA	1E-04
			Chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Cobalt	NA	NA	NA	NA	Respiratory	NA	3E-03	NA	3E-03
			Cyanide	NA	NA	NA	NA	Thyroid	NA	2E-01	NA	2E-01
			Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Manganese	NA	NA	NA	NA	Neurological	NA	1E-02	NA	1E-02
			Vanadium	NA	NA	NA	NA	Respiratory	NA	8E-04	NA	8E-04
		Exposure Point Total		NA	NA	NA	NA		NA	2E-01	NA	2E-01
	Exposure Medium Total			NA	NA	NA	NA		NA	2E-01	NA	2E-01
Soil Total				NA	NA	NA	NA		2E+00	2E-01	4E-03	2E+00
Groundwater	Groundwater	Groundwater	Tetrachloroethene	NA	NA	NA	NA	Neurological	3E-02	NA	1E-02	4E-02
			Trichloroethene	NA	NA	NA	NA	Immunological	2E+01	NA	3E+00	2E+01
			Vinyl chloride	NA	NA	NA	NA	Liver	4E-03	NA	3E-04	4E-03
		Exposure Point Total		NA	NA	NA	NA		2E+01	NA	3E+00	2E+01
	Exposure Medium Total			NA	NA	NA	NA		2E+01	NA	3E+00	2E+01
Groundwater	Bathroom Air	Water Vapors in Bathroom Air	Tetrachloroethene	NA	NA	NA	NA	Neurological	NA	3E-02	NA	3E-02
			Trichloroethene	NA	NA	NA	NA	Immunological	NA	3E+01	NA	3E+01
			Vinyl chloride	NA	NA	NA	NA	Liver	NA	8E-04	NA	8E-04
		Exposure Point Total		NA	NA	NA	NA		NA	3E+01	NA	3E+01
	Exposure Medium Total			NA	NA	NA	NA		NA	3E+01	NA	3E+01

TABLE 9.6.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Indoor Air	Indoor Air	Trichloroethene	NA	NA	NA	NA	Immunological	NA	8E+01	NA	8E+01
			Vinyl chloride	NA	NA	NA	NA	Liver	NA	3E-03	NA	3E-03
		Exposure Point Total		NA	NA	NA	NA		NA	8E+01	NA	8E+01
	Exposure Medium Total			NA	NA	NA	NA		NA	8E+01	NA	8E+01
Groundwater Total				NA	NA	NA	NA		2E+01	1E+02	3E+00	1E+02
Receptor Total				NA	NA	NA	NA		2E+01	1E+02	3E+00	1E+02

Notes:
HI = Hazard Index
NA = Not applicable or not available
GI = Gastrointestinal
NOE = no observed effect

Total Neurological HI Across Media =	0.6
Total Skin HI Across Media =	0.05
Total Blood HI Across Media =	0.05
Total NOE HI Across Media =	0.0001
Total Thyroid HI Across Media =	0.8
Total Testes HI Across Media =	0.01
Total GI Tract HI Across Media =	0.3
Total Hair HI Across Media =	0.2
Total Immunological HI Across Media =	**130**
Total Liver HI Across Media =	0.008
Total Reproductive HI Across Media =	0.0001
Total Developmental HI Across Media =	0.0001
Total Cardiovascular HI Across Media =	0.0001
Total Respiratory HI Across Media =	0.003

TABLE 9.7.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child Aggregate

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Total Soil	Total Soil (0 - 6 feet)	Aluminum	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Arsenic	3E-06	NA	2E-07	3E-06	NA	NA	NA	NA	NA
			Chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Cobalt	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Manganese	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Exposure Point Total		3E-06	NA	2E-07	3E-06		NA	NA	NA	NA
	Exposure Medium Total			3E-06	NA	2E-07	3E-06		NA	NA	NA	NA
Total Soil	Ambient Air	Emissions from Total Soil	Aluminum	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Arsenic	NA	2E-09	NA	2E-09	NA	NA	NA	NA	NA
			Chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Cobalt	NA	5E-08	NA	5E-08	NA	NA	NA	NA	NA
			Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Manganese	NA	NA	NA	NA	NA	NA	NA	NA	NA
			Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Exposure Point Total		NA	5E-08	NA	5E-08		NA	NA	NA	NA
	Exposure Medium Total			NA	5E-08	NA	5E-08		NA	NA	NA	NA
Total Soil Total				3E-06	5E-08	2E-07	3E-06		NA	NA	NA	NA

TABLE 9.7.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child Aggregate

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Groundwater	Tetrachloroethene	9E-08	NA	5E-08	1E-07	NA	NA	NA	NA	NA
			Trichloroethene	2E-04	NA	2E-05	2E-04	NA	NA	NA	NA	NA
			Vinyl chloride	3E-06	NA	1E-06	4E-06	NA	NA	NA	NA	NA
		Exposure Point Total		2E-04	NA	2E-05	2E-04		NA	NA	NA	NA
	Exposure Medium Total			2E-04	NA	2E-05	2E-04		NA	NA	NA	NA
Groundwater	Bathroom Air	Water Vapors in Bathroom Air	Tetrachloroethene	NA	4E-06	NA	4E-06	NA	NA	NA	NA	NA
			Trichloroethene	NA	3E-03	NA	3E-03	NA	NA	NA	NA	NA
			Vinyl chloride	NA	9E-07	NA	9E-07	NA	NA	NA	NA	NA
		Exposure Point Total		NA	3E-03	NA	3E-03		NA	NA	NA	NA
	Exposure Medium Total			NA	3E-03	NA	3E-03		NA	NA	NA	NA
Groundwater	Indoor Air	Indoor Air	Trichloroethene	NA	1E-03	NA	1E-03	NA	NA	NA	NA	NA
			Vinyl chloride	NA	3E-06	NA	3E-06	NA	NA	NA	NA	NA
		Exposure Point Total		NA	1E-03	NA	1E-03		NA	NA	NA	NA
	Exposure Medium Total			NA	1E-03	NA	1E-03		NA	NA	NA	NA
Groundwater Total				2E-04	4E-03	2E-05	5E-03		NA	NA	NA	NA
Receptor Total				2E-04	4E-03	2E-05	5E-03		NA	NA	NA	NA

Notes:
NA = Not applicable/Not available

TABLE 9.8.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Total Soil	Total Soil (0 - 6 feet)	Arsenic	4E-07	NA	5E-08	5E-07	Skin and Blood	3E-03	NA	3E-04	3E-03
			Chromium	NA	NA	NA	NA	NOE	7E-06	NA	NA	7E-06
		Exposure Point Total		4E-07	NA	5E-08	5E-07		3E-03	NA	3E-04	3E-03
	Exposure Medium Total			4E-07	NA	5E-08	5E-07		3E-03	NA	3E-04	3E-03
	Ambient Air	Emissions from Total Soil	Arsenic	NA	4E-10	NA	4E-10	Reproductive, Developmental, Cardiovascular, Neurological, Respiratory, Skin	NA	2E-05	NA	2E-05
			Chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Exposure Point Total		NA	4E-10	NA	4E-10		NA	2E-05	NA	2E-05
	Exposure Medium Total			NA	4E-10	NA	4E-10		NA	2E-05	NA	2E-05
Soil Total				4E-07	4E-10	5E-08	5E-07		3E-03	2E-05	3E-04	3E-03
Groundwater	Groundwater	Groundwater	Tetrachloroethene	2E-08	NA	3E-09	2E-08	Neurological	5E-03	NA	6E-04	5E-03
			Trichloroethene	2E-05	NA	9E-07	3E-05	Immunological	3E+00	NA	1E-01	3E+00
			Vinyl chloride	5E-07	NA	9E-09	5E-07	Liver	7E-04	NA	1E-05	7E-04
		Exposure Point Total		2E-05	NA	1E-06	3E-05		3E+00	NA	1E-01	3E+00
	Exposure Medium Total			2E-05	NA	1E-06	3E-05		3E+00	NA	1E-01	3E+00
Groundwater	Indoor Air	Indoor Air	Trichloroethene	NA	6E-05	NA	NA	Immunological	NA	2E+01	NA	2E+01
		Exposure Point Total		NA	6E-05	NA	6E-05		NA	2E+01	NA	2E+01
	Exposure Medium Total			NA	6E-05	NA	6E-05		NA	2E+01	NA	2E+01
Groundwater Total				2E-05	6E-05	5E-08	8E-05		3E+00	2E+01	1E-01	2E+01
Receptor Total				2E-05	6E-05	5E-08	8E-05		3E+00	2E+01	1E-01	2E+01

Notes:
HI = Hazard Index
NA = Not applicable or not available
NOE = no observed effect

Total Neurological HI Across Media =	0.005
Total Skin HI Across Media =	0.003
Total Blood HI Across Media =	0.003
Total NOE HI Across Media =	0.000007
Total Immunological HI Across Media =	**22**
Total Liver HI Across Media =	0.0007
Total Reproductive HI Across Media =	0.00002
Total Developmental HI Across Media =	0.00002
Total Cardiovascular HI Across Media =	0.00002
Total Respiratory HI Across Media =	0.00002

TABLE 9.9.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

SWMU 20

Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Total Soil	Total Soil (0 - 6 feet)	Arsenic	6E-08	NA	5E-09	6E-08	Skin and Blood	9E-03	NA	8E-04	1E-02
			Chromium	NA	NA	NA	NA	NOE	2E-05	NA	NA	2E-05
		Exposure Point Total		6E-08	NA	5E-09	6E-08		9E-03	NA	8E-04	1E-02
	Exposure Medium Total			6E-08	NA	5E-09	6E-08		9E-03	NA	8E-04	1E-02
	Ambient Air	Emissions from	Arsenic	NA	1E-09	NA	1E-09	Reproductive, Developmental, Cardiovascular,Neurological, Respiratory, Skin	NA	1E-03	NA	1E-03
		Total Soil	Chromium	NA	NA	NA	NA	Respiratory	NA	6E-05	NA	6E-05
		Exposure Point Total		NA	1E-09	NA	1E-09		NA	1E-03	NA	1E-03
	Exposure Medium Total			NA	1E-09	NA	1E-09		NA	1E-03	NA	1E-03
Total Soil Total				6E-08	1E-09	5E-09	6E-08		9E-03	1E-03	8E-04	1E-02
Receptor Total				6E-08	1E-09	5E-09	6E-08		9E-03	1E-03	8E-04	1E-02

Notes:
HI = Hazard Index
NA = Not applicable or not available
NOE = no observed effect

Total Neurological HI Across Media =	0.001
Total Skin HI Across Media =	0.01
Total Blood HI Across Media =	0.01
Total NOE HI Across Media =	0.00002
Total Reproductive HI Across Media =	0.001
Total Developmental HI Across Media =	0.001
Total Cardiovascular HI Across Media =	0.001
Total Respiratory HI Across Media =	0.001

TABLE 10.1.RME
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Groundwater	Trichloroethene	NA	NA	NA	NA	Immunological	1E+01	NA	2E+00	1E+01
		Exposure Point Total		NA	NA	NA	NA		1E+01	NA	2E+00	1E+01
	Exposure Medium Total			NA	NA	NA	NA		1E+01	NA	2E+00	1E+01
Groundwater	Bathroom Air	Water Vapors in Bathroom Air	Trichloroethene	NA	NA	NA	NA	Immunological	NA	5E+01	NA	5E+01
		Exposure Point Total		NA	NA	NA	NA		NA	5E+01	NA	5E+01
	Exposure Medium Total			NA	NA	NA	NA		NA	5E+01	NA	5E+01
Groundwater	Indoor Air	Indoor Air	Trichloroethene	NA	NA	NA	NA	Immunological	NA	8E+01	NA	8E+01
		Exposure Point Total		NA	NA	NA	NA		NA	8E+01	NA	8E+01
	Exposure Medium Total			NA	NA	NA	NA		NA	8E+01	NA	8E+01
Groundwater Total				NA	NA	NA	NA		1E+01	1E+02	2E+00	1E+02
Receptor Total				NA	NA	NA	NA		1E+01	1E+02	2E+00	1E+02

Notes:

NA = Not applicable/Not available

HI = Hazard Index

Total Immunological HI Across Media = **139**

TABLE 10.2.RME
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Groundwater	Trichloroethene	NA	NA	NA	NA	Immunological	2E+01	NA	3E+00	2E+01
		Exposure Point Total		NA	NA	NA	NA		2E+01	NA	3E+00	2E+01
	Exposure Medium Total			NA	NA	NA	NA		2E+01	NA	3E+00	2E+01
Groundwater	Bathroom Air	Water Vapors in Bathroom Air	Trichloroethene	NA	NA	NA	NA	Immunological	NA	3E+01	NA	3E+01
		Exposure Point Total		NA	NA	NA	NA		NA	3E+01	NA	3E+01
	Exposure Medium Total			NA	NA	NA	NA		NA	3E+01	NA	3E+01
Groundwater	Indoor Air	Indoor Air	Trichloroethene	NA	NA	NA	NA	Immunological	NA	8E+01	NA	8E+01
		Exposure Point Total		NA	NA	NA	NA		NA	8E+01	NA	8E+01
	Exposure Medium Total			NA	NA	NA	NA		NA	8E+01	NA	8E+01
Groundwater Total				NA	NA	NA	NA		2E+01	1E+02	3E+00	1E+02
Receptor Total				NA	NA	NA	NA		2E+01	1E+02	3E+00	1E+02

Notes:

NA = Not applicable/Not available

HI = Hazard Index

Total Immunological HI Across Media = **130**

TABLE 10.3.RME
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child Aggregate

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Groundwater	Trichloroethene	2E-04	NA	2E-05	2E-04	NA	NA	NA	NA	NA
			Vinyl chloride	3E-06	NA	1E-06	4E-06	NA	NA	NA	NA	NA
		Exposure Point Total		2E-04	NA	2E-05	2E-04		NA	NA	NA	NA
	Exposure Medium Total			2E-04	NA	2E-05	2E-04		NA	NA	NA	NA
Groundwater	Bathroom Air	Water Vapors in Bathroom Air	Tetrachloroethene	NA	4E-06	NA	4E-06	NA	NA	NA	NA	NA
			Trichloroethene	NA	3E-03	NA	3E-03	NA	NA	NA	NA	NA
		Exposure Point Total		NA	3E-03	NA	3E-03		NA	NA	NA	NA
	Exposure Medium Total			NA	3E-03	NA	3E-03		NA	NA	NA	NA
Groundwater	Indoor Air	Indoor Air	Trichloroethene	NA	1E-03	NA	1E-03	NA	NA	NA	NA	NA
			Vinyl chloride	NA	3E-06	NA	3E-06	NA	NA	NA	NA	NA
		Exposure Point Total		NA	1E-03	NA	1E-03		NA	NA	NA	NA
	Exposure Medium Total			NA	1E-03	NA	1E-03		NA	NA	NA	NA
Groundwater Total				2E-04	4E-03	2E-05	5E-03		NA	NA	NA	NA
Receptor Total				2E-04	4E-03	2E-05	5E-03		NA	NA	NA	NA

Notes:

NA = Not applicable/Not available

TABLE 10.4.RME
RISK SUMMARY
REASONABLE MAXIMUM EXPOSURE
SWMU 20
Former NASD, Vieques, Puerto Rico

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Groundwater	Trichloroethene	2E-05	NA	9E-07	3E-05	Immunological	3E+00	NA	1E-01	3E+00
		Exposure Point Total		2E-05	NA	9E-07	3E-05		3E+00	NA	1E-01	3E+00
	Exposure Medium Total			2E-05	NA	9E-07	3E-05		3E+00	NA	1E-01	3E+00
Groundwater	Indoor Air	Indoor Air	Trichloroethene	NA	6E-05	NA	6E-05	Immunological	NA	2E+01	NA	2E+01
		Exposure Point Total		NA	6E-05	NA	6E-05		NA	2E+01	NA	2E+01
	Exposure Medium Total			NA	6E-05	NA	6E-05		NA	2E+01	NA	2E+01
Groundwater Total				2E-05	6E-05	9E-07	8E-05		3E+00	2E+01	1E-01	2E+01
Receptor Total				2E-05	6E-05	9E-07	8E-05		3E+00	2E+01	1E-01	2E+01

Notes:
NA = Not applicable/Not available
HI = Hazard Index

Total Immunological HI Across Media = **22**

Attachment K-2
Data Grouping and Sample Assignment Tables

TABLE 1

Data Groupings

SWMU 20 Remedial Investigation

Former Vieques Naval Training Range, Vieques, Puerto Rico

Data Grouping	Data Description	Sample Counts
AOC_GW	Groundwater (2013 and 2014)	77
SO_TOT_0_6	Total Soil Samples (0-6 feet)	50
SO_SURF_0_1	Surface Soil Samples (0-1 feet)	25

TABLE 2
Samples Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Data Grouping	Data Grouping	Station	Sample Date	Matrix	Upper Depth (feet)	Lower Depth (feet)	Sample Type	Sample ID
AOC_GW		EPI04-MW01	14-May-13	GW	NA	NA	N	VEP4-GW01-0513
AOC_GW		EPI04-MW19	14-May-13	GW	NA	NA	N	VEP4-GW19-051413
AOC_GW		EPI04-MW06	15-May-13	GW	NA	NA	N	VEP4-GW06-0513
AOC_GW		EPI04-MW05	15-May-13	GW	NA	NA	N	VEP4-GW05-0513
AOC_GW		EPI04-MW05	15-May-13	GW	NA	NA	FD	VEP4-GW05P-0513
AOC_GW		EPI04-MW03	16-May-13	GW	NA	NA	N	VEP4-GW03-0513
AOC_GW		EPI04-MW16	16-May-13	GW	NA	NA	N	VEP4-GW16-051613
AOC_GW		EPI04-MW02	16-May-13	GW	NA	NA	N	VEP4-GW02-0513
AOC_GW		EPI04-MW07	17-May-13	GW	NA	NA	N	VEP4-GW07-0513
AOC_GW		EPI04-MW04	20-May-13	GW	NA	NA	N	VEP4-GW04-0513
AOC_GW		EPI04-MW08	20-May-13	GW	NA	NA	N	VEP4-GW08-0513
AOC_GW		EPI04-MW08	20-May-13	GW	NA	NA	FD	VEP4-GW08P-0513
AOC_GW		EPI04-MW18	21-May-13	GW	NA	NA	N	VEP4-GW18-052113
AOC_GW		EPI04-MW10	21-May-13	GW	NA	NA	N	VEP4-GW10-0513
AOC_GW		EPI04-MW09	22-May-13	GW	NA	NA	N	VEP4-GW09-0513
AOC_GW		EPI04-MW13	22-May-13	GW	NA	NA	N	VEP4-GW13-0513
AOC_GW		EPI04-MW13	22-May-13	GW	NA	NA	FD	VEP4-GW13P-0513
AOC_GW		EPI04-MW11	23-May-13	GW	NA	NA	N	VEP4-GW11-0513
AOC_GW		EPI04-MW15	23-May-13	GW	NA	NA	N	VEP4-GW15-052313
AOC_GW		EPI04-MW12	23-May-13	GW	NA	NA	N	VEP4-GW12-0513
AOC_GW		EPI04-MW14	24-May-13	GW	NA	NA	N	VEP4-GW14-0513
AOC_GW		EPI04-MW17	29-May-13	GW	NA	NA	N	VEP4-GW17-052913
AOC_GW		EPI04-MW15	05-Jun-13	GW	NA	NA	N	VEP4-GW15-0613
AOC_GW		EPI04-MW19	06-Jun-13	GW	NA	NA	N	VEP4-GW19-0613
AOC_GW		EPI04-MW18	07-Jun-13	GW	NA	NA	N	VEP4-GW18-0613
AOC_GW		EPI04-MW16	10-Jun-13	GW	NA	NA	N	VEP4-GW16-0613
AOC_GW		EPI04-MW17	10-Jun-13	GW	NA	NA	N	VEP4-GW17-0613
AOC_GW		EPI04-MW17	10-Jun-13	GW	NA	NA	FD	VEP4-GW17P-0613
AOC_GW		EPI04-MW20	10-Jun-13	GW	NA	NA	N	VEP4-GW20-061013
AOC_GW		EPI04-MW20	17-Jun-13	GW	NA	NA	N	VEP4-GW20-0613
AOC_GW		EPI04-MW22	19-Jun-13	GW	NA	NA	N	VEP4-GW22-061913
AOC_GW		EPI04-MW23	19-Jun-13	GW	NA	NA	N	VEP4-GW23-061913
AOC_GW		EPI04-MW24	20-Jun-13	GW	NA	NA	N	VEP4-GW24-062013
AOC_GW		EPI04-MW21	21-Jun-13	GW	NA	NA	N	VEP4-GW21-062113
AOC_GW		EPI04-MW13D	26-Jun-13	GW	NA	NA	N	VEP4-GW13D-062613
AOC_GW		EPI04-MW17D	26-Jun-13	GW	NA	NA	N	VEP4-GW17D-062613
AOC_GW		EPI04-MW17D	01-Jul-13	GW	NA	NA	N	VEP4-GW17D-0713
AOC_GW		EPI04-MW13D	02-Jul-13	GW	NA	NA	N	VEP4-GW13D-0713
AOC_GW		EPI04-MW21	16-Jul-13	GW	NA	NA	N	VEP4-GW21-0713
AOC_GW		EPI04-MW22	17-Jul-13	GW	NA	NA	N	VEP4-GW22-0713
AOC_GW		EPI04-MW23	23-Jul-13	GW	NA	NA	N	VEP4-GW23-0713
AOC_GW		EPI04-MW24	24-Jul-13	GW	NA	NA	N	VEP4-GW24-0713
AOC_GW		EPI04-MW30	24-Sep-13	GW	NA	NA	N	VEP4-GW30-0913
AOC_GW		EPI04-MW26	24-Sep-13	GW	NA	NA	N	VEP4-GW26-0913
AOC_GW		EPI04-MW27	26-Sep-13	GW	NA	NA	N	VEP4-GW27-0913
AOC_GW		EPI04-MW25	26-Sep-13	GW	NA	NA	N	VEP4-GW25-0913
AOC_GW		EPI04-MW29	02-Oct-13	GW	NA	NA	N	VEP4-GW29-1013
AOC_GW		EPI04-MW28	02-Oct-13	GW	NA	NA	N	VEP4-GW28-1013
AOC_GW		EPI04-MW28	09-Sep-14	GW	NA	NA	N	VEP4-GW28-0914
AOC_GW		EPI04-MW30	10-Sep-14	GW	NA	NA	N	VEP4-GW30-0914
AOC_GW		EPI04-MW29	10-Sep-14	GW	NA	NA	N	VEP4-GW29-0914
AOC_GW		EPI04-MW27	10-Sep-14	GW	NA	NA	N	VEP4-GW27-0914
AOC_GW		EPI04-MW22	11-Sep-14	GW	NA	NA	N	VEP4-GW22-0914
AOC_GW		EPI04-MW22	11-Sep-14	GW	NA	NA	FD	VEP4-GW22P-0914
AOC_GW		EPI04-MW21	11-Sep-14	GW	NA	NA	N	VEP4-GW21-0914
AOC_GW		EPI04-MW16	11-Sep-14	GW	NA	NA	N	VEP4-GW16-0914
AOC_GW		EPI04-MW26	12-Sep-14	GW	NA	NA	N	VEP4-GW26-0914

TABLE 2
Samples Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Data Grouping	Data Grouping	Station	Sample Date	Matrix	Upper Depth (feet)	Lower Depth (feet)	Sample Type	Sample ID
AOC_GW		EPI04-MW20	12-Sep-14	GW	NA	NA	N	VEP4-GW20-0914
AOC_GW		EPI04-MW19	15-Sep-14	GW	NA	NA	N	VEP4-GW19-0914
AOC_GW		EPI04-MW14	15-Sep-14	GW	NA	NA	N	VEP4-GW14-0914
AOC_GW		EPI04-MW18	15-Sep-14	GW	NA	NA	N	VEP4-GW18-0914
AOC_GW		EPI04-MW10	16-Sep-14	GW	NA	NA	N	VEP4-GW10-0914
AOC_GW		EPI04-MW13D	16-Sep-14	GW	NA	NA	N	VEP4-GW13D-0914
AOC_GW		EPI04-MW13	16-Sep-14	GW	NA	NA	N	VEP4-GW13-0914
AOC_GW		EPI04-MW13	16-Sep-14	GW	NA	NA	FD	VEP4-GW13P-0914
AOC_GW		EPI04-MW23	17-Sep-14	GW	NA	NA	N	VEP4-GW23-0914
AOC_GW		EPI04-MW17	17-Sep-14	GW	NA	NA	N	VEP4-GW17-0914
AOC_GW		EPI04-MW17D	17-Sep-14	GW	NA	NA	N	VEP4-GW17D-0914
AOC_GW		EPI04-MW25	18-Sep-14	GW	NA	NA	N	VEP4-GW25-0914
AOC_GW		EPI04-MW32	23-Sep-14	GW	NA	NA	N	VEP4-GW32-0914
AOC_GW		EPI04-MW25D	23-Sep-14	GW	NA	NA	N	VEP4-GW25D-0914
AOC_GW		EPI04-MW24	23-Sep-14	GW	NA	NA	N	VEP4-GW24-0914
AOC_GW		EPI04-MW24	23-Sep-14	GW	NA	NA	FD	VEP4-GW24P-0914
AOC_GW		EPI04-MW28D	26-Sep-14	GW	NA	NA	N	VEP4-GW28D-0914
AOC_GW		EPI04-MW31	26-Sep-14	GW	NA	NA	N	VEP4-GW31-0914
AOC_GW		EPI04-MW24D	26-Sep-14	GW	NA	NA	N	VEP4-GW24D-0914
AOC_GW		EPI04-MW33	26-Sep-14	GW	NA	NA	N	VEP4-GW33-0914
SO_TOT_0_6		EPI04-SO09	24-Jan-06	SB	4	6	N	EPI04-SB09-0406
SO_TOT_0_6		EPI04-SO10	24-Jan-06	SB	2	4	N	EPI04-SB10-0406
SO_TOT_0_6		EPI04-SO12	24-Jan-06	SB	4	6	N	EPI04-SB12-0406
SO_TOT_0_6		EPI04-SO11	25-Jan-06	SB	4	6	N	EPI04-SB11-0406
SO_TOT_0_6		EPI04-SO13	25-Jan-06	SB	4	6	N	EPI04-SB13-0406
SO_TOT_0_6		EPI04-SO08	25-Jan-06	SB	4	6	N	EPI04-SB08-0406
SO_TOT_0_6		EPI04-SO08	25-Jan-06	SB	4	6	FD	EPI04-SB08P-0406
SO_TOT_0_6		EPI04-SO07	25-Jan-06	SB	4	6	N	EPI04-SB07-0406
SO_TOT_0_6		EPI04-SO03	26-Jan-06	SB	4	6	N	EPI04-SB03-0406
SO_TOT_0_6		EPI04-SO04	26-Jan-06	SB	4	6	N	EPI04-SB04-0406
SO_TOT_0_6		EPI04-SO06	26-Jan-06	SB	4	6	N	EPI04-SB06-0406
SO_TOT_0_6		EPI04-SO05	26-Jan-06	SB	4	6	N	EPI04-SB05-0406
SO_TOT_0_6		EPI04-SO01	26-Jan-06	SB	4	6	N	EPI04-SB01-0406
SO_TOT_0_6		EPI04-SO02	26-Jan-06	SB	4	6	N	EPI04-SB02-0406
SO_TOT_0_6		EPI04-SO15	14-Feb-06	SB	4	6	N	EPI04-SB15-0406
SO_TOT_0_6		EPI04-SO14	14-Feb-06	SB	4	6	N	EPI04-SB14-0406
SO_TOT_0_6		EPI04-SO14	14-Feb-06	SB	4	6	FD	EPI04-SB14P-0406
SO_TOT_0_6		EPI04-MW13D	30-May-13	SB	4	6	N	VEP4-SB16-0406
SO_TOT_0_6		EPI04-MW17D	05-Jun-13	SB	4	6	N	VEP4-SB17-0406
SO_TOT_0_6		EPI04-SO22	16-Sep-14	SB	4	6	N	VEP4-SB22-0406
SO_TOT_0_6		EPI04-SO21	17-Sep-14	SB	4	6	N	VEP4-SB21-0406
SO_TOT_0_6		EPI04-SO24	18-Sep-14	SB	4	6	N	VEP4-SB24-0406
SO_TOT_0_6		EPI04-SO25	22-Sep-14	SB	4	6	N	VEP4-SB25-0406
SO_TOT_0_6		EPI04-SO23	22-Sep-14	SB	4	6	N	VEP4-SB23-0406
SO_TOT_0_6	SO_SURF_0_1	EPI04-SO09	24-Jan-06	SS	0	1	N	EPI04-SS09-0001
SO_TOT_0_6	SO_SURF_0_1	EPI04-SO10	24-Jan-06	SS	0	1	N	EPI04-SS10-0001
SO_TOT_0_6	SO_SURF_0_1	EPI04-SO12	24-Jan-06	SS	0	1	N	EPI04-SS12-0001
SO_TOT_0_6	SO_SURF_0_1	EPI04-SO11	25-Jan-06	SS	0	1	N	EPI04-SS11-0001
SO_TOT_0_6	SO_SURF_0_1	EPI04-SO13	25-Jan-06	SS	0	1	N	EPI04-SS13-0001
SO_TOT_0_6	SO_SURF_0_1	EPI04-SO08	25-Jan-06	SS	0	1	FD	EPI04-SS08P-0001
SO_TOT_0_6	SO_SURF_0_1	EPI04-SO08	25-Jan-06	SS	0	1	N	EPI04-SS08-0001
SO_TOT_0_6	SO_SURF_0_1	EPI04-SO07	25-Jan-06	SS	0	1	N	EPI04-SS07-0001
SO_TOT_0_6	SO_SURF_0_1	EPI04-SO03	26-Jan-06	SS	0	1	N	EPI04-SS03-0001
SO_TOT_0_6	SO_SURF_0_1	EPI04-SO04	26-Jan-06	SS	0	1	N	EPI04-SS04-0001
SO_TOT_0_6	SO_SURF_0_1	EPI04-SO06	26-Jan-06	SS	0	1	N	EPI04-SS06-0001
SO_TOT_0_6	SO_SURF_0_1	EPI04-SO05	26-Jan-06	SS	0	1	N	EPI04-SS05-0001
SO_TOT_0_6	SO_SURF_0_1	EPI04-SO05	26-Jan-06	SS	0	1	FD	EPI04-SS05P-0001

TABLE 2
Samples Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Data Grouping	Data Grouping	Station	Sample Date	Matrix	Upper Depth (feet)	Lower Depth (feet)	Sample Type	Sample ID
SO_TOT_0_6	SO_SURF_0_1	EPI04-SO01	26-Jan-06	SS	0	1	N	EPI04-SS01-0001
SO_TOT_0_6	SO_SURF_0_1	EPI04-SO02	26-Jan-06	SS	0	1	N	EPI04-SS02-0001
SO_TOT_0_6		EPI04-SO15	31-Jan-06	SS	0	6	N	EPI04-SS15-0006
SO_TOT_0_6	SO_SURF_0_1	EPI04-SO14	31-Jan-06	SS	0	1	N	EPI04-SS14-0006
SO_TOT_0_6	SO_SURF_0_1	EPI04-MW13D	30-May-13	SS	0	1	N	VEP4-SS16-0001
SO_TOT_0_6	SO_SURF_0_1	EPI04-MW17D	05-Jun-13	SS	0	1	N	VEP4-SS17-0001
SO_TOT_0_6	SO_SURF_0_1	EPI04-MW17D	05-Jun-13	SS	0	1	FD	VEP4-SS17P-0001
SO_TOT_0_6	SO_SURF_0_1	EPI04-SO22	16-Sep-14	SS	0	1	N	VEP4-SS22-0001
SO_TOT_0_6	SO_SURF_0_1	EPI04-SO21	17-Sep-14	SS	0	1	N	VEP4-SS21-0001
SO_TOT_0_6	SO_SURF_0_1	EPI04-SO21	17-Sep-14	SS	0	1	FD	VEP4-SS21P-0001
SO_TOT_0_6	SO_SURF_0_1	EPI04-SO24	18-Sep-14	SS	0	1	N	VEP4-SS24-0001
SO_TOT_0_6	SO_SURF_0_1	EPI04-SO25	22-Sep-14	SS	0	1	N	VEP4-SS25-0001
SO_TOT_0_6	SO_SURF_0_1	EPI04-SO23	22-Sep-14	SS	0	1	N	VEP4-SS23-0001

Notes:
Sample Type: N - Normal; FD - Field Duplicate
Matrix: GW - Groundwater; SS - Surface Soil; SB - Subsurface Soil.
NA - Not Available.

Attachment K-3
Analytical Data

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-MW01	MW	14-May-13	N	VEP4-GW01-0513	SVOA	123-91-1	1,4-Dioxane	0.49	UG_L	0.245	0.98	U	No
EPI04-MW01	MW	14-May-13	N	VEP4-GW01-0513	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW01	MW	14-May-13	N	VEP4-GW01-0513	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW01	MW	14-May-13	N	VEP4-GW01-0513	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW01	MW	14-May-13	N	VEP4-GW01-0513	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW01	MW	14-May-13	N	VEP4-GW01-0513	VOA	79-01-6	Trichloroethene	0.2	UG_L	0.1	0.5	U	No
EPI04-MW01	MW	14-May-13	N	VEP4-GW01-0513	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW02	MW	16-May-13	N	VEP4-GW02-0513	SVOA	123-91-1	1,4-Dioxane	0.481	UG_L	0.24	0.962	U	No
EPI04-MW02	MW	16-May-13	N	VEP4-GW02-0513	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW02	MW	16-May-13	N	VEP4-GW02-0513	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW02	MW	16-May-13	N	VEP4-GW02-0513	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW02	MW	16-May-13	N	VEP4-GW02-0513	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW02	MW	16-May-13	N	VEP4-GW02-0513	VOA	79-01-6	Trichloroethene	0.2	UG_L	0.1	0.5	U	No
EPI04-MW02	MW	16-May-13	N	VEP4-GW02-0513	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW03	MW	16-May-13	N	VEP4-GW03-0513	SVOA	123-91-1	1,4-Dioxane	0.481	UG_L	0.24	0.962	U	No
EPI04-MW03	MW	16-May-13	N	VEP4-GW03-0513	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW03	MW	16-May-13	N	VEP4-GW03-0513	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW03	MW	16-May-13	N	VEP4-GW03-0513	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW03	MW	16-May-13	N	VEP4-GW03-0513	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW03	MW	16-May-13	N	VEP4-GW03-0513	VOA	79-01-6	Trichloroethene	0.2	UG_L	0.1	0.5	U	No
EPI04-MW03	MW	16-May-13	N	VEP4-GW03-0513	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW04	MW	20-May-13	N	VEP4-GW04-0513	SVOA	123-91-1	1,4-Dioxane	0.472	UG_L	0.236	0.943	U	No
EPI04-MW04	MW	20-May-13	N	VEP4-GW04-0513	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW04	MW	20-May-13	N	VEP4-GW04-0513	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW04	MW	20-May-13	N	VEP4-GW04-0513	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW04	MW	20-May-13	N	VEP4-GW04-0513	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW04	MW	20-May-13	N	VEP4-GW04-0513	VOA	79-01-6	Trichloroethene	0.2	UG_L	0.1	0.5	U	No
EPI04-MW04	MW	20-May-13	N	VEP4-GW04-0513	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW05	MW	15-May-13	N	VEP4-GW05-0513	SVOA	123-91-1	1,4-Dioxane	0.463	UG_L	0.231	0.926	U	No
EPI04-MW05	MW	15-May-13	N	VEP4-GW05-0513	VOA	75-35-4	1,1-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW05	MW	15-May-13	N	VEP4-GW05-0513	VOA	156-59-2	cis-1,2-Dichloroethene	0.54	UG_L	0.5	2	J	Yes
EPI04-MW05	MW	15-May-13	N	VEP4-GW05-0513	VOA	127-18-4	Tetrachloroethene	1	UG_L	0.5	2	U	No
EPI04-MW05	MW	15-May-13	N	VEP4-GW05-0513	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW05	MW	15-May-13	N	VEP4-GW05-0513	VOA	79-01-6	Trichloroethene	2.5	UG_L	0.2	1		Yes
EPI04-MW05	MW	15-May-13	N	VEP4-GW05-0513	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-MW05	MW	15-May-13	FD	VEP4-GW05P-0513	SVOA	123-91-1	1,4-Dioxane	0.49	UG_L	0.245	0.98	U	No
EPI04-MW05	MW	15-May-13	FD	VEP4-GW05P-0513	VOA	75-35-4	1,1-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW05	MW	15-May-13	FD	VEP4-GW05P-0513	VOA	156-59-2	cis-1,2-Dichloroethene	0.62	UG_L	0.5	2	J	Yes
EPI04-MW05	MW	15-May-13	FD	VEP4-GW05P-0513	VOA	127-18-4	Tetrachloroethene	1	UG_L	0.5	2	U	No
EPI04-MW05	MW	15-May-13	FD	VEP4-GW05P-0513	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW05	MW	15-May-13	FD	VEP4-GW05P-0513	VOA	79-01-6	Trichloroethene	2.56	UG_L	0.2	1		Yes
EPI04-MW05	MW	15-May-13	FD	VEP4-GW05P-0513	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-MW06	MW	15-May-13	N	VEP4-GW06-0513	SVOA	123-91-1	1,4-Dioxane	0.5	UG_L	0.25	1	U	No
EPI04-MW06	MW	15-May-13	N	VEP4-GW06-0513	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW06	MW	15-May-13	N	VEP4-GW06-0513	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW06	MW	15-May-13	N	VEP4-GW06-0513	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW06	MW	15-May-13	N	VEP4-GW06-0513	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW06	MW	15-May-13	N	VEP4-GW06-0513	VOA	79-01-6	Trichloroethene	0.2	UG_L	0.1	0.5	U	No
EPI04-MW06	MW	15-May-13	N	VEP4-GW06-0513	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW07	MW	17-May-13	N	VEP4-GW07-0513	SVOA	123-91-1	1,4-Dioxane	0.5	UG_L	0.25	1	U	No
EPI04-MW07	MW	17-May-13	N	VEP4-GW07-0513	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW07	MW	17-May-13	N	VEP4-GW07-0513	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW07	MW	17-May-13	N	VEP4-GW07-0513	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW07	MW	17-May-13	N	VEP4-GW07-0513	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW07	MW	17-May-13	N	VEP4-GW07-0513	VOA	79-01-6	Trichloroethene	0.2	UG_L	0.1	0.5	U	No
EPI04-MW07	MW	17-May-13	N	VEP4-GW07-0513	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW08	MW	20-May-13	N	VEP4-GW08-0513	SVOA	123-91-1	1,4-Dioxane	0.495	UG_L	0.248	0.99	U	No
EPI04-MW08	MW	20-May-13	N	VEP4-GW08-0513	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW08	MW	20-May-13	N	VEP4-GW08-0513	VOA	156-59-2	cis-1,2-Dichloroethene	0.38	UG_L	0.25	1	J	Yes
EPI04-MW08	MW	20-May-13	N	VEP4-GW08-0513	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW08	MW	20-May-13	N	VEP4-GW08-0513	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW08	MW	20-May-13	N	VEP4-GW08-0513	VOA	79-01-6	Trichloroethene	2.44	UG_L	0.1	0.5		Yes
EPI04-MW08	MW	20-May-13	N	VEP4-GW08-0513	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW08	MW	20-May-13	FD	VEP4-GW08P-0513	SVOA	123-91-1	1,4-Dioxane	0.481	UG_L	0.24	0.962	U	No
EPI04-MW08	MW	20-May-13	FD	VEP4-GW08P-0513	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW08	MW	20-May-13	FD	VEP4-GW08P-0513	VOA	156-59-2	cis-1,2-Dichloroethene	0.44	UG_L	0.25	1	J	Yes
EPI04-MW08	MW	20-May-13	FD	VEP4-GW08P-0513	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW08	MW	20-May-13	FD	VEP4-GW08P-0513	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW08	MW	20-May-13	FD	VEP4-GW08P-0513	VOA	79-01-6	Trichloroethene	2.31	UG_L	0.1	0.5		Yes
EPI04-MW08	MW	20-May-13	FD	VEP4-GW08P-0513	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW09	MW	22-May-13	N	VEP4-GW09-0513	SVOA	123-91-1	1,4-Dioxane	0.481	UG_L	0.24	0.962	U	No
EPI04-MW09	MW	22-May-13	N	VEP4-GW09-0513	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW09	MW	22-May-13	N	VEP4-GW09-0513	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW09	MW	22-May-13	N	VEP4-GW09-0513	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW09	MW	22-May-13	N	VEP4-GW09-0513	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW09	MW	22-May-13	N	VEP4-GW09-0513	VOA	79-01-6	Trichloroethene	0.9	UG_L	0.1	0.5		Yes
EPI04-MW09	MW	22-May-13	N	VEP4-GW09-0513	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW10	MW	21-May-13	N	VEP4-GW10-0513	SVOA	123-91-1	1,4-Dioxane	0.5	UG_L	0.25	1	U	No
EPI04-MW10	MW	21-May-13	N	VEP4-GW10-0513	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW10	MW	21-May-13	N	VEP4-GW10-0513	VOA	156-59-2	cis-1,2-Dichloroethene	0.51	UG_L	0.25	1	J	Yes
EPI04-MW10	MW	21-May-13	N	VEP4-GW10-0513	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW10	MW	21-May-13	N	VEP4-GW10-0513	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW10	MW	21-May-13	N	VEP4-GW10-0513	VOA	79-01-6	Trichloroethene	6.71	UG_L	0.1	0.5		Yes
EPI04-MW10	MW	21-May-13	N	VEP4-GW10-0513	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW10	MW	16-Sep-14	N	VEP4-GW10-0914	VOA	75-35-4	1,1-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW10	MW	16-Sep-14	N	VEP4-GW10-0914	VOA	156-59-2	cis-1,2-Dichloroethene	0.674	UG_L	0.5	2	J	Yes
EPI04-MW10	MW	16-Sep-14	N	VEP4-GW10-0914	VOA	127-18-4	Tetrachloroethene	0.72	UG_L	0.5	2	J	Yes
EPI04-MW10	MW	16-Sep-14	N	VEP4-GW10-0914	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW10	MW	16-Sep-14	N	VEP4-GW10-0914	VOA	79-01-6	Trichloroethene	23.3	UG_L	0.2	1		Yes
EPI04-MW10	MW	16-Sep-14	N	VEP4-GW10-0914	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-MW11	MW	23-May-13	N	VEP4-GW11-0513	SVOA	123-91-1	1,4-Dioxane	0.5	UG_L	0.25	1	U	No
EPI04-MW11	MW	23-May-13	N	VEP4-GW11-0513	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW11	MW	23-May-13	N	VEP4-GW11-0513	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW11	MW	23-May-13	N	VEP4-GW11-0513	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW11	MW	23-May-13	N	VEP4-GW11-0513	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW11	MW	23-May-13	N	VEP4-GW11-0513	VOA	79-01-6	Trichloroethene	0.2	UG_L	0.1	0.5	U	No
EPI04-MW11	MW	23-May-13	N	VEP4-GW11-0513	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW12	MW	23-May-13	N	VEP4-GW12-0513	SVOA	123-91-1	1,4-Dioxane	0.526	UG_L	0.263	1.05	U	No
EPI04-MW12	MW	23-May-13	N	VEP4-GW12-0513	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW12	MW	23-May-13	N	VEP4-GW12-0513	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW12	MW	23-May-13	N	VEP4-GW12-0513	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW12	MW	23-May-13	N	VEP4-GW12-0513	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW12	MW	23-May-13	N	VEP4-GW12-0513	VOA	79-01-6	Trichloroethene	1.8	UG_L	0.1	0.5		Yes
EPI04-MW12	MW	23-May-13	N	VEP4-GW12-0513	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW13	MW	22-May-13	N	VEP4-GW13-0513	SVOA	123-91-1	1,4-Dioxane	0.481	UG_L	0.24	0.962	U	No
EPI04-MW13	MW	22-May-13	N	VEP4-GW13-0513	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW13	MW	22-May-13	N	VEP4-GW13-0513	VOA	156-59-2	cis-1,2-Dichloroethene	0.47	UG_L	0.25	1	J	Yes

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-MW13	MW	22-May-13	N	VEP4-GW13-0513	VOA	127-18-4	Tetrachloroethene	1.25	UG_L	0.25	1	J	Yes
EPI04-MW13	MW	22-May-13	N	VEP4-GW13-0513	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW13	MW	22-May-13	N	VEP4-GW13-0513	VOA	79-01-6	Trichloroethene	61.9	UG_L	0.1	0.5		Yes
EPI04-MW13	MW	22-May-13	N	VEP4-GW13-0513	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW13	MW	16-Sep-14	N	VEP4-GW13-0914	VOA	75-35-4	1,1-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW13	MW	16-Sep-14	N	VEP4-GW13-0914	VOA	156-59-2	cis-1,2-Dichloroethene	0.986	UG_L	0.5	2	J	Yes
EPI04-MW13	MW	16-Sep-14	N	VEP4-GW13-0914	VOA	127-18-4	Tetrachloroethene	0.576	UG_L	0.5	2	J	Yes
EPI04-MW13	MW	16-Sep-14	N	VEP4-GW13-0914	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW13	MW	16-Sep-14	N	VEP4-GW13-0914	VOA	79-01-6	Trichloroethene	32.3	UG_L	0.2	1		Yes
EPI04-MW13	MW	16-Sep-14	N	VEP4-GW13-0914	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-MW13	MW	22-May-13	FD	VEP4-GW13P-0513	SVOA	123-91-1	1,4-Dioxane	0.481	UG_L	0.24	0.962	U	No
EPI04-MW13	MW	22-May-13	FD	VEP4-GW13P-0513	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW13	MW	22-May-13	FD	VEP4-GW13P-0513	VOA	156-59-2	cis-1,2-Dichloroethene	0.47	UG_L	0.25	1	J	Yes
EPI04-MW13	MW	22-May-13	FD	VEP4-GW13P-0513	VOA	127-18-4	Tetrachloroethene	1.59	UG_L	0.25	1	J	Yes
EPI04-MW13	MW	22-May-13	FD	VEP4-GW13P-0513	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW13	MW	22-May-13	FD	VEP4-GW13P-0513	VOA	79-01-6	Trichloroethene	64.9	UG_L	0.1	0.5		Yes
EPI04-MW13	MW	22-May-13	FD	VEP4-GW13P-0513	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW13	MW	16-Sep-14	FD	VEP4-GW13P-0914	VOA	75-35-4	1,1-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW13	MW	16-Sep-14	FD	VEP4-GW13P-0914	VOA	156-59-2	cis-1,2-Dichloroethene	1.05	UG_L	0.5	2	J	Yes
EPI04-MW13	MW	16-Sep-14	FD	VEP4-GW13P-0914	VOA	127-18-4	Tetrachloroethene	0.644	UG_L	0.5	2	J	Yes
EPI04-MW13	MW	16-Sep-14	FD	VEP4-GW13P-0914	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW13	MW	16-Sep-14	FD	VEP4-GW13P-0914	VOA	79-01-6	Trichloroethene	32.6	UG_L	0.2	1		Yes
EPI04-MW13	MW	16-Sep-14	FD	VEP4-GW13P-0914	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-MW13D	MW	26-Jun-13	N	VEP4-GW13D-062613	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW13D	MW	26-Jun-13	N	VEP4-GW13D-062613	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW13D	MW	26-Jun-13	N	VEP4-GW13D-062613	VOA	127-18-4	Tetrachloroethene	0.69	UG_L	0.25	1	J	Yes
EPI04-MW13D	MW	26-Jun-13	N	VEP4-GW13D-062613	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW13D	MW	26-Jun-13	N	VEP4-GW13D-062613	VOA	79-01-6	Trichloroethene	44.4	UG_L	0.1	0.5		Yes
EPI04-MW13D	MW	26-Jun-13	N	VEP4-GW13D-062613	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW13D	MW	02-Jul-13	N	VEP4-GW13D-0713	SVOA	123-91-1	1,4-Dioxane	0.481	UG_L	0.24	0.962	U	No
EPI04-MW13D	MW	02-Jul-13	N	VEP4-GW13D-0713	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW13D	MW	02-Jul-13	N	VEP4-GW13D-0713	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW13D	MW	02-Jul-13	N	VEP4-GW13D-0713	VOA	127-18-4	Tetrachloroethene	0.78	UG_L	0.25	1	J	Yes
EPI04-MW13D	MW	02-Jul-13	N	VEP4-GW13D-0713	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW13D	MW	02-Jul-13	N	VEP4-GW13D-0713	VOA	79-01-6	Trichloroethene	48.8	UG_L	0.1	0.5		Yes
EPI04-MW13D	MW	02-Jul-13	N	VEP4-GW13D-0713	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW13D	MW	16-Sep-14	N	VEP4-GW13D-0914	VOA	75-35-4	1,1-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW13D	MW	16-Sep-14	N	VEP4-GW13D-0914	VOA	156-59-2	cis-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW13D	MW	16-Sep-14	N	VEP4-GW13D-0914	VOA	127-18-4	Tetrachloroethene	0.725	UG_L	0.5	2	J	Yes
EPI04-MW13D	MW	16-Sep-14	N	VEP4-GW13D-0914	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW13D	MW	16-Sep-14	N	VEP4-GW13D-0914	VOA	79-01-6	Trichloroethene	35.3	UG_L	0.2	1		Yes
EPI04-MW13D	MW	16-Sep-14	N	VEP4-GW13D-0914	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-MW13D	MW	30-May-13	N	VEP4-SB16-0406	SVOA	123-91-1	1,4-Dioxane	34.9	UG_KG	17.5	69.8	U	No
EPI04-MW13D	MW	30-May-13	N	VEP4-SB16-0406	VOA	75-35-4	1,1-Dichloroethene	2.23	UG_KG	1.12	4.47	U	No
EPI04-MW13D	MW	30-May-13	N	VEP4-SB16-0406	VOA	156-59-2	cis-1,2-Dichloroethene	2.23	UG_KG	1.12	4.47	U	No
EPI04-MW13D	MW	30-May-13	N	VEP4-SB16-0406	VOA	127-18-4	Tetrachloroethene	2.23	UG_KG	1.12	4.47	U	No
EPI04-MW13D	MW	30-May-13	N	VEP4-SB16-0406	VOA	156-60-5	trans-1,2-Dichloroethene	2.23	UG_KG	1.12	4.47	U	No
EPI04-MW13D	MW	30-May-13	N	VEP4-SB16-0406	VOA	79-01-6	Trichloroethene	2.23	UG_KG	1.12	4.47	U	No
EPI04-MW13D	MW	30-May-13	N	VEP4-SB16-0406	VOA	75-01-4	Vinyl chloride	2.23	UG_KG	1.12	4.47	U	No
EPI04-MW13D	MW	30-May-13	N	VEP4-SS16-0001	SVOA	123-91-1	1,4-Dioxane	34.8	UG_KG	17.5	69.8	U	No
EPI04-MW13D	MW	30-May-13	N	VEP4-SS16-0001	VOA	75-35-4	1,1-Dichloroethene	2.57	UG_KG	1.29	5.15	U	No
EPI04-MW13D	MW	30-May-13	N	VEP4-SS16-0001	VOA	156-59-2	cis-1,2-Dichloroethene	2.57	UG_KG	1.29	5.15	U	No
EPI04-MW13D	MW	30-May-13	N	VEP4-SS16-0001	VOA	127-18-4	Tetrachloroethene	2.57	UG_KG	1.29	5.15	U	No
EPI04-MW13D	MW	30-May-13	N	VEP4-SS16-0001	VOA	156-60-5	trans-1,2-Dichloroethene	2.57	UG_KG	1.29	5.15	U	No
EPI04-MW13D	MW	30-May-13	N	VEP4-SS16-0001	VOA	79-01-6	Trichloroethene	2.57	UG_KG	1.29	5.15	U	No
EPI04-MW13D	MW	30-May-13	N	VEP4-SS16-0001	VOA	75-01-4	Vinyl chloride	2.57	UG_KG	1.29	5.15	U	No
EPI04-MW14	MW	24-May-13	N	VEP4-GW14-0513	SVOA	123-91-1	1,4-Dioxane	0.481	UG_L	0.24	0.962	U	No
EPI04-MW14	MW	24-May-13	N	VEP4-GW14-0513	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW14	MW	24-May-13	N	VEP4-GW14-0513	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW14	MW	24-May-13	N	VEP4-GW14-0513	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW14	MW	24-May-13	N	VEP4-GW14-0513	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW14	MW	24-May-13	N	VEP4-GW14-0513	VOA	79-01-6	Trichloroethene	0.3	UG_L	0.1	0.5	J	Yes
EPI04-MW14	MW	24-May-13	N	VEP4-GW14-0513	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	UJ	No
EPI04-MW14	MW	15-Sep-14	N	VEP4-GW14-0914	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW14	MW	15-Sep-14	N	VEP4-GW14-0914	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW14	MW	15-Sep-14	N	VEP4-GW14-0914	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW14	MW	15-Sep-14	N	VEP4-GW14-0914	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW14	MW	15-Sep-14	N	VEP4-GW14-0914	VOA	79-01-6	Trichloroethene	0.2	UG_L	0.1	0.5	U	No
EPI04-MW14	MW	15-Sep-14	N	VEP4-GW14-0914	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW15	MW	23-May-13	N	VEP4-GW15-052313	SVOA	123-91-1	1,4-Dioxane	0.481	UG_L	0.24	0.962	U	No
EPI04-MW15	MW	23-May-13	N	VEP4-GW15-052313	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW15	MW	23-May-13	N	VEP4-GW15-052313	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW15	MW	23-May-13	N	VEP4-GW15-052313	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW15	MW	23-May-13	N	VEP4-GW15-052313	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW15	MW	23-May-13	N	VEP4-GW15-052313	VOA	79-01-6	Trichloroethene	1.5	UG_L	0.1	0.5		Yes
EPI04-MW15	MW	23-May-13	N	VEP4-GW15-052313	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW15	MW	05-Jun-13	N	VEP4-GW15-0613	SVOA	123-91-1	1,4-Dioxane	0.472	UG_L	0.236	0.943	U	No
EPI04-MW15	MW	05-Jun-13	N	VEP4-GW15-0613	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW15	MW	05-Jun-13	N	VEP4-GW15-0613	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW15	MW	05-Jun-13	N	VEP4-GW15-0613	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	UJ	No
EPI04-MW15	MW	05-Jun-13	N	VEP4-GW15-0613	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW15	MW	05-Jun-13	N	VEP4-GW15-0613	VOA	79-01-6	Trichloroethene	2.3	UG_L	0.1	0.5		Yes
EPI04-MW15	MW	05-Jun-13	N	VEP4-GW15-0613	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW16	MW	16-May-13	N	VEP4-GW16-051613	SVOA	123-91-1	1,4-Dioxane	0.463	UG_L	0.231	0.926	U	No
EPI04-MW16	MW	16-May-13	N	VEP4-GW16-051613	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW16	MW	16-May-13	N	VEP4-GW16-051613	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW16	MW	16-May-13	N	VEP4-GW16-051613	VOA	127-18-4	Tetrachloroethene	0.27	UG_L	0.25	1	J	Yes
EPI04-MW16	MW	16-May-13	N	VEP4-GW16-051613	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW16	MW	16-May-13	N	VEP4-GW16-051613	VOA	79-01-6	Trichloroethene	12.2	UG_L	0.1	0.5		Yes
EPI04-MW16	MW	16-May-13	N	VEP4-GW16-051613	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW16	MW	10-Jun-13	N	VEP4-GW16-0613	SVOA	123-91-1	1,4-Dioxane	0.463	UG_L	0.231	0.926	U	No
EPI04-MW16	MW	10-Jun-13	N	VEP4-GW16-0613	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW16	MW	10-Jun-13	N	VEP4-GW16-0613	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW16	MW	10-Jun-13	N	VEP4-GW16-0613	VOA	127-18-4	Tetrachloroethene	0.34	UG_L	0.25	1	J	Yes
EPI04-MW16	MW	10-Jun-13	N	VEP4-GW16-0613	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW16	MW	10-Jun-13	N	VEP4-GW16-0613	VOA	79-01-6	Trichloroethene	14.7	UG_L	0.1	0.5		Yes
EPI04-MW16	MW	10-Jun-13	N	VEP4-GW16-0613	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW16	MW	11-Sep-14	N	VEP4-GW16-0914	VOA	75-35-4	1,1-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW16	MW	11-Sep-14	N	VEP4-GW16-0914	VOA	156-59-2	cis-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW16	MW	11-Sep-14	N	VEP4-GW16-0914	VOA	127-18-4	Tetrachloroethene	1	UG_L	0.5	2	U	No
EPI04-MW16	MW	11-Sep-14	N	VEP4-GW16-0914	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW16	MW	11-Sep-14	N	VEP4-GW16-0914	VOA	79-01-6	Trichloroethene	9.17	UG_L	0.2	1		Yes
EPI04-MW16	MW	11-Sep-14	N	VEP4-GW16-0914	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-MW17	MW	29-May-13	N	VEP4-GW17-052913	SVOA	123-91-1	1,4-Dioxane	0.5	UG_L	0.25	1	U	No
EPI04-MW17	MW	29-May-13	N	VEP4-GW17-052913	VOA	75-35-4	1,1-Dichloroethene	0.33	UG_L	0.25	1	J	Yes
EPI04-MW17	MW	29-May-13	N	VEP4-GW17-052913	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW17	MW	29-May-13	N	VEP4-GW17-052913	VOA	127-18-4	Tetrachloroethene	2.76	UG_L	0.25	1		Yes

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-MW17	MW	29-May-13	N	VEP4-GW17-052913	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW17	MW	29-May-13	N	VEP4-GW17-052913	VOA	79-01-6	Trichloroethene	112	UG_L	0.1	0.5		Yes
EPI04-MW17	MW	29-May-13	N	VEP4-GW17-052913	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW17	MW	10-Jun-13	N	VEP4-GW17-0613	SVOA	123-91-1	1,4-Dioxane	0.463	UG_L	0.231	0.926	U	No
EPI04-MW17	MW	10-Jun-13	N	VEP4-GW17-0613	VOA	75-35-4	1,1-Dichloroethene	0.3	UG_L	0.25	1	J	Yes
EPI04-MW17	MW	10-Jun-13	N	VEP4-GW17-0613	VOA	156-59-2	cis-1,2-Dichloroethene	0.28	UG_L	0.25	1	J	Yes
EPI04-MW17	MW	10-Jun-13	N	VEP4-GW17-0613	VOA	127-18-4	Tetrachloroethene	2.4	UG_L	0.25	1	J	Yes
EPI04-MW17	MW	10-Jun-13	N	VEP4-GW17-0613	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW17	MW	10-Jun-13	N	VEP4-GW17-0613	VOA	79-01-6	Trichloroethene	114	UG_L	0.1	0.5	J	Yes
EPI04-MW17	MW	10-Jun-13	N	VEP4-GW17-0613	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW17	MW	17-Sep-14	N	VEP4-GW17-0914	VOA	75-35-4	1,1-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW17	MW	17-Sep-14	N	VEP4-GW17-0914	VOA	156-59-2	cis-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW17	MW	17-Sep-14	N	VEP4-GW17-0914	VOA	127-18-4	Tetrachloroethene	2.14	UG_L	0.5	2		Yes
EPI04-MW17	MW	17-Sep-14	N	VEP4-GW17-0914	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW17	MW	17-Sep-14	N	VEP4-GW17-0914	VOA	79-01-6	Trichloroethene	98.1	UG_L	0.2	1		Yes
EPI04-MW17	MW	17-Sep-14	N	VEP4-GW17-0914	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-MW17	MW	10-Jun-13	FD	VEP4-GW17P-0613	SVOA	123-91-1	1,4-Dioxane	0.463	UG_L	0.231	0.926	U	No
EPI04-MW17	MW	10-Jun-13	FD	VEP4-GW17P-0613	VOA	75-35-4	1,1-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW17	MW	10-Jun-13	FD	VEP4-GW17P-0613	VOA	156-59-2	cis-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW17	MW	10-Jun-13	FD	VEP4-GW17P-0613	VOA	127-18-4	Tetrachloroethene	1.92	UG_L	0.5	2	J	Yes
EPI04-MW17	MW	10-Jun-13	FD	VEP4-GW17P-0613	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW17	MW	10-Jun-13	FD	VEP4-GW17P-0613	VOA	79-01-6	Trichloroethene	92.7	UG_L	0.2	1	J	Yes
EPI04-MW17	MW	10-Jun-13	FD	VEP4-GW17P-0613	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-MW17D	MW	26-Jun-13	N	VEP4-GW17D-062613	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW17D	MW	26-Jun-13	N	VEP4-GW17D-062613	VOA	156-59-2	cis-1,2-Dichloroethene	0.59	UG_L	0.25	1	J	Yes
EPI04-MW17D	MW	26-Jun-13	N	VEP4-GW17D-062613	VOA	127-18-4	Tetrachloroethene	1.06	UG_L	0.25	1		Yes
EPI04-MW17D	MW	26-Jun-13	N	VEP4-GW17D-062613	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW17D	MW	26-Jun-13	N	VEP4-GW17D-062613	VOA	79-01-6	Trichloroethene	63.9	UG_L	0.1	0.5		Yes
EPI04-MW17D	MW	26-Jun-13	N	VEP4-GW17D-062613	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW17D	MW	01-Jul-13	N	VEP4-GW17D-0713	SVOA	123-91-1	1,4-Dioxane	0.49	UG_L	0.245	0.98	U	No
EPI04-MW17D	MW	01-Jul-13	N	VEP4-GW17D-0713	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW17D	MW	01-Jul-13	N	VEP4-GW17D-0713	VOA	156-59-2	cis-1,2-Dichloroethene	0.6	UG_L	0.25	1	J	Yes
EPI04-MW17D	MW	01-Jul-13	N	VEP4-GW17D-0713	VOA	127-18-4	Tetrachloroethene	1.07	UG_L	0.25	1		Yes
EPI04-MW17D	MW	01-Jul-13	N	VEP4-GW17D-0713	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW17D	MW	01-Jul-13	N	VEP4-GW17D-0713	VOA	79-01-6	Trichloroethene	58.8	UG_L	0.1	0.5		Yes
EPI04-MW17D	MW	01-Jul-13	N	VEP4-GW17D-0713	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW17D	MW	17-Sep-14	N	VEP4-GW17D-0914	VOA	75-35-4	1,1-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW17D	MW	17-Sep-14	N	VEP4-GW17D-0914	VOA	156-59-2	cis-1,2-Dichloroethene	0.651	UG_L	0.5	2	J	Yes
EPI04-MW17D	MW	17-Sep-14	N	VEP4-GW17D-0914	VOA	127-18-4	Tetrachloroethene	1.01	UG_L	0.5	2	J	Yes
EPI04-MW17D	MW	17-Sep-14	N	VEP4-GW17D-0914	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW17D	MW	17-Sep-14	N	VEP4-GW17D-0914	VOA	79-01-6	Trichloroethene	47.6	UG_L	0.2	1		Yes
EPI04-MW17D	MW	17-Sep-14	N	VEP4-GW17D-0914	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-MW17D	MW	05-Jun-13	N	VEP4-SB17-0406	SVOA	123-91-1	1,4-Dioxane	33.4	UG_KG	16.7	66.9	U	No
EPI04-MW17D	MW	05-Jun-13	N	VEP4-SB17-0406	VOA	75-35-4	1,1-Dichloroethene	4.08	UG_KG	2.04	8.17	U	No
EPI04-MW17D	MW	05-Jun-13	N	VEP4-SB17-0406	VOA	156-59-2	cis-1,2-Dichloroethene	4.08	UG_KG	2.04	8.17	U	No
EPI04-MW17D	MW	05-Jun-13	N	VEP4-SB17-0406	VOA	127-18-4	Tetrachloroethene	4.08	UG_KG	2.04	8.17	U	No
EPI04-MW17D	MW	05-Jun-13	N	VEP4-SB17-0406	VOA	156-60-5	trans-1,2-Dichloroethene	4.08	UG_KG	2.04	8.17	U	No
EPI04-MW17D	MW	05-Jun-13	N	VEP4-SB17-0406	VOA	79-01-6	Trichloroethene	4.08	UG_KG	2.04	8.17	U	No
EPI04-MW17D	MW	05-Jun-13	N	VEP4-SB17-0406	VOA	75-01-4	Vinyl chloride	4.08	UG_KG	2.04	8.17	U	No
EPI04-MW17D	MW	05-Jun-13	N	VEP4-SS17-0001	SVOA	123-91-1	1,4-Dioxane	379	UG_KG	190	758	U	No
EPI04-MW17D	MW	05-Jun-13	N	VEP4-SS17-0001	VOA	75-35-4	1,1-Dichloroethene	3.29	UG_KG	1.64	6.57	U	No
EPI04-MW17D	MW	05-Jun-13	N	VEP4-SS17-0001	VOA	156-59-2	cis-1,2-Dichloroethene	3.29	UG_KG	1.64	6.57	U	No
EPI04-MW17D	MW	05-Jun-13	N	VEP4-SS17-0001	VOA	127-18-4	Tetrachloroethene	3.29	UG_KG	1.64	6.57	U	No
EPI04-MW17D	MW	05-Jun-13	N	VEP4-SS17-0001	VOA	156-60-5	trans-1,2-Dichloroethene	3.29	UG_KG	1.64	6.57	U	No
EPI04-MW17D	MW	05-Jun-13	N	VEP4-SS17-0001	VOA	79-01-6	Trichloroethene	3.29	UG_KG	1.64	6.57	U	No
EPI04-MW17D	MW	05-Jun-13	N	VEP4-SS17-0001	VOA	75-01-4	Vinyl chloride	3.29	UG_KG	1.64	6.57	U	No
EPI04-MW17D	MW	05-Jun-13	FD	VEP4-SS17P-0001	SVOA	123-91-1	1,4-Dioxane	353	UG_KG	177	706	U	No
EPI04-MW17D	MW	05-Jun-13	FD	VEP4-SS17P-0001	VOA	75-35-4	1,1-Dichloroethene	2.27	UG_KG	1.13	4.54	U	No
EPI04-MW17D	MW	05-Jun-13	FD	VEP4-SS17P-0001	VOA	156-59-2	cis-1,2-Dichloroethene	2.27	UG_KG	1.13	4.54	U	No
EPI04-MW17D	MW	05-Jun-13	FD	VEP4-SS17P-0001	VOA	127-18-4	Tetrachloroethene	2.27	UG_KG	1.13	4.54	U	No
EPI04-MW17D	MW	05-Jun-13	FD	VEP4-SS17P-0001	VOA	156-60-5	trans-1,2-Dichloroethene	2.27	UG_KG	1.13	4.54	U	No
EPI04-MW17D	MW	05-Jun-13	FD	VEP4-SS17P-0001	VOA	79-01-6	Trichloroethene	2.27	UG_KG	1.13	4.54	U	No
EPI04-MW17D	MW	05-Jun-13	FD	VEP4-SS17P-0001	VOA	75-01-4	Vinyl chloride	2.27	UG_KG	1.13	4.54	U	No
EPI04-MW18	MW	21-May-13	N	VEP4-GW18-052113	SVOA	123-91-1	1,4-Dioxane	0.467	UG_L	0.234	0.935	U	No
EPI04-MW18	MW	21-May-13	N	VEP4-GW18-052113	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW18	MW	21-May-13	N	VEP4-GW18-052113	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW18	MW	21-May-13	N	VEP4-GW18-052113	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW18	MW	21-May-13	N	VEP4-GW18-052113	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW18	MW	21-May-13	N	VEP4-GW18-052113	VOA	79-01-6	Trichloroethene	2.87	UG_L	0.1	0.5		Yes
EPI04-MW18	MW	21-May-13	N	VEP4-GW18-052113	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW18	MW	07-Jun-13	N	VEP4-GW18-0613	SVOA	123-91-1	1,4-Dioxane	0.49	UG_L	0.245	0.98	U	No
EPI04-MW18	MW	07-Jun-13	N	VEP4-GW18-0613	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW18	MW	07-Jun-13	N	VEP4-GW18-0613	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW18	MW	07-Jun-13	N	VEP4-GW18-0613	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW18	MW	07-Jun-13	N	VEP4-GW18-0613	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW18	MW	07-Jun-13	N	VEP4-GW18-0613	VOA	79-01-6	Trichloroethene	2.24	UG_L	0.1	0.5		Yes
EPI04-MW18	MW	07-Jun-13	N	VEP4-GW18-0613	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW18	MW	15-Sep-14	N	VEP4-GW18-0914	VOA	75-35-4	1,1-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW18	MW	15-Sep-14	N	VEP4-GW18-0914	VOA	156-59-2	cis-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW18	MW	15-Sep-14	N	VEP4-GW18-0914	VOA	127-18-4	Tetrachloroethene	1	UG_L	0.5	2	U	No
EPI04-MW18	MW	15-Sep-14	N	VEP4-GW18-0914	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW18	MW	15-Sep-14	N	VEP4-GW18-0914	VOA	79-01-6	Trichloroethene	2.3	UG_L	0.2	1		Yes
EPI04-MW18	MW	15-Sep-14	N	VEP4-GW18-0914	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-MW19	MW	14-May-13	N	VEP4-GW19-051413	SVOA	123-91-1	1,4-Dioxane	0.463	UG_L	0.231	0.926	U	No
EPI04-MW19	MW	14-May-13	N	VEP4-GW19-051413	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW19	MW	14-May-13	N	VEP4-GW19-051413	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW19	MW	14-May-13	N	VEP4-GW19-051413	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW19	MW	14-May-13	N	VEP4-GW19-051413	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW19	MW	14-May-13	N	VEP4-GW19-051413	VOA	79-01-6	Trichloroethene	2.74	UG_L	0.1	0.5		Yes
EPI04-MW19	MW	14-May-13	N	VEP4-GW19-051413	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW19	MW	06-Jun-13	N	VEP4-GW19-0613	SVOA	123-91-1	1,4-Dioxane	0.463	UG_L	0.231	0.926	U	No
EPI04-MW19	MW	06-Jun-13	N	VEP4-GW19-0613	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW19	MW	06-Jun-13	N	VEP4-GW19-0613	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW19	MW	06-Jun-13	N	VEP4-GW19-0613	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW19	MW	06-Jun-13	N	VEP4-GW19-0613	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW19	MW	06-Jun-13	N	VEP4-GW19-0613	VOA	79-01-6	Trichloroethene	2.7	UG_L	0.1	0.5		Yes
EPI04-MW19	MW	06-Jun-13	N	VEP4-GW19-0613	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW19	MW	15-Sep-14	N	VEP4-GW19-0914	VOA	75-35-4	1,1-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW19	MW	15-Sep-14	N	VEP4-GW19-0914	VOA	156-59-2	cis-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW19	MW	15-Sep-14	N	VEP4-GW19-0914	VOA	127-18-4	Tetrachloroethene	1	UG_L	0.5	2	U	No
EPI04-MW19	MW	15-Sep-14	N	VEP4-GW19-0914	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW19	MW	15-Sep-14	N	VEP4-GW19-0914	VOA	79-01-6	Trichloroethene	3.27	UG_L	0.2	1		Yes
EPI04-MW19	MW	15-Sep-14	N	VEP4-GW19-0914	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-MW20	MW	10-Jun-13	N	VEP4-GW20-061013	SVOA	123-91-1	1,4-Dioxane	0.472	UG_L	0.236	0.943	QU	No
EPI04-MW20	MW	10-Jun-13	N	VEP4-GW20-061013	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW20	MW	10-Jun-13	N	VEP4-GW20-061013	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW20	MW	10-Jun-13	N	VEP4-GW20-061013	VOA	127-18-4	Tetrachloroethene	1.22	UG_L	0.25	1		Yes

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-MW20	MW	10-Jun-13	N	VEP4-GW20-061013	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW20	MW	10-Jun-13	N	VEP4-GW20-061013	VOA	79-01-6	Trichloroethene	45.9	UG_L	0.1	0.5		Yes
EPI04-MW20	MW	10-Jun-13	N	VEP4-GW20-061013	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW20	MW	17-Jun-13	N	VEP4-GW20-0613	SVOA	123-91-1	1,4-Dioxane	0.467	UG_L	0.234	0.935	U	No
EPI04-MW20	MW	17-Jun-13	N	VEP4-GW20-0613	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW20	MW	17-Jun-13	N	VEP4-GW20-0613	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW20	MW	17-Jun-13	N	VEP4-GW20-0613	VOA	127-18-4	Tetrachloroethene	1.06	UG_L	0.25	1		Yes
EPI04-MW20	MW	17-Jun-13	N	VEP4-GW20-0613	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW20	MW	17-Jun-13	N	VEP4-GW20-0613	VOA	79-01-6	Trichloroethene	52.2	UG_L	0.1	0.5		Yes
EPI04-MW20	MW	17-Jun-13	N	VEP4-GW20-0613	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW20	MW	12-Sep-14	N	VEP4-GW20-0914	VOA	75-35-4	1,1-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW20	MW	12-Sep-14	N	VEP4-GW20-0914	VOA	156-59-2	cis-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW20	MW	12-Sep-14	N	VEP4-GW20-0914	VOA	127-18-4	Tetrachloroethene	0.574	UG_L	0.5	2	J	Yes
EPI04-MW20	MW	12-Sep-14	N	VEP4-GW20-0914	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW20	MW	12-Sep-14	N	VEP4-GW20-0914	VOA	79-01-6	Trichloroethene	30.6	UG_L	0.2	1		Yes
EPI04-MW20	MW	12-Sep-14	N	VEP4-GW20-0914	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-MW21	MW	21-Jun-13	N	VEP4-GW21-062113	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW21	MW	21-Jun-13	N	VEP4-GW21-062113	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW21	MW	21-Jun-13	N	VEP4-GW21-062113	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW21	MW	21-Jun-13	N	VEP4-GW21-062113	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW21	MW	21-Jun-13	N	VEP4-GW21-062113	VOA	79-01-6	Trichloroethene	4.07	UG_L	0.1	0.5		Yes
EPI04-MW21	MW	21-Jun-13	N	VEP4-GW21-062113	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW21	MW	16-Jul-13	N	VEP4-GW21-0713	SVOA	123-91-1	1,4-Dioxane	0.495	UG_L	0.248	0.99	U	No
EPI04-MW21	MW	16-Jul-13	N	VEP4-GW21-0713	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW21	MW	16-Jul-13	N	VEP4-GW21-0713	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW21	MW	16-Jul-13	N	VEP4-GW21-0713	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW21	MW	16-Jul-13	N	VEP4-GW21-0713	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW21	MW	16-Jul-13	N	VEP4-GW21-0713	VOA	79-01-6	Trichloroethene	6.8	UG_L	0.1	0.5		Yes
EPI04-MW21	MW	16-Jul-13	N	VEP4-GW21-0713	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	UJ	No
EPI04-MW21	MW	11-Sep-14	N	VEP4-GW21-0914	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW21	MW	11-Sep-14	N	VEP4-GW21-0914	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW21	MW	11-Sep-14	N	VEP4-GW21-0914	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW21	MW	11-Sep-14	N	VEP4-GW21-0914	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW21	MW	11-Sep-14	N	VEP4-GW21-0914	VOA	79-01-6	Trichloroethene	2.1	UG_L	0.1	0.5		Yes
EPI04-MW21	MW	11-Sep-14	N	VEP4-GW21-0914	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW22	MW	19-Jun-13	N	VEP4-GW22-061913	SVOA	123-91-1	1,4-Dioxane	0.476	UG_L	0.238	0.952	U	No
EPI04-MW22	MW	19-Jun-13	N	VEP4-GW22-061913	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW22	MW	19-Jun-13	N	VEP4-GW22-061913	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW22	MW	19-Jun-13	N	VEP4-GW22-061913	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW22	MW	19-Jun-13	N	VEP4-GW22-061913	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW22	MW	19-Jun-13	N	VEP4-GW22-061913	VOA	79-01-6	Trichloroethene	0.94	UG_L	0.1	0.5		Yes
EPI04-MW22	MW	19-Jun-13	N	VEP4-GW22-061913	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW22	MW	17-Jul-13	N	VEP4-GW22-0713	SVOA	123-91-1	1,4-Dioxane	0.472	UG_L	0.236	0.943	U	No
EPI04-MW22	MW	17-Jul-13	N	VEP4-GW22-0713	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW22	MW	17-Jul-13	N	VEP4-GW22-0713	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW22	MW	17-Jul-13	N	VEP4-GW22-0713	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW22	MW	17-Jul-13	N	VEP4-GW22-0713	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW22	MW	17-Jul-13	N	VEP4-GW22-0713	VOA	79-01-6	Trichloroethene	1.73	UG_L	0.1	0.5		Yes
EPI04-MW22	MW	17-Jul-13	N	VEP4-GW22-0713	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW22	MW	11-Sep-14	N	VEP4-GW22-0914	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW22	MW	11-Sep-14	N	VEP4-GW22-0914	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW22	MW	11-Sep-14	N	VEP4-GW22-0914	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW22	MW	11-Sep-14	N	VEP4-GW22-0914	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW22	MW	11-Sep-14	N	VEP4-GW22-0914	VOA	79-01-6	Trichloroethene	0.613	UG_L	0.1	0.5		Yes
EPI04-MW22	MW	11-Sep-14	N	VEP4-GW22-0914	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW22	MW	11-Sep-14	FD	VEP4-GW22P-0914	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW22	MW	11-Sep-14	FD	VEP4-GW22P-0914	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW22	MW	11-Sep-14	FD	VEP4-GW22P-0914	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW22	MW	11-Sep-14	FD	VEP4-GW22P-0914	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW22	MW	11-Sep-14	FD	VEP4-GW22P-0914	VOA	79-01-6	Trichloroethene	0.525	UG_L	0.1	0.5		Yes
EPI04-MW22	MW	11-Sep-14	FD	VEP4-GW22P-0914	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW23	MW	19-Jun-13	N	VEP4-GW23-061913	SVOA	123-91-1	1,4-Dioxane	0.481	UG_L	0.24	0.962	U	No
EPI04-MW23	MW	19-Jun-13	N	VEP4-GW23-061913	VOA	75-35-4	1,1-Dichloroethene	0.38	UG_L	0.25	1	J	Yes
EPI04-MW23	MW	19-Jun-13	N	VEP4-GW23-061913	VOA	156-59-2	cis-1,2-Dichloroethene	1.59	UG_L	0.25	1		Yes
EPI04-MW23	MW	19-Jun-13	N	VEP4-GW23-061913	VOA	127-18-4	Tetrachloroethene	0.47	UG_L	0.25	1	J	Yes
EPI04-MW23	MW	19-Jun-13	N	VEP4-GW23-061913	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW23	MW	19-Jun-13	N	VEP4-GW23-061913	VOA	79-01-6	Trichloroethene	51.4	UG_L	0.1	0.5		Yes
EPI04-MW23	MW	19-Jun-13	N	VEP4-GW23-061913	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW23	MW	23-Jul-13	N	VEP4-GW23-0713	SVOA	123-91-1	1,4-Dioxane	0.49	UG_L	0.245	0.98	U	No
EPI04-MW23	MW	23-Jul-13	N	VEP4-GW23-0713	VOA	75-35-4	1,1-Dichloroethene	0.34	UG_L	0.25	1	J	Yes
EPI04-MW23	MW	23-Jul-13	N	VEP4-GW23-0713	VOA	156-59-2	cis-1,2-Dichloroethene	1.04	UG_L	0.25	1		Yes
EPI04-MW23	MW	23-Jul-13	N	VEP4-GW23-0713	VOA	127-18-4	Tetrachloroethene	1.32	UG_L	0.25	1		Yes
EPI04-MW23	MW	23-Jul-13	N	VEP4-GW23-0713	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW23	MW	23-Jul-13	N	VEP4-GW23-0713	VOA	79-01-6	Trichloroethene	71	UG_L	0.1	0.5		Yes
EPI04-MW23	MW	23-Jul-13	N	VEP4-GW23-0713	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW23	MW	17-Sep-14	N	VEP4-GW23-0914	VOA	75-35-4	1,1-Dichloroethene	0.754	UG_L	0.5	2	J	Yes
EPI04-MW23	MW	17-Sep-14	N	VEP4-GW23-0914	VOA	156-59-2	cis-1,2-Dichloroethene	1.33	UG_L	0.5	2	J	Yes
EPI04-MW23	MW	17-Sep-14	N	VEP4-GW23-0914	VOA	127-18-4	Tetrachloroethene	1.62	UG_L	0.5	2	J	Yes
EPI04-MW23	MW	17-Sep-14	N	VEP4-GW23-0914	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW23	MW	17-Sep-14	N	VEP4-GW23-0914	VOA	79-01-6	Trichloroethene	84.1	UG_L	0.2	1		Yes
EPI04-MW23	MW	17-Sep-14	N	VEP4-GW23-0914	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-MW24	MW	20-Jun-13	N	VEP4-GW24-062013	VOA	75-35-4	1,1-Dichloroethene	1.06	UG_L	0.25	1		Yes
EPI04-MW24	MW	20-Jun-13	N	VEP4-GW24-062013	VOA	156-59-2	cis-1,2-Dichloroethene	0.6	UG_L	0.25	1	J	Yes
EPI04-MW24	MW	20-Jun-13	N	VEP4-GW24-062013	VOA	127-18-4	Tetrachloroethene	3.38	UG_L	0.25	1		Yes
EPI04-MW24	MW	20-Jun-13	N	VEP4-GW24-062013	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW24	MW	20-Jun-13	N	VEP4-GW24-062013	VOA	79-01-6	Trichloroethene	166	UG_L	0.2	1	D	Yes
EPI04-MW24	MW	20-Jun-13	N	VEP4-GW24-062013	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW24	MW	24-Jul-13	N	VEP4-GW24-0713	SVOA	123-91-1	1,4-Dioxane	0.481	UG_L	0.24	0.962	U	No
EPI04-MW24	MW	24-Jul-13	N	VEP4-GW24-0713	VOA	75-35-4	1,1-Dichloroethene	1.06	UG_L	0.5	2	J	Yes
EPI04-MW24	MW	24-Jul-13	N	VEP4-GW24-0713	VOA	156-59-2	cis-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW24	MW	24-Jul-13	N	VEP4-GW24-0713	VOA	127-18-4	Tetrachloroethene	5.14	UG_L	0.5	2		Yes
EPI04-MW24	MW	24-Jul-13	N	VEP4-GW24-0713	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW24	MW	24-Jul-13	N	VEP4-GW24-0713	VOA	79-01-6	Trichloroethene	246	UG_L	0.2	1		Yes
EPI04-MW24	MW	24-Jul-13	N	VEP4-GW24-0713	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-MW24	MW	23-Sep-14	N	VEP4-GW24-0914	VOA	75-35-4	1,1-Dichloroethene	1.15	UG_L	0.5	2	J	Yes
EPI04-MW24	MW	23-Sep-14	N	VEP4-GW24-0914	VOA	156-59-2	cis-1,2-Dichloroethene	0.719	UG_L	0.5	2	J	Yes
EPI04-MW24	MW	23-Sep-14	N	VEP4-GW24-0914	VOA	127-18-4	Tetrachloroethene	5.87	UG_L	0.5	2		Yes
EPI04-MW24	MW	23-Sep-14	N	VEP4-GW24-0914	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW24	MW	23-Sep-14	N	VEP4-GW24-0914	VOA	79-01-6	Trichloroethene	334	UG_L	0.2	1		Yes
EPI04-MW24	MW	23-Sep-14	N	VEP4-GW24-0914	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-MW24	MW	23-Sep-14	FD	VEP4-GW24P-0914	VOA	75-35-4	1,1-Dichloroethene	1.29	UG_L	0.5	2	J	Yes
EPI04-MW24	MW	23-Sep-14	FD	VEP4-GW24P-0914	VOA	156-59-2	cis-1,2-Dichloroethene	0.648	UG_L	0.5	2	J	Yes
EPI04-MW24	MW	23-Sep-14	FD	VEP4-GW24P-0914	VOA	127-18-4	Tetrachloroethene	5.33	UG_L	0.5	2		Yes
EPI04-MW24	MW	23-Sep-14	FD	VEP4-GW24P-0914	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW24	MW	23-Sep-14	FD	VEP4-GW24P-0914	VOA	79-01-6	Trichloroethene	317	UG_L	0.2	1		Yes
EPI04-MW24	MW	23-Sep-14	FD	VEP4-GW24P-0914	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-MW24D	MW	26-Sep-14	N	VEP4-GW24D-0914	VOA	75-35-4	1,1-Dichloroethene	1	UG_L	0.5	2	U	No

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-MW24D	MW	26-Sep-14	N	VEP4-GW24D-0914	VOA	156-59-2	cis-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW24D	MW	26-Sep-14	N	VEP4-GW24D-0914	VOA	127-18-4	Tetrachloroethene	1.52	UG_L	0.5	2	J	Yes
EPI04-MW24D	MW	26-Sep-14	N	VEP4-GW24D-0914	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW24D	MW	26-Sep-14	N	VEP4-GW24D-0914	VOA	79-01-6	Trichloroethene	98.2	UG_L	0.2	1		Yes
EPI04-MW24D	MW	26-Sep-14	N	VEP4-GW24D-0914	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-MW25	MW	26-Sep-13	N	VEP4-GW25-0913	SVOA	123-91-1	1,4-Dioxane	0.463	UG_L	0.231	0.926	UJ	No
EPI04-MW25	MW	26-Sep-13	N	VEP4-GW25-0913	VOA	75-35-4	1,1-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW25	MW	26-Sep-13	N	VEP4-GW25-0913	VOA	156-59-2	cis-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW25	MW	26-Sep-13	N	VEP4-GW25-0913	VOA	127-18-4	Tetrachloroethene	2.84	UG_L	0.5	2		Yes
EPI04-MW25	MW	26-Sep-13	N	VEP4-GW25-0913	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW25	MW	26-Sep-13	N	VEP4-GW25-0913	VOA	79-01-6	Trichloroethene	143	UG_L	0.2	1		Yes
EPI04-MW25	MW	26-Sep-13	N	VEP4-GW25-0913	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-MW25	MW	18-Sep-14	N	VEP4-GW25-0914	VOA	75-35-4	1,1-Dichloroethene	0.527	UG_L	0.5	2	J	Yes
EPI04-MW25	MW	18-Sep-14	N	VEP4-GW25-0914	VOA	156-59-2	cis-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW25	MW	18-Sep-14	N	VEP4-GW25-0914	VOA	127-18-4	Tetrachloroethene	2.35	UG_L	0.5	2		Yes
EPI04-MW25	MW	18-Sep-14	N	VEP4-GW25-0914	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW25	MW	18-Sep-14	N	VEP4-GW25-0914	VOA	79-01-6	Trichloroethene	157	UG_L	0.2	1		Yes
EPI04-MW25	MW	18-Sep-14	N	VEP4-GW25-0914	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-MW25D	MW	23-Sep-14	N	VEP4-GW25D-0914	VOA	75-35-4	1,1-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW25D	MW	23-Sep-14	N	VEP4-GW25D-0914	VOA	156-59-2	cis-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW25D	MW	23-Sep-14	N	VEP4-GW25D-0914	VOA	127-18-4	Tetrachloroethene	1.5	UG_L	0.5	2	J	Yes
EPI04-MW25D	MW	23-Sep-14	N	VEP4-GW25D-0914	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW25D	MW	23-Sep-14	N	VEP4-GW25D-0914	VOA	79-01-6	Trichloroethene	101	UG_L	0.2	1		Yes
EPI04-MW25D	MW	23-Sep-14	N	VEP4-GW25D-0914	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-MW26	MW	24-Sep-13	N	VEP4-GW26-0913	SVOA	123-91-1	1,4-Dioxane	0.463	UG_L	0.231	0.926	U	No
EPI04-MW26	MW	24-Sep-13	N	VEP4-GW26-0913	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW26	MW	24-Sep-13	N	VEP4-GW26-0913	VOA	156-59-2	cis-1,2-Dichloroethene	0.73	UG_L	0.25	1	J	Yes
EPI04-MW26	MW	24-Sep-13	N	VEP4-GW26-0913	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW26	MW	24-Sep-13	N	VEP4-GW26-0913	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW26	MW	24-Sep-13	N	VEP4-GW26-0913	VOA	79-01-6	Trichloroethene	12.6	UG_L	0.1	0.5		Yes
EPI04-MW26	MW	24-Sep-13	N	VEP4-GW26-0913	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW26	MW	12-Sep-14	N	VEP4-GW26-0914	VOA	75-35-4	1,1-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW26	MW	12-Sep-14	N	VEP4-GW26-0914	VOA	156-59-2	cis-1,2-Dichloroethene	0.507	UG_L	0.5	2	J	Yes
EPI04-MW26	MW	12-Sep-14	N	VEP4-GW26-0914	VOA	127-18-4	Tetrachloroethene	1	UG_L	0.5	2	U	No
EPI04-MW26	MW	12-Sep-14	N	VEP4-GW26-0914	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW26	MW	12-Sep-14	N	VEP4-GW26-0914	VOA	79-01-6	Trichloroethene	6.52	UG_L	0.2	1		Yes
EPI04-MW26	MW	12-Sep-14	N	VEP4-GW26-0914	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-MW27	MW	26-Sep-13	N	VEP4-GW27-0913	SVOA	123-91-1	1,4-Dioxane	0.463	UG_L	0.231	0.926	UJ	No
EPI04-MW27	MW	26-Sep-13	N	VEP4-GW27-0913	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW27	MW	26-Sep-13	N	VEP4-GW27-0913	VOA	156-59-2	cis-1,2-Dichloroethene	1.43	UG_L	0.25	1		Yes
EPI04-MW27	MW	26-Sep-13	N	VEP4-GW27-0913	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW27	MW	26-Sep-13	N	VEP4-GW27-0913	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW27	MW	26-Sep-13	N	VEP4-GW27-0913	VOA	79-01-6	Trichloroethene	7.45	UG_L	0.1	0.5		Yes
EPI04-MW27	MW	26-Sep-13	N	VEP4-GW27-0913	VOA	75-01-4	Vinyl chloride	0.23	UG_L	0.14	0.5	J	Yes
EPI04-MW27	MW	10-Sep-14	N	VEP4-GW27-0914	VOA	75-35-4	1,1-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW27	MW	10-Sep-14	N	VEP4-GW27-0914	VOA	156-59-2	cis-1,2-Dichloroethene	0.666	UG_L	0.5	2	J	Yes
EPI04-MW27	MW	10-Sep-14	N	VEP4-GW27-0914	VOA	127-18-4	Tetrachloroethene	1	UG_L	0.5	2	U	No
EPI04-MW27	MW	10-Sep-14	N	VEP4-GW27-0914	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW27	MW	10-Sep-14	N	VEP4-GW27-0914	VOA	79-01-6	Trichloroethene	2.81	UG_L	0.2	1		Yes
EPI04-MW27	MW	10-Sep-14	N	VEP4-GW27-0914	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-MW28	MW	09-Sep-14	N	VEP4-GW28-0914	VOA	75-35-4	1,1-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW28	MW	09-Sep-14	N	VEP4-GW28-0914	VOA	156-59-2	cis-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW28	MW	09-Sep-14	N	VEP4-GW28-0914	VOA	127-18-4	Tetrachloroethene	1	UG_L	0.5	2	U	No
EPI04-MW28	MW	09-Sep-14	N	VEP4-GW28-0914	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW28	MW	09-Sep-14	N	VEP4-GW28-0914	VOA	79-01-6	Trichloroethene	11.9	UG_L	0.2	1		Yes
EPI04-MW28	MW	09-Sep-14	N	VEP4-GW28-0914	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-MW28	MW	02-Oct-13	N	VEP4-GW28-1013	SVOA	123-91-1	1,4-Dioxane	0.463	UG_L	0.231	0.926	U	No
EPI04-MW28	MW	02-Oct-13	N	VEP4-GW28-1013	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW28	MW	02-Oct-13	N	VEP4-GW28-1013	VOA	156-59-2	cis-1,2-Dichloroethene	0.78	UG_L	0.25	1	J	Yes
EPI04-MW28	MW	02-Oct-13	N	VEP4-GW28-1013	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW28	MW	02-Oct-13	N	VEP4-GW28-1013	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW28	MW	02-Oct-13	N	VEP4-GW28-1013	VOA	79-01-6	Trichloroethene	20.5	UG_L	0.1	0.5		Yes
EPI04-MW28	MW	02-Oct-13	N	VEP4-GW28-1013	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW28D	MW	26-Sep-14	N	VEP4-GW28D-0914	VOA	75-35-4	1,1-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW28D	MW	26-Sep-14	N	VEP4-GW28D-0914	VOA	156-59-2	cis-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW28D	MW	26-Sep-14	N	VEP4-GW28D-0914	VOA	127-18-4	Tetrachloroethene	1	UG_L	0.5	2	U	No
EPI04-MW28D	MW	26-Sep-14	N	VEP4-GW28D-0914	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW28D	MW	26-Sep-14	N	VEP4-GW28D-0914	VOA	79-01-6	Trichloroethene	1.01	UG_L	0.2	1		Yes
EPI04-MW28D	MW	26-Sep-14	N	VEP4-GW28D-0914	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-MW29	MW	10-Sep-14	N	VEP4-GW29-0914	VOA	75-35-4	1,1-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW29	MW	10-Sep-14	N	VEP4-GW29-0914	VOA	156-59-2	cis-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW29	MW	10-Sep-14	N	VEP4-GW29-0914	VOA	127-18-4	Tetrachloroethene	1	UG_L	0.5	2	U	No
EPI04-MW29	MW	10-Sep-14	N	VEP4-GW29-0914	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW29	MW	10-Sep-14	N	VEP4-GW29-0914	VOA	79-01-6	Trichloroethene	2.56	UG_L	0.2	1		Yes
EPI04-MW29	MW	10-Sep-14	N	VEP4-GW29-0914	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-MW29	MW	02-Oct-13	N	VEP4-GW29-1013	SVOA	123-91-1	1,4-Dioxane	0.481	UG_L	0.24	0.962	U	No
EPI04-MW29	MW	02-Oct-13	N	VEP4-GW29-1013	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW29	MW	02-Oct-13	N	VEP4-GW29-1013	VOA	156-59-2	cis-1,2-Dichloroethene	0.36	UG_L	0.25	1	J	Yes
EPI04-MW29	MW	02-Oct-13	N	VEP4-GW29-1013	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW29	MW	02-Oct-13	N	VEP4-GW29-1013	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW29	MW	02-Oct-13	N	VEP4-GW29-1013	VOA	79-01-6	Trichloroethene	4.15	UG_L	0.1	0.5		Yes
EPI04-MW29	MW	02-Oct-13	N	VEP4-GW29-1013	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW30	MW	24-Sep-13	N	VEP4-GW30-0913	SVOA	123-91-1	1,4-Dioxane	0.463	UG_L	0.231	0.926	U	No
EPI04-MW30	MW	24-Sep-13	N	VEP4-GW30-0913	VOA	75-35-4	1,1-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW30	MW	24-Sep-13	N	VEP4-GW30-0913	VOA	156-59-2	cis-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW30	MW	24-Sep-13	N	VEP4-GW30-0913	VOA	127-18-4	Tetrachloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW30	MW	24-Sep-13	N	VEP4-GW30-0913	VOA	156-60-5	trans-1,2-Dichloroethene	0.5	UG_L	0.25	1	U	No
EPI04-MW30	MW	24-Sep-13	N	VEP4-GW30-0913	VOA	79-01-6	Trichloroethene	1.88	UG_L	0.1	0.5		Yes
EPI04-MW30	MW	24-Sep-13	N	VEP4-GW30-0913	VOA	75-01-4	Vinyl chloride	0.2	UG_L	0.14	0.5	U	No
EPI04-MW30	MW	10-Sep-14	N	VEP4-GW30-0914	VOA	75-35-4	1,1-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW30	MW	10-Sep-14	N	VEP4-GW30-0914	VOA	156-59-2	cis-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW30	MW	10-Sep-14	N	VEP4-GW30-0914	VOA	127-18-4	Tetrachloroethene	1	UG_L	0.5	2	U	No
EPI04-MW30	MW	10-Sep-14	N	VEP4-GW30-0914	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW30	MW	10-Sep-14	N	VEP4-GW30-0914	VOA	79-01-6	Trichloroethene	1.32	UG_L	0.2	1		Yes
EPI04-MW30	MW	10-Sep-14	N	VEP4-GW30-0914	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-MW31	MW	26-Sep-14	N	VEP4-GW31-0914	VOA	75-35-4	1,1-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW31	MW	26-Sep-14	N	VEP4-GW31-0914	VOA	156-59-2	cis-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW31	MW	26-Sep-14	N	VEP4-GW31-0914	VOA	127-18-4	Tetrachloroethene	1	UG_L	0.5	2	U	No
EPI04-MW31	MW	26-Sep-14	N	VEP4-GW31-0914	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW31	MW	26-Sep-14	N	VEP4-GW31-0914	VOA	79-01-6	Trichloroethene	0.4	UG_L	0.2	1	U	No
EPI04-MW31	MW	26-Sep-14	N	VEP4-GW31-0914	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-MW32	MW	23-Sep-14	N	VEP4-GW32-0914	VOA	75-35-4	1,1-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW32	MW	23-Sep-14	N	VEP4-GW32-0914	VOA	156-59-2	cis-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW32	MW	23-Sep-14	N	VEP4-GW32-0914	VOA	127-18-4	Tetrachloroethene	1	UG_L	0.5	2	U	No
EPI04-MW32	MW	23-Sep-14	N	VEP4-GW32-0914	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW32	MW	23-Sep-14	N	VEP4-GW32-0914	VOA	79-01-6	Trichloroethene	0.4	UG_L	0.2	1	U	No
EPI04-MW32	MW	23-Sep-14	N	VEP4-GW32-0914	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-MW33	MW	26-Sep-14	N	VEP4-GW33-0914	VOA	75-35-4	1,1-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW33	MW	26-Sep-14	N	VEP4-GW33-0914	VOA	156-59-2	cis-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW33	MW	26-Sep-14	N	VEP4-GW33-0914	VOA	127-18-4	Tetrachloroethene	1	UG_L	0.5	2	U	No
EPI04-MW33	MW	26-Sep-14	N	VEP4-GW33-0914	VOA	156-60-5	trans-1,2-Dichloroethene	1	UG_L	0.5	2	U	No
EPI04-MW33	MW	26-Sep-14	N	VEP4-GW33-0914	VOA	79-01-6	Trichloroethene	0.4	UG_L	0.2	1	U	No
EPI04-MW33	MW	26-Sep-14	N	VEP4-GW33-0914	VOA	75-01-4	Vinyl chloride	0.4	UG_L	0.28	1	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	METAL	7429-90-5	Aluminum	9060	MG_KG		21.3	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	METAL	7440-36-0	Antimony	6.4	MG_KG		6.4	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	METAL	7440-38-2	Arsenic	1.1	MG_KG		1.1	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	METAL	7440-39-3	Barium	46.9	MG_KG		21.3	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	METAL	7440-41-7	Beryllium	0.53	MG_KG		0.53	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	METAL	7440-43-9	Cadmium	0.53	MG_KG		0.53	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	METAL	7440-70-2	Calcium	14100	MG_KG		531	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	METAL	7440-47-3	Chromium	16.2	MG_KG		1.1	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	METAL	7440-48-4	Cobalt	7.9	MG_KG		5.3	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	METAL	7440-50-8	Copper	45	MG_KG		2.7	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	METAL	57-12-5	Cyanide	2.7	MG_KG		2.7	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	METAL	7439-89-6	Iron	21400	MG_KG		10.6	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	METAL	7439-92-1	Lead	1.6	MG_KG		1.1	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	METAL	7439-95-4	Magnesium	4890	MG_KG		531	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	METAL	7439-96-5	Manganese	308	MG_KG		1.6	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	METAL	7439-97-6	Mercury	0.11	MG_KG		0.11	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	METAL	7440-02-0	Nickel	6.6	MG_KG		4.3	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	METAL	7440-09-7	Potassium	531	MG_KG		531	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	METAL	7782-49-2	Selenium	3.7	MG_KG		3.7	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	METAL	7440-22-4	Silver	1.1	MG_KG		1.1	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	METAL	7440-23-5	Sodium	470	MG_KG		531	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	METAL	7440-28-0	Thallium	0.53	MG_KG		0.53	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	METAL	7440-62-2	Vanadium	99.4	MG_KG		5.3	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	METAL	7440-66-6	Zinc	18.7	MG_KG		6.4		Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	72-54-8	4,4'-DDD	3.5	UG_KG		3.5	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	72-55-9	4,4'-DDE	3.5	UG_KG		3.5	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	50-29-3	4,4'-DDT	3.5	UG_KG		3.5	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	309-00-2	Aldrin	1.8	UG_KG		1.8	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	319-84-6	alpha-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	5103-71-9	alpha-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	319-85-7	beta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	319-86-8	delta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	60-57-1	Dieldrin	3.5	UG_KG		3.5	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	959-98-8	Endosulfan I	1.8	UG_KG		1.8	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	33213-65-9	Endosulfan II	3.5	UG_KG		3.5	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	1031-07-8	Endosulfan sulfate	3.5	UG_KG		3.5	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	72-20-8	Endrin	3.5	UG_KG		3.5	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	7421-93-4	Endrin aldehyde	3.5	UG_KG		3.5	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	53494-70-5	Endrin ketone	3.5	UG_KG		3.5	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	58-89-9	gamma-BHC (Lindane)	1.8	UG_KG		1.8	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	5103-74-2	gamma-Chlordane	0.49	UG_KG		1.8	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	76-44-8	Heptachlor	1.8	UG_KG		1.8	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	1024-57-3	Heptachlor epoxide	1.8	UG_KG		1.8	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	72-43-5	Methoxychlor	18	UG_KG		18	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	8001-35-2	Toxaphene	180	UG_KG		180	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	92-52-4	1,1-Biphenyl	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	880	UG_KG		880	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	120-83-2	2,4-Dichlorophenol	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	105-67-9	2,4-Dimethylphenol	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	51-28-5	2,4-Dinitrophenol	880	UG_KG		880	UJ	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	121-14-2	2,4-Dinitrotoluene	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	606-20-2	2,6-Dinitrotoluene	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	91-58-7	2-Chloronaphthalene	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	95-57-8	2-Chlorophenol	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	91-57-6	2-Methylnaphthalene	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	95-48-7	2-Methylphenol	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	88-74-4	2-Nitroaniline	880	UG_KG		880	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	88-75-5	2-Nitrophenol	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	99-09-2	3-Nitroaniline	880	UG_KG		880	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	880	UG_KG		880	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	106-47-8	4-Chloroaniline	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	106-44-5	4-Methylphenol	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	100-01-6	4-Nitroaniline	880	UG_KG		880	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	100-02-7	4-Nitrophenol	880	UG_KG		880	UJ	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	83-32-9	Acenaphthene	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	208-96-8	Acenaphthylene	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	98-86-2	Acetophenone	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	120-12-7	Anthracene	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	1912-24-9	Atrazine	350	UG_KG		350	UJ	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	100-52-7	Benzaldehyde	350	UG_KG		350	UJ	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	56-55-3	Benzo(a)anthracene	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	50-32-8	Benzo(a)pyrene	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	205-99-2	Benzo(b)fluoranthene	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	191-24-2	Benzo(g,h,i)perylene	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	207-08-9	Benzo(k)fluoranthene	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	85-68-7	Butylbenzylphthalate	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	105-60-2	Caprolactam	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	86-74-8	Carbazole	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	218-01-9	Chrysene	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	53-70-3	Dibenz(a,h)anthracene	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	132-64-9	Dibenzofuran	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	84-66-2	Diethylphthalate	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	131-11-3	Dimethyl phthalate	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	84-74-2	Di-n-butylphthalate	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	117-84-0	Di-n-octylphthalate	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	206-44-0	Fluoranthene	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	86-73-7	Fluorene	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	118-74-1	Hexachlorobenzene	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	87-68-3	Hexachlorobutadiene	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	67-72-1	Hexachloroethane	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	350	UG_KG		350	U	No

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	78-59-1	Isophorone	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	91-20-3	Naphthalene	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	98-95-3	Nitrobenzene	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	87-86-5	Pentachlorophenol	880	UG_KG		880	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	85-01-8	Phenanthrene	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	108-95-2	Phenol	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	129-00-0	Pyrene	350	UG_KG		350	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	71-55-6	1,1,1-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	79-00-5	1,1,2-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	75-34-3	1,1-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	75-35-4	1,1-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	106-93-4	1,2-Dibromoethane	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	95-50-1	1,2-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	107-06-2	1,2-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	78-87-5	1,2-Dichloropropane	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	541-73-1	1,3-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	106-46-7	1,4-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	78-93-3	2-Butanone	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	591-78-6	2-Hexanone	10	UG_KG		10	UJ	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	108-10-1	4-Methyl-2-pentanone	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	67-64-1	Acetone	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	71-43-2	Benzene	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	75-27-4	Bromodichloromethane	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	75-25-2	Bromoform	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	74-83-9	Bromomethane	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	75-15-0	Carbon disulfide	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	56-23-5	Carbon tetrachloride	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	108-90-7	Chlorobenzene	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	75-00-3	Chloroethane	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	67-66-3	Chloroform	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	74-87-3	Chloromethane	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	156-59-2	cis-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	110-82-7	Cyclohexane	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	124-48-1	Dibromochloromethane	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	100-41-4	Ethylbenzene	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	98-82-8	Isopropylbenzene	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	79-20-9	Methyl acetate	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	108-87-2	Methylcyclohexane	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	75-09-2	Methylene chloride	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	100-42-5	Styrene	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	127-18-4	Tetrachloroethene	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	108-88-3	Toluene	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	156-60-5	trans-1,2-Dichloroethene	10	UG_KG		10	UJ	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	79-01-6	Trichloroethene	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	75-01-4	Vinyl chloride	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	1330-20-7	Xylene, total	10	UG_KG		10	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	METAL	7429-90-5	Aluminum	5720	MG_KG		44.4	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	METAL	7440-36-0	Antimony	6.7	MG_KG		13.3	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	METAL	7440-38-2	Arsenic	3.2	MG_KG		1.1	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	METAL	7440-39-3	Barium	33	MG_KG		22.2	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	METAL	7440-41-7	Beryllium	0.55	MG_KG		1.1	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	METAL	7440-43-9	Cadmium	0.55	MG_KG		0.56	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	METAL	7440-70-2	Calcium	171000	MG_KG		5550	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	METAL	7440-47-3	Chromium	14.1	MG_KG		1.1	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	METAL	7440-48-4	Cobalt	5.6	MG_KG		5.5	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	METAL	7440-50-8	Copper	19.9	MG_KG		2.8	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	METAL	57-12-5	Cyanide	0.54	MG_KG		2.8	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	METAL	7439-89-6	Iron	14200	MG_KG		11.1	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	METAL	7439-92-1	Lead	28.8	MG_KG		2.2	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	METAL	7439-95-4	Magnesium	27000	MG_KG		555	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	METAL	7439-96-5	Manganese	265	MG_KG		1.7	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	METAL	7439-97-6	Mercury	0.11	MG_KG		0.11	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	METAL	7440-02-0	Nickel	5.3	MG_KG		4.4	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	METAL	7440-09-7	Potassium	805	MG_KG		555	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	METAL	7782-49-2	Selenium	7.8	MG_KG		7.8	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	METAL	7440-22-4	Silver	2.2	MG_KG		2.2	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	METAL	7440-23-5	Sodium	555	MG_KG		555	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	METAL	7440-28-0	Thallium	0.56	MG_KG		0.56	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	METAL	7440-62-2	Vanadium	37.9	MG_KG		11.1	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	METAL	7440-66-6	Zinc	23.9	MG_KG		6.7	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	72-54-8	4,4'-DDD	3.7	UG_KG		3.7	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	72-55-9	4,4'-DDE	3.8	UG_KG		3.7		Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	50-29-3	4,4'-DDT	1.4	UG_KG		3.7	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	309-00-2	Aldrin	1.9	UG_KG		1.9	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	319-84-6	alpha-BHC	1.9	UG_KG		1.9	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	5103-71-9	alpha-Chlordane	1.9	UG_KG		1.9	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	319-85-7	beta-BHC	1.9	UG_KG		1.9	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	319-86-8	delta-BHC	1.9	UG_KG		1.9	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	60-57-1	Dieldrin	3.7	UG_KG		3.7	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	959-98-8	Endosulfan I	1.9	UG_KG		1.9	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	33213-65-9	Endosulfan II	3.7	UG_KG		3.7	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	3.7	UG_KG		3.7	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	72-20-8	Endrin	3.7	UG_KG		3.7	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	7421-93-4	Endrin aldehyde	3.7	UG_KG		3.7	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	53494-70-5	Endrin ketone	3.7	UG_KG		3.7	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	1.9	UG_KG		1.9	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	5103-74-2	gamma-Chlordane	0.69	UG_KG		1.9	J	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	76-44-8	Heptachlor	1.9	UG_KG		1.9	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	1.9	UG_KG		1.9	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	72-43-5	Methoxychlor	19	UG_KG		19	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	8001-35-2	Toxaphene	190	UG_KG		190	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	92-52-4	1,1-Biphenyl	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	920	UG_KG		920	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	120-83-2	2,4-Dichlorophenol	370	UG_KG		370	U	No

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	105-67-9	2,4-Dimethylphenol	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	51-28-5	2,4-Dinitrophenol	920	UG_KG		920	R	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	121-14-2	2,4-Dinitrotoluene	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	606-20-2	2,6-Dinitrotoluene	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	91-58-7	2-Chloronaphthalene	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	95-57-8	2-Chlorophenol	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	91-57-6	2-Methylnaphthalene	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	95-48-7	2-Methylphenol	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	88-74-4	2-Nitroaniline	920	UG_KG		920	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	88-75-5	2-Nitrophenol	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	370	UG_KG		370	UJ	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	99-09-2	3-Nitroaniline	920	UG_KG		920	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	920	UG_KG		920	UJ	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	106-47-8	4-Chloroaniline	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	106-44-5	4-Methylphenol	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	100-01-6	4-Nitroaniline	920	UG_KG		920	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	100-02-7	4-Nitrophenol	920	UG_KG		920	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	83-32-9	Acenaphthene	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	208-96-8	Acenaphthylene	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	98-86-2	Acetophenone	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	120-12-7	Anthracene	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	1912-24-9	Atrazine	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	100-52-7	Benzaldehyde	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	56-55-3	Benzo(a)anthracene	370	UG_KG		370	UJ	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	50-32-8	Benzo(a)pyrene	370	UG_KG		370	R	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	205-99-2	Benzo(b)fluoranthene	370	UG_KG		370	R	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	191-24-2	Benzo(g,h,i)perylene	370	UG_KG		370	R	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	207-08-9	Benzo(k)fluoranthene	370	UG_KG		370	R	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	370	UG_KG		370	UJ	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	85-68-7	Butylbenzylphthalate	370	UG_KG		370	UJ	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	105-60-2	Caprolactam	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	86-74-8	Carbazole	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	218-01-9	Chrysene	370	UG_KG		370	UJ	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	53-70-3	Dibenz(a,h)anthracene	370	UG_KG		370	R	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	132-64-9	Dibenzofuran	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	84-66-2	Diethylphthalate	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	131-11-3	Dimethyl phthalate	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	84-74-2	Di-n-butylphthalate	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	117-84-0	Di-n-octylphthalate	370	UG_KG		370	R	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	206-44-0	Fluoranthene	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	86-73-7	Fluorene	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	118-74-1	Hexachlorobenzene	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	87-68-3	Hexachlorobutadiene	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	67-72-1	Hexachloroethane	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	370	UG_KG		370	R	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	78-59-1	Isophorone	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	91-20-3	Naphthalene	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	98-95-3	Nitrobenzene	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	370	UG_KG		370	UJ	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	87-86-5	Pentachlorophenol	920	UG_KG		920	UJ	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	85-01-8	Phenanthrene	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	108-95-2	Phenol	370	UG_KG		370	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	129-00-0	Pyrene	370	UG_KG		370	UJ	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	71-55-6	1,1,1-Trichloroethane	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	79-00-5	1,1,2-Trichloroethane	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	75-34-3	1,1-Dichloroethane	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	75-35-4	1,1-Dichloroethene	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	106-93-4	1,2-Dibromoethane	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	95-50-1	1,2-Dichlorobenzene	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	107-06-2	1,2-Dichloroethane	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	78-87-5	1,2-Dichloropropane	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	541-73-1	1,3-Dichlorobenzene	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	106-46-7	1,4-Dichlorobenzene	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	78-93-3	2-Butanone	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	591-78-6	2-Hexanone	13	UG_KG		13	UJ	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	108-10-1	4-Methyl-2-pentanone	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	67-64-1	Acetone	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	71-43-2	Benzene	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	75-27-4	Bromodichloromethane	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	75-25-2	Bromoform	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	74-83-9	Bromomethane	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	75-15-0	Carbon disulfide	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	56-23-5	Carbon tetrachloride	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	108-90-7	Chlorobenzene	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	75-00-3	Chloroethane	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	67-66-3	Chloroform	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	74-87-3	Chloromethane	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	156-59-2	cis-1,2-Dichloroethene	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	110-82-7	Cyclohexane	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	124-48-1	Dibromochloromethane	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	100-41-4	Ethylbenzene	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	98-82-8	Isopropylbenzene	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	79-20-9	Methyl acetate	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	108-87-2	Methylcyclohexane	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	75-09-2	Methylene chloride	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	100-42-5	Styrene	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	127-18-4	Tetrachloroethene	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	108-88-3	Toluene	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	156-60-5	trans-1,2-Dichloroethene	13	UG_KG		13	UJ	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	79-01-6	Trichloroethene	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	13	UG_KG		13	U	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	75-01-4	Vinyl chloride	13	UG_KG		13	U	No

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	1330-20-7	Xylene, total	13	UG_KG		13	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	METAL	7429-90-5	Aluminum	6660	MG_KG		20.9	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	METAL	7440-36-0	Antimony	6.3	MG_KG		6.3	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	METAL	7440-38-2	Arsenic	1	MG_KG		1	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	METAL	7440-39-3	Barium	42.4	MG_KG		20.9	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	METAL	7440-41-7	Beryllium	0.52	MG_KG		0.52	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	METAL	7440-43-9	Cadmium	0.52	MG_KG		0.52	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	METAL	7440-70-2	Calcium	2050	MG_KG		523	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	METAL	7440-47-3	Chromium	10.8	MG_KG		1	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	METAL	7440-48-4	Cobalt	8.1	MG_KG		5.2	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	METAL	7440-50-8	Copper	39.3	MG_KG		2.6	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	METAL	57-12-5	Cyanide	2.6	MG_KG		2.6	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	METAL	7439-89-6	Iron	15000	MG_KG		10.5	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	METAL	7439-92-1	Lead	1.1	MG_KG		1	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	METAL	7439-95-4	Magnesium	2580	MG_KG		523	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	METAL	7439-96-5	Manganese	322	MG_KG		1.6	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	METAL	7439-97-6	Mercury	0.1	MG_KG		0.1	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	METAL	7440-02-0	Nickel	5.8	MG_KG		4.2	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	METAL	7440-09-7	Potassium	523	MG_KG		523	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	METAL	7782-49-2	Selenium	3.7	MG_KG		3.7	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	METAL	7440-22-4	Silver	1	MG_KG		1	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	METAL	7440-23-5	Sodium	523	MG_KG		523	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	METAL	7440-28-0	Thallium	0.52	MG_KG		0.52	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	METAL	7440-62-2	Vanadium	60.3	MG_KG		5.2	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	METAL	7440-66-6	Zinc	13.9	MG_KG		6.3	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	72-54-8	4,4'-DDD	3.4	UG_KG		3.4	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	72-55-9	4,4'-DDE	3.4	UG_KG		3.4	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	50-29-3	4,4'-DDT	3.4	UG_KG		3.4	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	309-00-2	Aldrin	1.8	UG_KG		1.8	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	319-84-6	alpha-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	5103-71-9	alpha-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	319-85-7	beta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	319-86-8	delta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	60-57-1	Dieldrin	3.4	UG_KG		3.4	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	959-98-8	Endosulfan I	1.8	UG_KG		1.8	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	33213-65-9	Endosulfan II	3.4	UG_KG		3.4	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	1031-07-8	Endosulfan sulfate	3.4	UG_KG		3.4	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	72-20-8	Endrin	3.4	UG_KG		3.4	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	7421-93-4	Endrin aldehyde	3.4	UG_KG		3.4	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	53494-70-5	Endrin ketone	3.4	UG_KG		3.4	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	58-89-9	gamma-BHC (Lindane)	1.8	UG_KG		1.8	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	5103-74-2	gamma-Chlordane	0.45	UG_KG		1.8	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	76-44-8	Heptachlor	1.8	UG_KG		1.8	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	1024-57-3	Heptachlor epoxide	1.8	UG_KG		1.8	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	72-43-5	Methoxychlor	18	UG_KG		18	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	8001-35-2	Toxaphene	180	UG_KG		180	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	92-52-4	1,1-Biphenyl	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	860	UG_KG		860	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	120-83-2	2,4-Dichlorophenol	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	105-67-9	2,4-Dimethylphenol	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	51-28-5	2,4-Dinitrophenol	860	UG_KG		860	UJ	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	121-14-2	2,4-Dinitrotoluene	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	606-20-2	2,6-Dinitrotoluene	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	91-58-7	2-Chloronaphthalene	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	95-57-8	2-Chlorophenol	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	91-57-6	2-Methylnaphthalene	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	95-48-7	2-Methylphenol	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	88-74-4	2-Nitroaniline	860	UG_KG		860	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	88-75-5	2-Nitrophenol	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	99-09-2	3-Nitroaniline	860	UG_KG		860	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	860	UG_KG		860	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	106-47-8	4-Chloroaniline	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	106-44-5	4-Methylphenol	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	100-01-6	4-Nitroaniline	860	UG_KG		860	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	100-02-7	4-Nitrophenol	860	UG_KG		860	UJ	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	83-32-9	Acenaphthene	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	208-96-8	Acenaphthylene	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	98-86-2	Acetophenone	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	120-12-7	Anthracene	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	1912-24-9	Atrazine	340	UG_KG		340	UJ	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	100-52-7	Benzaldehyde	340	UG_KG		340	UJ	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	56-55-3	Benzo(a)anthracene	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	50-32-8	Benzo(a)pyrene	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	205-99-2	Benzo(b)fluoranthene	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	191-24-2	Benzo(g,h,i)perylene	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	207-08-9	Benzo(k)fluoranthene	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	85-68-7	Butylbenzylphthalate	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	105-60-2	Caprolactam	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	86-74-8	Carbazole	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	218-01-9	Chrysene	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	53-70-3	Dibenz(a,h)anthracene	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	132-64-9	Dibenzofuran	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	84-66-2	Diethylphthalate	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	131-11-3	Dimethyl phthalate	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	84-74-2	Di-n-butylphthalate	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	117-84-0	Di-n-octylphthalate	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	206-44-0	Fluoranthene	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	86-73-7	Fluorene	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	118-74-1	Hexachlorobenzene	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	87-68-3	Hexachlorobutadiene	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	67-72-1	Hexachloroethane	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	78-59-1	Isophorone	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	91-20-3	Naphthalene	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	98-95-3	Nitrobenzene	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	340	UG_KG		340	U	No

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	87-86-5	Pentachlorophenol	860	UG_KG		860	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	85-01-8	Phenanthrene	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	108-95-2	Phenol	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	129-00-0	Pyrene	340	UG_KG		340	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	71-55-6	1,1,1-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	79-00-5	1,1,2-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	75-34-3	1,1-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	75-35-4	1,1-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	106-93-4	1,2-Dibromoethane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	95-50-1	1,2-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	107-06-2	1,2-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	78-87-5	1,2-Dichloropropane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	541-73-1	1,3-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	106-46-7	1,4-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	78-93-3	2-Butanone	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	591-78-6	2-Hexanone	10	UG_KG		10	UJ	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	108-10-1	4-Methyl-2-pentanone	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	67-64-1	Acetone	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	71-43-2	Benzene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	75-27-4	Bromodichloromethane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	75-25-2	Bromoform	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	74-83-9	Bromomethane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	75-15-0	Carbon disulfide	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	56-23-5	Carbon tetrachloride	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	108-90-7	Chlorobenzene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	75-00-3	Chloroethane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	67-66-3	Chloroform	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	74-87-3	Chloromethane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	156-59-2	cis-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	110-82-7	Cyclohexane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	124-48-1	Dibromochloromethane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	100-41-4	Ethylbenzene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	98-82-8	Isopropylbenzene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	79-20-9	Methyl acetate	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	108-87-2	Methylcyclohexane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	75-09-2	Methylene chloride	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	100-42-5	Styrene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	127-18-4	Tetrachloroethene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	108-88-3	Toluene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	156-60-5	trans-1,2-Dichloroethene	10	UG_KG		10	UJ	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	79-01-6	Trichloroethene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	75-01-4	Vinyl chloride	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	1330-20-7	Xylene, total	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	METAL	7429-90-5	Aluminum	9040	MG_KG		21.7	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	METAL	7440-36-0	Antimony	6.5	MG_KG		6.5	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	METAL	7440-38-2	Arsenic	1.1	MG_KG		1.1	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	METAL	7440-39-3	Barium	45.4	MG_KG		21.7	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	METAL	7440-41-7	Beryllium	0.54	MG_KG		0.54	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	METAL	7440-43-9	Cadmium	0.54	MG_KG		0.54	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	METAL	7440-70-2	Calcium	15400	MG_KG		542	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	METAL	7440-47-3	Chromium	12.7	MG_KG		1.1	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	METAL	7440-48-4	Cobalt	8.3	MG_KG		5.4	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	METAL	7440-50-8	Copper	43.5	MG_KG		2.7	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	METAL	57-12-5	Cyanide	2.7	MG_KG		2.7	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	METAL	7439-89-6	Iron	16100	MG_KG		10.8	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	METAL	7439-92-1	Lead	7.3	MG_KG		1.1	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	METAL	7439-95-4	Magnesium	5030	MG_KG		542	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	METAL	7439-96-5	Manganese	444	MG_KG		1.6	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	METAL	7439-97-6	Mercury	0.11	MG_KG		0.11	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	METAL	7440-02-0	Nickel	7.2	MG_KG		4.3	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	METAL	7440-09-7	Potassium	950	MG_KG		542	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	METAL	7782-49-2	Selenium	3.8	MG_KG		3.8	UJ	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	METAL	7440-22-4	Silver	1.1	MG_KG		1.1	UJ	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	METAL	7440-23-5	Sodium	542	MG_KG		542	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	METAL	7440-28-0	Thallium	0.54	MG_KG		0.54	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	METAL	7440-62-2	Vanadium	49.7	MG_KG		5.4	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	METAL	7440-66-6	Zinc	27.3	MG_KG		6.5	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	72-54-8	4,4'-DDD	3.6	UG_KG		3.6	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	72-55-9	4,4'-DDE	2.2	UG_KG		3.6	J	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	50-29-3	4,4'-DDT	3.6	UG_KG		3.6	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	309-00-2	Aldrin	1.8	UG_KG		1.8	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	319-84-6	alpha-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	5103-71-9	alpha-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	319-85-7	beta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	319-86-8	delta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	60-57-1	Dieldrin	3.6	UG_KG		3.6	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	959-98-8	Endosulfan I	1.8	UG_KG		1.8	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	33213-65-9	Endosulfan II	3.6	UG_KG		3.6	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	3.6	UG_KG		3.6	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	72-20-8	Endrin	3.6	UG_KG		3.6	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	7421-93-4	Endrin aldehyde	3.6	UG_KG		3.6	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	53494-70-5	Endrin ketone	3.6	UG_KG		3.6	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	1.8	UG_KG		1.8	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	5103-74-2	gamma-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	76-44-8	Heptachlor	1.8	UG_KG		1.8	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	1.8	UG_KG		1.8	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	72-43-5	Methoxychlor	18	UG_KG		18	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	8001-35-2	Toxaphene	180	UG_KG		180	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	92-52-4	1,1-Biphenyl	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	900	UG_KG		900	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	120-83-2	2,4-Dichlorophenol	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	105-67-9	2,4-Dimethylphenol	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	51-28-5	2,4-Dinitrophenol	900	UG_KG		900	R	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	121-14-2	2,4-Dinitrotoluene	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	606-20-2	2,6-Dinitrotoluene	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	91-58-7	2-Chloronaphthalene	360	UG_KG		360	U	No

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	95-57-8	2-Chlorophenol	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	91-57-6	2-Methylnaphthalene	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	95-48-7	2-Methylphenol	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	88-74-4	2-Nitroaniline	900	UG_KG		900	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	88-75-5	2-Nitrophenol	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	99-09-2	3-Nitroaniline	900	UG_KG		900	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	900	UG_KG		900	UJ	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	106-47-8	4-Chloroaniline	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	106-44-5	4-Methylphenol	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	100-01-6	4-Nitroaniline	900	UG_KG		900	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	100-02-7	4-Nitrophenol	900	UG_KG		900	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	83-32-9	Acenaphthene	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	208-96-8	Acenaphthylene	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	98-86-2	Acetophenone	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	120-12-7	Anthracene	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	1912-24-9	Atrazine	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	100-52-7	Benzaldehyde	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	56-55-3	Benzo(a)anthracene	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	50-32-8	Benzo(a)pyrene	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	205-99-2	Benzo(b)fluoranthene	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	191-24-2	Benzo(g,h,i)perylene	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	207-08-9	Benzo(k)fluoranthene	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	85-68-7	Butylbenzylphthalate	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	105-60-2	Caprolactam	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	86-74-8	Carbazole	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	218-01-9	Chrysene	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	53-70-3	Dibenz(a,h)anthracene	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	132-64-9	Dibenzofuran	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	84-66-2	Diethylphthalate	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	131-11-3	Dimethyl phthalate	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	84-74-2	Di-n-butylphthalate	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	117-84-0	Di-n-octylphthalate	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	206-44-0	Fluoranthene	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	86-73-7	Fluorene	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	118-74-1	Hexachlorobenzene	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	87-68-3	Hexachlorobutadiene	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	67-72-1	Hexachloroethane	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	78-59-1	Isophorone	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	91-20-3	Naphthalene	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	98-95-3	Nitrobenzene	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	360	UG_KG		360	UJ	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	87-86-5	Pentachlorophenol	900	UG_KG		900	UJ	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	85-01-8	Phenanthrene	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	108-95-2	Phenol	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	129-00-0	Pyrene	360	UG_KG		360	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	71-55-6	1,1,1-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	79-00-5	1,1,2-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	75-34-3	1,1-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	75-35-4	1,1-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	106-93-4	1,2-Dibromoethane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	95-50-1	1,2-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	107-06-2	1,2-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	78-87-5	1,2-Dichloropropane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	541-73-1	1,3-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	106-46-7	1,4-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	78-93-3	2-Butanone	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	591-78-6	2-Hexanone	10	UG_KG		10	UJ	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	108-10-1	4-Methyl-2-pentanone	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	67-64-1	Acetone	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	71-43-2	Benzene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	75-27-4	Bromodichloromethane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	75-25-2	Bromoform	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	74-83-9	Bromomethane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	75-15-0	Carbon disulfide	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	56-23-5	Carbon tetrachloride	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	108-90-7	Chlorobenzene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	75-00-3	Chloroethane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	67-66-3	Chloroform	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	74-87-3	Chloromethane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	156-59-2	cis-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	110-82-7	Cyclohexane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	124-48-1	Dibromochloromethane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	100-41-4	Ethylbenzene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	98-82-8	Isopropylbenzene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	79-20-9	Methyl acetate	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	108-87-2	Methylcyclohexane	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	75-09-2	Methylene chloride	10	UG_KG		10	UJ	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	100-42-5	Styrene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	127-18-4	Tetrachloroethene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	108-88-3	Toluene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	156-60-5	trans-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	79-01-6	Trichloroethene	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	75-01-4	Vinyl chloride	10	UG_KG		10	U	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	1330-20-7	Xylene, total	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	METAL	7429-90-5	Aluminum	7240	MG_KG		21	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	METAL	7440-36-0	Antimony	6.3	MG_KG		6.3	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	METAL	7440-38-2	Arsenic	1.1	MG_KG		1.1	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	METAL	7440-39-3	Barium	44.7	MG_KG		21	J	Yes

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	METAL	7440-41-7	Beryllium	0.52	MG_KG		0.53	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	METAL	7440-43-9	Cadmium	0.52	MG_KG		0.53	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	METAL	7440-70-2	Calcium	3180	MG_KG		526	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	METAL	7440-47-3	Chromium	11.3	MG_KG		1.1	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	METAL	7440-48-4	Cobalt	7.5	MG_KG		5.3	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	METAL	7440-50-8	Copper	44.9	MG_KG		2.6	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	METAL	57-12-5	Cyanide	2.6	MG_KG		2.6	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	METAL	7439-89-6	Iron	17100	MG_KG		10.5	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	METAL	7439-92-1	Lead	2.3	MG_KG		1.1	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	METAL	7439-95-4	Magnesium	2360	MG_KG		526	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	METAL	7439-96-5	Manganese	309	MG_KG		1.6	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	METAL	7439-97-6	Mercury	0.1	MG_KG		0.1	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	METAL	7440-02-0	Nickel	4.5	MG_KG		4.2	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	METAL	7440-09-7	Potassium	526	MG_KG		526	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	METAL	7782-49-2	Selenium	3.7	MG_KG		3.7	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	METAL	7440-22-4	Silver	1.1	MG_KG		1.1	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	METAL	7440-23-5	Sodium	526	MG_KG		526	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	METAL	7440-28-0	Thallium	0.53	MG_KG		0.53	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	METAL	7440-62-2	Vanadium	65.6	MG_KG		5.3	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	METAL	7440-66-6	Zinc	15	MG_KG		6.3	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	72-54-8	4,4'-DDD	3.5	UG_KG		3.5	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	72-55-9	4,4'-DDE	1.5	UG_KG		3.5	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	50-29-3	4,4'-DDT	3.5	UG_KG		3.5	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	309-00-2	Aldrin	1.8	UG_KG		1.8	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	319-84-6	alpha-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	5103-71-9	alpha-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	319-85-7	beta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	319-86-8	delta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	60-57-1	Dieldrin	3.5	UG_KG		3.5	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	959-98-8	Endosulfan I	1.8	UG_KG		1.8	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	33213-65-9	Endosulfan II	3.5	UG_KG		3.5	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	1031-07-8	Endosulfan sulfate	3.5	UG_KG		3.5	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	72-20-8	Endrin	3.5	UG_KG		3.5	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	7421-93-4	Endrin aldehyde	3.5	UG_KG		3.5	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	53494-70-5	Endrin ketone	3.5	UG_KG		3.5	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	58-89-9	gamma-BHC (Lindane)	1.8	UG_KG		1.8	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	5103-74-2	gamma-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	76-44-8	Heptachlor	1.8	UG_KG		1.8	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	1024-57-3	Heptachlor epoxide	1.8	UG_KG		1.8	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	72-43-5	Methoxychlor	18	UG_KG		18	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	8001-35-2	Toxaphene	180	UG_KG		180	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	92-52-4	1,1-Biphenyl	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	870	UG_KG		870	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	120-83-2	2,4-Dichlorophenol	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	105-67-9	2,4-Dimethylphenol	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	51-28-5	2,4-Dinitrophenol	870	UG_KG		870	UJ	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	121-14-2	2,4-Dinitrotoluene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	606-20-2	2,6-Dinitrotoluene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	91-58-7	2-Chloronaphthalene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	95-57-8	2-Chlorophenol	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	91-57-6	2-Methylnaphthalene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	95-48-7	2-Methylphenol	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	88-74-4	2-Nitroaniline	870	UG_KG		870	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	88-75-5	2-Nitrophenol	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	99-09-2	3-Nitroaniline	870	UG_KG		870	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	870	UG_KG		870	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	106-47-8	4-Chloroaniline	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	106-44-5	4-Methylphenol	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	100-01-6	4-Nitroaniline	870	UG_KG		870	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	100-02-7	4-Nitrophenol	870	UG_KG		870	UJ	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	83-32-9	Acenaphthene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	208-96-8	Acenaphthylene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	98-86-2	Acetophenone	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	120-12-7	Anthracene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	1912-24-9	Atrazine	350	UG_KG		350	UJ	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	100-52-7	Benzaldehyde	350	UG_KG		350	UJ	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	56-55-3	Benzo(a)anthracene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	50-32-8	Benzo(a)pyrene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	205-99-2	Benzo(b)fluoranthene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	191-24-2	Benzo(g,h,i)perylene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	207-08-9	Benzo(k)fluoranthene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	85-68-7	Butylbenzylphthalate	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	105-60-2	Caprolactam	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	86-74-8	Carbazole	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	218-01-9	Chrysene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	53-70-3	Dibenz(a,h)anthracene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	132-64-9	Dibenzofuran	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	84-66-2	Diethylphthalate	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	131-11-3	Dimethyl phthalate	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	84-74-2	Di-n-butylphthalate	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	117-84-0	Di-n-octylphthalate	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	206-44-0	Fluoranthene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	86-73-7	Fluorene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	118-74-1	Hexachlorobenzene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	87-68-3	Hexachlorobutadiene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	67-72-1	Hexachloroethane	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	78-59-1	Isophorone	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	91-20-3	Naphthalene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	98-95-3	Nitrobenzene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	87-86-5	Pentachlorophenol	870	UG_KG		870	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	85-01-8	Phenanthrene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	108-95-2	Phenol	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	129-00-0	Pyrene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	71-55-6	1,1,1-Trichloroethane	10	UG_KG		10	U	No

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	79-00-5	1,1,2-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	75-34-3	1,1-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	75-35-4	1,1-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	106-93-4	1,2-Dibromoethane	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	95-50-1	1,2-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	107-06-2	1,2-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	78-87-5	1,2-Dichloropropane	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	541-73-1	1,3-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	106-46-7	1,4-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	78-93-3	2-Butanone	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	591-78-6	2-Hexanone	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	108-10-1	4-Methyl-2-pentanone	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	67-64-1	Acetone	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	71-43-2	Benzene	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	75-27-4	Bromodichloromethane	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	75-25-2	Bromoform	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	74-83-9	Bromomethane	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	75-15-0	Carbon disulfide	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	56-23-5	Carbon tetrachloride	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	108-90-7	Chlorobenzene	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	75-00-3	Chloroethane	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	67-66-3	Chloroform	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	74-87-3	Chloromethane	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	156-59-2	cis-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	110-82-7	Cyclohexane	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	124-48-1	Dibromochloromethane	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	100-41-4	Ethylbenzene	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	98-82-8	Isopropylbenzene	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	79-20-9	Methyl acetate	10	UG_KG		10	UJ	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	108-87-2	Methylcyclohexane	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	75-09-2	Methylene chloride	10	UG_KG		10	UJ	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	100-42-5	Styrene	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	127-18-4	Tetrachloroethene	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	108-88-3	Toluene	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	156-60-5	trans-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	79-01-6	Trichloroethene	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	75-01-4	Vinyl chloride	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	1330-20-7	Xylene, total	10	UG_KG		10	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	METAL	7429-90-5	Aluminum	7450	MG_KG		21.3	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	METAL	7440-36-0	Antimony	6.4	MG_KG		6.4	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	METAL	7440-38-2	Arsenic	1.1	MG_KG		1.1	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	METAL	7440-39-3	Barium	52.1	MG_KG		21.3	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	METAL	7440-41-7	Beryllium	0.53	MG_KG		0.53	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	METAL	7440-43-9	Cadmium	0.53	MG_KG		0.53	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	METAL	7440-70-2	Calcium	7200	MG_KG		532	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	METAL	7440-47-3	Chromium	10.1	MG_KG		1.1	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	METAL	7440-48-4	Cobalt	9	MG_KG		5.3	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	METAL	7440-50-8	Copper	32.1	MG_KG		2.7	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	METAL	57-12-5	Cyanide	2.7	MG_KG		2.7	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	METAL	7439-89-6	Iron	15000	MG_KG		10.6	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	METAL	7439-92-1	Lead	4.1	MG_KG		1.1	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	METAL	7439-95-4	Magnesium	1770	MG_KG		532	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	METAL	7439-96-5	Manganese	567	MG_KG		1.6	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	METAL	7439-97-6	Mercury	0.11	MG_KG		0.11	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	METAL	7440-02-0	Nickel	4.3	MG_KG		4.3	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	METAL	7440-09-7	Potassium	849	MG_KG		532	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	METAL	7782-49-2	Selenium	0.55	MG_KG		3.7	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	METAL	7440-22-4	Silver	1.1	MG_KG		1.1	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	METAL	7440-23-5	Sodium	532	MG_KG		532	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	METAL	7440-28-0	Thallium	0.53	MG_KG		0.53	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	METAL	7440-62-2	Vanadium	56.1	MG_KG		5.3	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	METAL	7440-66-6	Zinc	16.7	MG_KG		6.4	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	72-54-8	4,4'-DDD	3.5	UG_KG		3.5	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	72-55-9	4,4'-DDE	12	UG_KG		3.5		Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	50-29-3	4,4'-DDT	3.1	UG_KG		3.5	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	309-00-2	Aldrin	1.8	UG_KG		1.8	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	319-84-6	alpha-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	5103-71-9	alpha-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	319-85-7	beta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	319-86-8	delta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	60-57-1	Dieldrin	3.5	UG_KG		3.5	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	959-98-8	Endosulfan I	1.8	UG_KG		1.8	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	33213-65-9	Endosulfan II	3.5	UG_KG		3.5	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	3.5	UG_KG		3.5	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	72-20-8	Endrin	3.5	UG_KG		3.5	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	7421-93-4	Endrin aldehyde	3.5	UG_KG		3.5	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	53494-70-5	Endrin ketone	3.5	UG_KG		3.5	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	1.8	UG_KG		1.8	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	5103-74-2	gamma-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	76-44-8	Heptachlor	1.8	UG_KG		1.8	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	1.8	UG_KG		1.8	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	72-43-5	Methoxychlor	18	UG_KG		18	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	8001-35-2	Toxaphene	180	UG_KG		180	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	92-52-4	1,1-Biphenyl	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	880	UG_KG		880	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	120-83-2	2,4-Dichlorophenol	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	105-67-9	2,4-Dimethylphenol	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	51-28-5	2,4-Dinitrophenol	880	UG_KG		880	R	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	121-14-2	2,4-Dinitrotoluene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	606-20-2	2,6-Dinitrotoluene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	91-58-7	2-Chloronaphthalene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	95-57-8	2-Chlorophenol	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	91-57-6	2-Methylnaphthalene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	95-48-7	2-Methylphenol	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	88-74-4	2-Nitroaniline	880	UG_KG		880	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	88-75-5	2-Nitrophenol	350	UG_KG		350	U	No

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	99-09-2	3-Nitroaniline	880	UG_KG		880	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	880	UG_KG		880	UJ	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	106-47-8	4-Chloroaniline	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	106-44-5	4-Methylphenol	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	100-01-6	4-Nitroaniline	880	UG_KG		880	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	100-02-7	4-Nitrophenol	880	UG_KG		880	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	83-32-9	Acenaphthene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	208-96-8	Acenaphthylene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	98-86-2	Acetophenone	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	120-12-7	Anthracene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	1912-24-9	Atrazine	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	100-52-7	Benzaldehyde	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	56-55-3	Benzo(a)anthracene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	50-32-8	Benzo(a)pyrene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	205-99-2	Benzo(b)fluoranthene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	191-24-2	Benzo(g,h,i)perylene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	207-08-9	Benzo(k)fluoranthene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	85-68-7	Butylbenzylphthalate	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	105-60-2	Caprolactam	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	86-74-8	Carbazole	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	218-01-9	Chrysene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	53-70-3	Dibenz(a,h)anthracene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	132-64-9	Dibenzofuran	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	84-66-2	Diethylphthalate	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	131-11-3	Dimethyl phthalate	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	84-74-2	Di-n-butylphthalate	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	117-84-0	Di-n-octylphthalate	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	206-44-0	Fluoranthene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	86-73-7	Fluorene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	118-74-1	Hexachlorobenzene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	87-68-3	Hexachlorobutadiene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	67-72-1	Hexachloroethane	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	78-59-1	Isophorone	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	91-20-3	Naphthalene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	98-95-3	Nitrobenzene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	350	UG_KG		350	UJ	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	87-86-5	Pentachlorophenol	880	UG_KG		880	UJ	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	85-01-8	Phenanthrene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	108-95-2	Phenol	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	129-00-0	Pyrene	350	UG_KG		350	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	71-55-6	1,1,1-Trichloroethane	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	79-00-5	1,1,2-Trichloroethane	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	75-34-3	1,1-Dichloroethane	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	75-35-4	1,1-Dichloroethene	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	106-93-4	1,2-Dibromoethane	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	95-50-1	1,2-Dichlorobenzene	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	107-06-2	1,2-Dichloroethane	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	78-87-5	1,2-Dichloropropane	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	541-73-1	1,3-Dichlorobenzene	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	106-46-7	1,4-Dichlorobenzene	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	78-93-3	2-Butanone	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	591-78-6	2-Hexanone	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	108-10-1	4-Methyl-2-pentanone	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	67-64-1	Acetone	28	UG_KG		53	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	71-43-2	Benzene	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	75-27-4	Bromodichloromethane	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	75-25-2	Bromoform	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	74-83-9	Bromomethane	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	75-15-0	Carbon disulfide	10	UG_KG		12	J	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	56-23-5	Carbon tetrachloride	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	108-90-7	Chlorobenzene	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	75-00-3	Chloroethane	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	67-66-3	Chloroform	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	74-87-3	Chloromethane	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	156-59-2	cis-1,2-Dichloroethene	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	110-82-7	Cyclohexane	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	124-48-1	Dibromochloromethane	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	100-41-4	Ethylbenzene	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	98-82-8	Isopropylbenzene	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	79-20-9	Methyl acetate	12	UG_KG		12	UJ	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	108-87-2	Methylcyclohexane	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	75-09-2	Methylene chloride	12	UG_KG		12	UJ	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	100-42-5	Styrene	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	127-18-4	Tetrachloroethene	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	108-88-3	Toluene	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	156-60-5	trans-1,2-Dichloroethene	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	79-01-6	Trichloroethene	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	75-01-4	Vinyl chloride	12	UG_KG		12	U	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	1330-20-7	Xylene, total	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	METAL	7429-90-5	Aluminum	7350	MG_KG		23.1		Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	METAL	7440-36-0	Antimony	6.9	MG_KG		6.9	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	METAL	7440-38-2	Arsenic	1.2	MG_KG		1.2	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	METAL	7440-39-3	Barium	51.8	MG_KG		23.1		Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	METAL	7440-41-7	Beryllium	0.58	MG_KG		0.58	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	METAL	7440-43-9	Cadmium	0.58	MG_KG		0.58	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	METAL	7440-70-2	Calcium	2760	MG_KG		577		Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	METAL	7440-47-3	Chromium	10.6	MG_KG		1.2		Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	METAL	7440-48-4	Cobalt	7.7	MG_KG		5.8		Yes

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	METAL	7440-50-8	Copper	41.7	MG_KG		2.9		Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	METAL	57-12-5	Cyanide	2.9	MG_KG		2.9	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	METAL	7439-89-6	Iron	15700	MG_KG		11.5		Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	METAL	7439-92-1	Lead	1.4	MG_KG		1.2	J	Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	METAL	7439-95-4	Magnesium	2510	MG_KG		577		Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	METAL	7439-96-5	Manganese	395	MG_KG		1.7		Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	METAL	7439-97-6	Mercury	0.12	MG_KG		0.12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	METAL	7440-02-0	Nickel	5	MG_KG		4.6		Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	METAL	7440-09-7	Potassium	577	MG_KG		577	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	METAL	7782-49-2	Selenium	0.54	MG_KG		4	J	Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	METAL	7440-22-4	Silver	1.2	MG_KG		1.2	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	METAL	7440-23-5	Sodium	577	MG_KG		577	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	METAL	7440-28-0	Thallium	0.58	MG_KG		0.58	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	METAL	7440-62-2	Vanadium	61.7	MG_KG		5.8		Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	METAL	7440-66-6	Zinc	15.7	MG_KG		6.9	J	Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	72-54-8	4,4'-DDD	3.8	UG_KG		3.8	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	72-55-9	4,4'-DDE	3.8	UG_KG		3.8	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	50-29-3	4,4'-DDT	3.8	UG_KG		3.8	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	309-00-2	Aldrin	2	UG_KG		2	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	319-84-6	alpha-BHC	2	UG_KG		2	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	5103-71-9	alpha-Chlordane	2	UG_KG		2	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	12674-11-2	Aroclor-1016	38	UG_KG		38	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	11104-28-2	Aroclor-1221	77	UG_KG		77	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	11141-16-5	Aroclor-1232	38	UG_KG		38	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	53469-21-9	Aroclor-1242	38	UG_KG		38	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	12672-29-6	Aroclor-1248	38	UG_KG		38	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	11097-69-1	Aroclor-1254	38	UG_KG		38	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	11096-82-5	Aroclor-1260	38	UG_KG		38	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	319-85-7	beta-BHC	2	UG_KG		2	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	319-86-8	delta-BHC	2	UG_KG		2	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	60-57-1	Dieldrin	3.8	UG_KG		3.8	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	959-98-8	Endosulfan I	2	UG_KG		2	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	33213-65-9	Endosulfan II	3.8	UG_KG		3.8	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	1031-07-8	Endosulfan sulfate	3.8	UG_KG		3.8	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	72-20-8	Endrin	3.8	UG_KG		3.8	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	7421-93-4	Endrin aldehyde	3.8	UG_KG		3.8	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	53494-70-5	Endrin ketone	3.8	UG_KG		3.8	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	58-89-9	gamma-BHC (Lindane)	2	UG_KG		2	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	5103-74-2	gamma-Chlordane	2	UG_KG		2	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	76-44-8	Heptachlor	2	UG_KG		2	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	1024-57-3	Heptachlor epoxide	2	UG_KG		2	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	72-43-5	Methoxychlor	20	UG_KG		20	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	8001-35-2	Toxaphene	200	UG_KG		200	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	92-52-4	1,1-Biphenyl	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	950	UG_KG		950	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	120-83-2	2,4-Dichlorophenol	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	105-67-9	2,4-Dimethylphenol	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	51-28-5	2,4-Dinitrophenol	950	UG_KG		950	R	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	121-14-2	2,4-Dinitrotoluene	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	606-20-2	2,6-Dinitrotoluene	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	91-58-7	2-Chloronaphthalene	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	95-57-8	2-Chlorophenol	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	91-57-6	2-Methylnaphthalene	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	95-48-7	2-Methylphenol	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	88-74-4	2-Nitroaniline	950	UG_KG		950	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	88-75-5	2-Nitrophenol	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	99-09-2	3-Nitroaniline	950	UG_KG		950	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	950	UG_KG		950	UJ	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	106-47-8	4-Chloroaniline	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	106-44-5	4-Methylphenol	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	100-01-6	4-Nitroaniline	950	UG_KG		950	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	100-02-7	4-Nitrophenol	950	UG_KG		950	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	83-32-9	Acenaphthene	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	208-96-8	Acenaphthylene	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	98-86-2	Acetophenone	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	120-12-7	Anthracene	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	1912-24-9	Atrazine	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	100-52-7	Benzaldehyde	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	56-55-3	Benzo(a)anthracene	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	50-32-8	Benzo(a)pyrene	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	205-99-2	Benzo(b)fluoranthene	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	191-24-2	Benzo(g,h,i)perylene	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	207-08-9	Benzo(k)fluoranthene	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	85-68-7	Butylbenzylphthalate	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	105-60-2	Caprolactam	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	86-74-8	Carbazole	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	218-01-9	Chrysene	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	53-70-3	Dibenz(a,h)anthracene	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	132-64-9	Dibenzofuran	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	84-66-2	Diethylphthalate	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	131-11-3	Dimethyl phthalate	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	84-74-2	Di-n-butylphthalate	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	117-84-0	Di-n-octylphthalate	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	206-44-0	Fluoranthene	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	86-73-7	Fluorene	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	118-74-1	Hexachlorobenzene	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	87-68-3	Hexachlorobutadiene	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	67-72-1	Hexachloroethane	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	78-59-1	Isophorone	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	91-20-3	Naphthalene	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	98-95-3	Nitrobenzene	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	87-86-5	Pentachlorophenol	950	UG_KG		950	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	85-01-8	Phenanthrene	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	108-95-2	Phenol	380	UG_KG		380	U	No

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	129-00-0	Pyrene	380	UG_KG		380	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	71-55-6	1,1,1-Trichloroethane	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	79-00-5	1,1,2-Trichloroethane	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	75-34-3	1,1-Dichloroethane	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	75-35-4	1,1-Dichloroethene	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	106-93-4	1,2-Dibromoethane	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	95-50-1	1,2-Dichlorobenzene	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	107-06-2	1,2-Dichloroethane	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	78-87-5	1,2-Dichloropropane	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	541-73-1	1,3-Dichlorobenzene	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	106-46-7	1,4-Dichlorobenzene	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	78-93-3	2-Butanone	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	591-78-6	2-Hexanone	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	108-10-1	4-Methyl-2-pentanone	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	67-64-1	Acetone	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	71-43-2	Benzene	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	75-27-4	Bromodichloromethane	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	75-25-2	Bromoform	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	74-83-9	Bromomethane	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	75-15-0	Carbon disulfide	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	56-23-5	Carbon tetrachloride	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	108-90-7	Chlorobenzene	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	75-00-3	Chloroethane	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	67-66-3	Chloroform	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	74-87-3	Chloromethane	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	156-59-2	cis-1,2-Dichloroethene	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	110-82-7	Cyclohexane	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	124-48-1	Dibromochloromethane	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	100-41-4	Ethylbenzene	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	98-82-8	Isopropylbenzene	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	79-20-9	Methyl acetate	11	UG_KG		11	UJ	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	108-87-2	Methylcyclohexane	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	75-09-2	Methylene chloride	11	UG_KG		11	UJ	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	100-42-5	Styrene	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	127-18-4	Tetrachloroethene	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	108-88-3	Toluene	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	156-60-5	trans-1,2-Dichloroethene	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	79-01-6	Trichloroethene	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	75-01-4	Vinyl chloride	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	1330-20-7	Xylene, total	11	UG_KG		11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	METAL	7429-90-5	Aluminum	8220	MG_KG		21.3		Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	METAL	7440-36-0	Antimony	6.4	MG_KG		6.4	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	METAL	7440-38-2	Arsenic	0.35	MG_KG		1.1	J	Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	METAL	7440-39-3	Barium	55.7	MG_KG		21.3		Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	METAL	7440-41-7	Beryllium	0.53	MG_KG		0.53	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	METAL	7440-43-9	Cadmium	0.53	MG_KG		0.53	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	METAL	7440-70-2	Calcium	2770	MG_KG		533		Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	METAL	7440-47-3	Chromium	9.1	MG_KG		1.1		Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	METAL	7440-48-4	Cobalt	9.7	MG_KG		5.3		Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	METAL	7440-50-8	Copper	33.2	MG_KG		2.7		Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	METAL	57-12-5	Cyanide	0.72	MG_KG		2.7	J	Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	METAL	7439-89-6	Iron	13600	MG_KG		10.7		Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	METAL	7439-92-1	Lead	2.7	MG_KG		1.1	J	Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	METAL	7439-95-4	Magnesium	1510	MG_KG		533		Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	METAL	7439-96-5	Manganese	584	MG_KG		1.6		Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	METAL	7439-97-6	Mercury	0.11	MG_KG		0.11	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	METAL	7440-02-0	Nickel	4.3	MG_KG		4.3	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	METAL	7440-09-7	Potassium	1150	MG_KG		533	J	Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	METAL	7782-49-2	Selenium	3.7	MG_KG		3.7	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	METAL	7440-22-4	Silver	1.1	MG_KG		1.1	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	METAL	7440-23-5	Sodium	533	MG_KG		533	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	METAL	7440-28-0	Thallium	0.53	MG_KG		0.53	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	METAL	7440-62-2	Vanadium	49.5	MG_KG		5.3		Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	METAL	7440-66-6	Zinc	16.7	MG_KG		6.4	J	Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	72-54-8	4,4'-DDD	3.5	UG_KG		3.5	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	72-55-9	4,4'-DDE	1.2	UG_KG		3.5	J	Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	50-29-3	4,4'-DDT	3.5	UG_KG		3.5	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	309-00-2	Aldrin	1.8	UG_KG		1.8	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	319-84-6	alpha-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	5103-71-9	alpha-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	12674-11-2	Aroclor-1016	35	UG_KG		35	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	11104-28-2	Aroclor-1221	71	UG_KG		71	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	11141-16-5	Aroclor-1232	35	UG_KG		35	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	53469-21-9	Aroclor-1242	35	UG_KG		35	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	12672-29-6	Aroclor-1248	35	UG_KG		35	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	11097-69-1	Aroclor-1254	35	UG_KG		35	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	11096-82-5	Aroclor-1260	35	UG_KG		35	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	319-85-7	beta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	319-86-8	delta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	60-57-1	Dieldrin	3.5	UG_KG		3.5	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	959-98-8	Endosulfan I	1.8	UG_KG		1.8	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	33213-65-9	Endosulfan II	3.5	UG_KG		3.5	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	3.5	UG_KG		3.5	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	72-20-8	Endrin	3.5	UG_KG		3.5	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	7421-93-4	Endrin aldehyde	3.5	UG_KG		3.5	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	53494-70-5	Endrin ketone	3.5	UG_KG		3.5	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	1.8	UG_KG		1.8	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	5103-74-2	gamma-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	76-44-8	Heptachlor	1.8	UG_KG		1.8	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	1.8	UG_KG		1.8	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	72-43-5	Methoxychlor	18	UG_KG		18	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	8001-35-2	Toxaphene	180	UG_KG		180	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	92-52-4	1,1-Biphenyl	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	880	UG_KG		880	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	120-83-2	2,4-Dichlorophenol	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	105-67-9	2,4-Dimethylphenol	350	UG_KG		350	U	No

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	51-28-5	2,4-Dinitrophenol	880	UG_KG		880	R	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	121-14-2	2,4-Dinitrotoluene	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	606-20-2	2,6-Dinitrotoluene	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	91-58-7	2-Chloronaphthalene	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	95-57-8	2-Chlorophenol	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	91-57-6	2-Methylnaphthalene	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	95-48-7	2-Methylphenol	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	88-74-4	2-Nitroaniline	880	UG_KG		880	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	88-75-5	2-Nitrophenol	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	99-09-2	3-Nitroaniline	880	UG_KG		880	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	880	UG_KG		880	UJ	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	106-47-8	4-Chloroaniline	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	106-44-5	4-Methylphenol	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	100-01-6	4-Nitroaniline	880	UG_KG		880	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	100-02-7	4-Nitrophenol	880	UG_KG		880	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	83-32-9	Acenaphthene	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	208-96-8	Acenaphthylene	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	98-86-2	Acetophenone	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	120-12-7	Anthracene	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	1912-24-9	Atrazine	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	100-52-7	Benzaldehyde	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	56-55-3	Benzo(a)anthracene	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	50-32-8	Benzo(a)pyrene	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	205-99-2	Benzo(b)fluoranthene	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	191-24-2	Benzo(g,h,i)perylene	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	207-08-9	Benzo(k)fluoranthene	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	85-68-7	Butylbenzylphthalate	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	105-60-2	Caprolactam	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	86-74-8	Carbazole	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	218-01-9	Chrysene	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	53-70-3	Dibenz(a,h)anthracene	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	132-64-9	Dibenzofuran	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	84-66-2	Diethylphthalate	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	131-11-3	Dimethyl phthalate	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	84-74-2	Di-n-butylphthalate	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	117-84-0	Di-n-octylphthalate	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	206-44-0	Fluoranthene	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	86-73-7	Fluorene	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	118-74-1	Hexachlorobenzene	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	87-68-3	Hexachlorobutadiene	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	67-72-1	Hexachloroethane	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	78-59-1	Isophorone	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	91-20-3	Naphthalene	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	98-95-3	Nitrobenzene	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	87-86-5	Pentachlorophenol	880	UG_KG		880	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	85-01-8	Phenanthrene	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	108-95-2	Phenol	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	129-00-0	Pyrene	350	UG_KG		350	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	71-55-6	1,1,1-Trichloroethane	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	79-00-5	1,1,2-Trichloroethane	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	75-34-3	1,1-Dichloroethane	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	75-35-4	1,1-Dichloroethene	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	106-93-4	1,2-Dibromoethane	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	95-50-1	1,2-Dichlorobenzene	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	107-06-2	1,2-Dichloroethane	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	78-87-5	1,2-Dichloropropane	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	541-73-1	1,3-Dichlorobenzene	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	106-46-7	1,4-Dichlorobenzene	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	78-93-3	2-Butanone	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	591-78-6	2-Hexanone	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	108-10-1	4-Methyl-2-pentanone	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	67-64-1	Acetone	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	71-43-2	Benzene	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	75-27-4	Bromodichloromethane	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	75-25-2	Bromoform	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	74-83-9	Bromomethane	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	75-15-0	Carbon disulfide	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	56-23-5	Carbon tetrachloride	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	108-90-7	Chlorobenzene	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	75-00-3	Chloroethane	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	67-66-3	Chloroform	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	74-87-3	Chloromethane	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	156-59-2	cis-1,2-Dichloroethene	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	110-82-7	Cyclohexane	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	124-48-1	Dibromochloromethane	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	100-41-4	Ethylbenzene	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	98-82-8	Isopropylbenzene	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	79-20-9	Methyl acetate	12	UG_KG		12	UJ	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	108-87-2	Methylcyclohexane	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	75-09-2	Methylene chloride	12	UG_KG		12	UJ	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	100-42-5	Styrene	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	127-18-4	Tetrachloroethene	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	108-88-3	Toluene	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	156-60-5	trans-1,2-Dichloroethene	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	79-01-6	Trichloroethene	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	75-01-4	Vinyl chloride	12	UG_KG		12	U	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	1330-20-7	Xylene, total	12	UG_KG		12	U	No

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	METAL	7429-90-5	Aluminum	7370	MG_KG		21.1	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	METAL	7440-36-0	Antimony	6.3	MG_KG		6.3	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	METAL	7440-38-2	Arsenic	1	MG_KG		1.1	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	METAL	7440-39-3	Barium	44.4	MG_KG		21.1	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	METAL	7440-41-7	Beryllium	0.53	MG_KG		0.53	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	METAL	7440-43-9	Cadmium	0.53	MG_KG		0.53	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	METAL	7440-70-2	Calcium	2310	MG_KG		527	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	METAL	7440-47-3	Chromium	11.4	MG_KG		1.1	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	METAL	7440-48-4	Cobalt	7.4	MG_KG		5.3	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	METAL	7440-50-8	Copper	48.8	MG_KG		2.6	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	METAL	57-12-5	Cyanide	2.6	MG_KG		2.6	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	METAL	7439-89-6	Iron	16800	MG_KG		10.5	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	METAL	7439-92-1	Lead	1	MG_KG		1.1	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	METAL	7439-95-4	Magnesium	2930	MG_KG		527	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	METAL	7439-96-5	Manganese	374	MG_KG		1.6	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	METAL	7439-97-6	Mercury	0.1	MG_KG		0.1	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	METAL	7440-02-0	Nickel	5.9	MG_KG		4.2	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	METAL	7440-09-7	Potassium	527	MG_KG		527	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	METAL	7782-49-2	Selenium	3.7	MG_KG		3.7	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	METAL	7440-22-4	Silver	1.1	MG_KG		1.1	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	METAL	7440-23-5	Sodium	527	MG_KG		527	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	METAL	7440-28-0	Thallium	0.53	MG_KG		0.53	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	METAL	7440-62-2	Vanadium	62.7	MG_KG		5.3	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	METAL	7440-66-6	Zinc	18.3	MG_KG		6.3	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	72-54-8	4,4'-DDD	3.5	UG_KG		3.5	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	72-55-9	4,4'-DDE	3.5	UG_KG		3.5	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	50-29-3	4,4'-DDT	3.5	UG_KG		3.5	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	309-00-2	Aldrin	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	319-84-6	alpha-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	5103-71-9	alpha-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	319-85-7	beta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	319-86-8	delta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	60-57-1	Dieldrin	3.5	UG_KG		3.5	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	959-98-8	Endosulfan I	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	33213-65-9	Endosulfan II	3.5	UG_KG		3.5	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	1031-07-8	Endosulfan sulfate	3.5	UG_KG		3.5	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	72-20-8	Endrin	3.5	UG_KG		3.5	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	7421-93-4	Endrin aldehyde	3.5	UG_KG		3.5	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	53494-70-5	Endrin ketone	3.5	UG_KG		3.5	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	58-89-9	gamma-BHC (Lindane)	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	5103-74-2	gamma-Chlordane	0.65	UG_KG		1.8	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	76-44-8	Heptachlor	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	1024-57-3	Heptachlor epoxide	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	72-43-5	Methoxychlor	18	UG_KG		18	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	8001-35-2	Toxaphene	180	UG_KG		180	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	92-52-4	1,1-Biphenyl	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	870	UG_KG		870	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	120-83-2	2,4-Dichlorophenol	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	105-67-9	2,4-Dimethylphenol	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	51-28-5	2,4-Dinitrophenol	870	UG_KG		870	UJ	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	121-14-2	2,4-Dinitrotoluene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	606-20-2	2,6-Dinitrotoluene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	91-58-7	2-Chloronaphthalene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	95-57-8	2-Chlorophenol	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	91-57-6	2-Methylnaphthalene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	95-48-7	2-Methylphenol	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	88-74-4	2-Nitroaniline	870	UG_KG		870	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	88-75-5	2-Nitrophenol	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	99-09-2	3-Nitroaniline	870	UG_KG		870	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	870	UG_KG		870	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	106-47-8	4-Chloroaniline	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	106-44-5	4-Methylphenol	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	100-01-6	4-Nitroaniline	870	UG_KG		870	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	100-02-7	4-Nitrophenol	870	UG_KG		870	UJ	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	83-32-9	Acenaphthene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	208-96-8	Acenaphthylene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	98-86-2	Acetophenone	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	120-12-7	Anthracene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	1912-24-9	Atrazine	350	UG_KG		350	UJ	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	100-52-7	Benzaldehyde	350	UG_KG		350	UJ	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	56-55-3	Benzo(a)anthracene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	50-32-8	Benzo(a)pyrene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	205-99-2	Benzo(b)fluoranthene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	191-24-2	Benzo(g,h,i)perylene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	207-08-9	Benzo(k)fluoranthene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	85-68-7	Butylbenzylphthalate	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	105-60-2	Caprolactam	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	86-74-8	Carbazole	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	218-01-9	Chrysene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	53-70-3	Dibenz(a,h)anthracene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	132-64-9	Dibenzofuran	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	84-66-2	Diethylphthalate	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	131-11-3	Dimethyl phthalate	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	84-74-2	Di-n-butylphthalate	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	117-84-0	Di-n-octylphthalate	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	206-44-0	Fluoranthene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	86-73-7	Fluorene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	118-74-1	Hexachlorobenzene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	87-68-3	Hexachlorobutadiene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	67-72-1	Hexachloroethane	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	78-59-1	Isophorone	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	91-20-3	Naphthalene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	98-95-3	Nitrobenzene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	87-86-5	Pentachlorophenol	870	UG_KG		870	U	No

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	85-01-8	Phenanthrene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	108-95-2	Phenol	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	129-00-0	Pyrene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	71-55-6	1,1,1-Trichloroethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	79-00-5	1,1,2-Trichloroethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	75-34-3	1,1-Dichloroethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	75-35-4	1,1-Dichloroethene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	106-93-4	1,2-Dibromoethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	95-50-1	1,2-Dichlorobenzene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	107-06-2	1,2-Dichloroethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	78-87-5	1,2-Dichloropropane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	541-73-1	1,3-Dichlorobenzene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	106-46-7	1,4-Dichlorobenzene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	78-93-3	2-Butanone	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	591-78-6	2-Hexanone	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	108-10-1	4-Methyl-2-pentanone	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	67-64-1	Acetone	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	71-43-2	Benzene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	75-27-4	Bromodichloromethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	75-25-2	Bromoform	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	74-83-9	Bromomethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	75-15-0	Carbon disulfide	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	56-23-5	Carbon tetrachloride	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	108-90-7	Chlorobenzene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	75-00-3	Chloroethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	67-66-3	Chloroform	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	74-87-3	Chloromethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	156-59-2	cis-1,2-Dichloroethene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	110-82-7	Cyclohexane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	124-48-1	Dibromochloromethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	100-41-4	Ethylbenzene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	98-82-8	Isopropylbenzene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	79-20-9	Methyl acetate	11	UG_KG		11	UJ	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	108-87-2	Methylcyclohexane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	75-09-2	Methylene chloride	11	UG_KG		11	UJ	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	100-42-5	Styrene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	127-18-4	Tetrachloroethene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	108-88-3	Toluene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	156-60-5	trans-1,2-Dichloroethene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	79-01-6	Trichloroethene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	75-01-4	Vinyl chloride	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	1330-20-7	Xylene, total	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	METAL	7429-90-5	Aluminum	6770	MG_KG		21.3	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	METAL	7440-36-0	Antimony	6.4	MG_KG		6.4	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	METAL	7440-38-2	Arsenic	1.1	MG_KG		1.1	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	METAL	7440-39-3	Barium	52.7	MG_KG		21.3	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	METAL	7440-41-7	Beryllium	0.53	MG_KG		0.53	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	METAL	7440-43-9	Cadmium	0.53	MG_KG		0.53	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	METAL	7440-70-2	Calcium	2700	MG_KG		532	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	METAL	7440-47-3	Chromium	9	MG_KG		1.1	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	METAL	7440-48-4	Cobalt	9.1	MG_KG		5.3	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	METAL	7440-50-8	Copper	37.1	MG_KG		2.7	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	METAL	57-12-5	Cyanide	2.7	MG_KG		2.7	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	METAL	7439-89-6	Iron	14100	MG_KG		10.6	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	METAL	7439-92-1	Lead	3.2	MG_KG		1.1	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	METAL	7439-95-4	Magnesium	1430	MG_KG		532	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	METAL	7439-96-5	Manganese	572	MG_KG		1.6	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	METAL	7439-97-6	Mercury	0.11	MG_KG		0.11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	METAL	7440-02-0	Nickel	4.3	MG_KG		4.3	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	METAL	7440-09-7	Potassium	1040	MG_KG		532	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	METAL	7782-49-2	Selenium	0.38	MG_KG		3.7	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	METAL	7440-22-4	Silver	1.1	MG_KG		1.1	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	METAL	7440-23-5	Sodium	532	MG_KG		532	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	METAL	7440-28-0	Thallium	0.53	MG_KG		0.53	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	METAL	7440-62-2	Vanadium	51	MG_KG		5.3	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	METAL	7440-66-6	Zinc	19.5	MG_KG		6.4	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	72-54-8	4,4'-DDD	3.5	UG_KG		3.5	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	72-55-9	4,4'-DDE	2.7	UG_KG		3.5	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	50-29-3	4,4'-DDT	1.4	UG_KG		3.5	J	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	309-00-2	Aldrin	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	319-84-6	alpha-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	5103-71-9	alpha-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	319-85-7	beta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	319-86-8	delta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	60-57-1	Dieldrin	3.5	UG_KG		3.5	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	959-98-8	Endosulfan I	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	33213-65-9	Endosulfan II	3.5	UG_KG		3.5	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	3.5	UG_KG		3.5	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	72-20-8	Endrin	3.5	UG_KG		3.5	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	7421-93-4	Endrin aldehyde	3.5	UG_KG		3.5	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	53494-70-5	Endrin ketone	3.5	UG_KG		3.5	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	5103-74-2	gamma-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	76-44-8	Heptachlor	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	72-43-5	Methoxychlor	18	UG_KG		18	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	8001-35-2	Toxaphene	180	UG_KG		180	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	92-52-4	1,1-Biphenyl	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	880	UG_KG		880	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	120-83-2	2,4-Dichlorophenol	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	105-67-9	2,4-Dimethylphenol	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	51-28-5	2,4-Dinitrophenol	880	UG_KG		880	R	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	121-14-2	2,4-Dinitrotoluene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	606-20-2	2,6-Dinitrotoluene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	91-58-7	2-Chloronaphthalene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	95-57-8	2-Chlorophenol	350	UG_KG		350	U	No

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	91-57-6	2-Methylnaphthalene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	95-48-7	2-Methylphenol	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	88-74-4	2-Nitroaniline	880	UG_KG		880	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	88-75-5	2-Nitrophenol	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	99-09-2	3-Nitroaniline	880	UG_KG		880	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	880	UG_KG		880	UJ	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	106-47-8	4-Chloroaniline	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	106-44-5	4-Methylphenol	350	UG_KG		350	UJ	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	100-01-6	4-Nitroaniline	880	UG_KG		880	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	100-02-7	4-Nitrophenol	880	UG_KG		880	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	83-32-9	Acenaphthene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	208-96-8	Acenaphthylene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	98-86-2	Acetophenone	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	120-12-7	Anthracene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	1912-24-9	Atrazine	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	100-52-7	Benzaldehyde	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	56-55-3	Benzo(a)anthracene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	50-32-8	Benzo(a)pyrene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	205-99-2	Benzo(b)fluoranthene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	191-24-2	Benzo(g,h,i)perylene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	207-08-9	Benzo(k)fluoranthene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	85-68-7	Butylbenzylphthalate	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	105-60-2	Caprolactam	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	86-74-8	Carbazole	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	218-01-9	Chrysene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	53-70-3	Dibenz(a,h)anthracene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	132-64-9	Dibenzofuran	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	84-66-2	Diethylphthalate	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	131-11-3	Dimethyl phthalate	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	84-74-2	Di-n-butylphthalate	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	117-84-0	Di-n-octylphthalate	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	206-44-0	Fluoranthene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	86-73-7	Fluorene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	118-74-1	Hexachlorobenzene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	87-68-3	Hexachlorobutadiene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	67-72-1	Hexachloroethane	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	78-59-1	Isophorone	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	91-20-3	Naphthalene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	98-95-3	Nitrobenzene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	87-86-5	Pentachlorophenol	880	UG_KG		880	UJ	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	85-01-8	Phenanthrene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	108-95-2	Phenol	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	129-00-0	Pyrene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	71-55-6	1,1,1-Trichloroethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	79-00-5	1,1,2-Trichloroethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	75-34-3	1,1-Dichloroethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	75-35-4	1,1-Dichloroethene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	106-93-4	1,2-Dibromoethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	95-50-1	1,2-Dichlorobenzene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	107-06-2	1,2-Dichloroethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	78-87-5	1,2-Dichloropropane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	541-73-1	1,3-Dichlorobenzene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	106-46-7	1,4-Dichlorobenzene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	78-93-3	2-Butanone	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	591-78-6	2-Hexanone	11	UG_KG		11	UJ	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	108-10-1	4-Methyl-2-pentanone	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	67-64-1	Acetone	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	71-43-2	Benzene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	75-27-4	Bromodichloromethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	75-25-2	Bromoform	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	74-83-9	Bromomethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	75-15-0	Carbon disulfide	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	56-23-5	Carbon tetrachloride	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	108-90-7	Chlorobenzene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	75-00-3	Chloroethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	67-66-3	Chloroform	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	74-87-3	Chloromethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	156-59-2	cis-1,2-Dichloroethene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	110-82-7	Cyclohexane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	124-48-1	Dibromochloromethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	100-41-4	Ethylbenzene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	98-82-8	Isopropylbenzene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	79-20-9	Methyl acetate	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	108-87-2	Methylcyclohexane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	75-09-2	Methylene chloride	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	100-42-5	Styrene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	127-18-4	Tetrachloroethene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	108-88-3	Toluene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	156-60-5	trans-1,2-Dichloroethene	11	UG_KG		11	UJ	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	79-01-6	Trichloroethene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	75-01-4	Vinyl chloride	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	1330-20-7	Xylene, total	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	METAL	7429-90-5	Aluminum	6930	MG_KG		21.3	J	Yes
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	METAL	7440-36-0	Antimony	6.4	MG_KG		6.4	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	METAL	7440-38-2	Arsenic	1.1	MG_KG		1.1	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	METAL	7440-39-3	Barium	53.3	MG_KG		21.3	J	Yes
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	METAL	7440-41-7	Beryllium	0.53	MG_KG		0.53	U	No

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	METAL	7440-43-9	Cadmium	0.53	MG_KG		0.53	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	METAL	7440-70-2	Calcium	2850	MG_KG		531	J	Yes
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	METAL	7440-47-3	Chromium	8.8	MG_KG		1.1	J	Yes
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	METAL	7440-48-4	Cobalt	9.8	MG_KG		5.3	J	Yes
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	METAL	7440-50-8	Copper	37.6	MG_KG		2.7	J	Yes
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	METAL	57-12-5	Cyanide	2.7	MG_KG		2.7	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	METAL	7439-89-6	Iron	14200	MG_KG		10.6	J	Yes
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	METAL	7439-92-1	Lead	2.7	MG_KG		1.1	J	Yes
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	METAL	7439-95-4	Magnesium	1540	MG_KG		531	J	Yes
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	METAL	7439-96-5	Manganese	573	MG_KG		1.6	J	Yes
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	METAL	7439-97-6	Mercury	0.11	MG_KG		0.11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	METAL	7440-02-0	Nickel	4.2	MG_KG		4.3	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	METAL	7440-09-7	Potassium	1030	MG_KG		531	J	Yes
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	METAL	7782-49-2	Selenium	0.45	MG_KG		3.7	J	Yes
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	METAL	7440-22-4	Silver	1.1	MG_KG		1.1	UJ	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	METAL	7440-23-5	Sodium	531	MG_KG		531	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	METAL	7440-28-0	Thallium	0.53	MG_KG		0.53	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	METAL	7440-62-2	Vanadium	50.7	MG_KG		5.3	J	Yes
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	METAL	7440-66-6	Zinc	18	MG_KG		6.4	J	Yes
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	72-54-8	4,4'-DDD	3.5	UG_KG		3.5	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	72-55-9	4,4'-DDE	4.7	UG_KG		3.5		Yes
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	50-29-3	4,4'-DDT	27	UG_KG		3.5		Yes
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	309-00-2	Aldrin	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	319-84-6	alpha-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	5103-71-9	alpha-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	319-85-7	beta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	319-86-8	delta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	60-57-1	Dieldrin	3.5	UG_KG		3.5	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	959-98-8	Endosulfan I	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	33213-65-9	Endosulfan II	3.5	UG_KG		3.5	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	3.5	UG_KG		3.5	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	72-20-8	Endrin	3.5	UG_KG		3.5	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	7421-93-4	Endrin aldehyde	3.5	UG_KG		3.5	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	53494-70-5	Endrin ketone	3.5	UG_KG		3.5	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	5103-74-2	gamma-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	76-44-8	Heptachlor	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	1.8	UG_KG		1.8	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	72-43-5	Methoxychlor	18	UG_KG		18	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	8001-35-2	Toxaphene	180	UG_KG		180	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	92-52-4	1,1-Biphenyl	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	880	UG_KG		880	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	120-83-2	2,4-Dichlorophenol	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	105-67-9	2,4-Dimethylphenol	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	51-28-5	2,4-Dinitrophenol	880	UG_KG		880	R	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	121-14-2	2,4-Dinitrotoluene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	606-20-2	2,6-Dinitrotoluene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	91-58-7	2-Chloronaphthalene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	95-57-8	2-Chlorophenol	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	91-57-6	2-Methylnaphthalene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	95-48-7	2-Methylphenol	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	88-74-4	2-Nitroaniline	880	UG_KG		880	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	88-75-5	2-Nitrophenol	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	99-09-2	3-Nitroaniline	880	UG_KG		880	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	880	UG_KG		880	UJ	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	106-47-8	4-Chloroaniline	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	106-44-5	4-Methylphenol	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	100-01-6	4-Nitroaniline	880	UG_KG		880	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	100-02-7	4-Nitrophenol	880	UG_KG		880	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	83-32-9	Acenaphthene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	208-96-8	Acenaphthylene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	98-86-2	Acetophenone	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	120-12-7	Anthracene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	1912-24-9	Atrazine	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	100-52-7	Benzaldehyde	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	56-55-3	Benzo(a)anthracene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	50-32-8	Benzo(a)pyrene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	205-99-2	Benzo(b)fluoranthene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	191-24-2	Benzo(g,h,i)perylene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	207-08-9	Benzo(k)fluoranthene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	85-68-7	Butylbenzylphthalate	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	105-60-2	Caprolactam	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	86-74-8	Carbazole	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	218-01-9	Chrysene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	53-70-3	Dibenz(a,h)anthracene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	132-64-9	Dibenzofuran	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	84-66-2	Diethylphthalate	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	131-11-3	Dimethyl phthalate	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	84-74-2	Di-n-butylphthalate	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	117-84-0	Di-n-octylphthalate	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	206-44-0	Fluoranthene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	86-73-7	Fluorene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	118-74-1	Hexachlorobenzene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	87-68-3	Hexachlorobutadiene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	67-72-1	Hexachloroethane	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	78-59-1	Isophorone	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	91-20-3	Naphthalene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	98-95-3	Nitrobenzene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	350	UG_KG		350	UJ	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	87-86-5	Pentachlorophenol	880	UG_KG		880	UJ	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	85-01-8	Phenanthrene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	108-95-2	Phenol	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	129-00-0	Pyrene	350	UG_KG		350	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	71-55-6	1,1,1-Trichloroethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	11	UG_KG		11	U	No

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	79-00-5	1,1,2-Trichloroethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	75-34-3	1,1-Dichloroethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	75-35-4	1,1-Dichloroethene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	106-93-4	1,2-Dibromoethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	95-50-1	1,2-Dichlorobenzene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	107-06-2	1,2-Dichloroethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	78-87-5	1,2-Dichloropropane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	541-73-1	1,3-Dichlorobenzene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	106-46-7	1,4-Dichlorobenzene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	78-93-3	2-Butanone	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	591-78-6	2-Hexanone	11	UG_KG		11	UJ	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	108-10-1	4-Methyl-2-pentanone	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	67-64-1	Acetone	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	71-43-2	Benzene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	75-27-4	Bromodichloromethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	75-25-2	Bromoform	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	74-83-9	Bromomethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	75-15-0	Carbon disulfide	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	56-23-5	Carbon tetrachloride	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	108-90-7	Chlorobenzene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	75-00-3	Chloroethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	67-66-3	Chloroform	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	74-87-3	Chloromethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	156-59-2	cis-1,2-Dichloroethene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	110-82-7	Cyclohexane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	124-48-1	Dibromochloromethane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	100-41-4	Ethylbenzene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	98-82-8	Isopropylbenzene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	79-20-9	Methyl acetate	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	108-87-2	Methylcyclohexane	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	75-09-2	Methylene chloride	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	100-42-5	Styrene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	127-18-4	Tetrachloroethene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	108-88-3	Toluene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	156-60-5	trans-1,2-Dichloroethene	11	UG_KG		11	UJ	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	79-01-6	Trichloroethene	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	75-01-4	Vinyl chloride	11	UG_KG		11	U	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	1330-20-7	Xylene, total	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	METAL	7429-90-5	Aluminum	12400	MG_KG		22.2	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	METAL	7440-36-0	Antimony	6.7	MG_KG		6.7	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	METAL	7440-38-2	Arsenic	1.1	MG_KG		1.1	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	METAL	7440-39-3	Barium	84.3	MG_KG		22.2	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	METAL	7440-41-7	Beryllium	0.56	MG_KG		0.56	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	METAL	7440-43-9	Cadmium	0.56	MG_KG		0.56	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	METAL	7440-70-2	Calcium	3040	MG_KG		555	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	METAL	7440-47-3	Chromium	11.6	MG_KG		1.1	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	METAL	7440-48-4	Cobalt	11.1	MG_KG		5.5	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	METAL	7440-50-8	Copper	57.5	MG_KG		2.8	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	METAL	57-12-5	Cyanide	2.8	MG_KG		2.8	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	METAL	7439-89-6	Iron	20500	MG_KG		11.1	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	METAL	7439-92-1	Lead	1.4	MG_KG		1.1	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	METAL	7439-95-4	Magnesium	3250	MG_KG		555	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	METAL	7439-96-5	Manganese	504	MG_KG		1.7	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	METAL	7439-97-6	Mercury	0.11	MG_KG		0.11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	METAL	7440-02-0	Nickel	9.7	MG_KG		4.4	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	METAL	7440-09-7	Potassium	555	MG_KG		555	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	METAL	7782-49-2	Selenium	0.49	MG_KG		3.9	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	METAL	7440-22-4	Silver	1.1	MG_KG		1.1	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	METAL	7440-23-5	Sodium	555	MG_KG		555	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	METAL	7440-28-0	Thallium	0.56	MG_KG		0.56	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	METAL	7440-62-2	Vanadium	70.3	MG_KG		5.5	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	METAL	7440-66-6	Zinc	17.4	MG_KG		6.7	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	72-54-8	4,4'-DDD	3.7	UG_KG		3.7	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	72-55-9	4,4'-DDE	2.7	UG_KG		3.7	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	50-29-3	4,4'-DDT	2.2	UG_KG		3.7	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	309-00-2	Aldrin	1.9	UG_KG		1.9	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	319-84-6	alpha-BHC	1.9	UG_KG		1.9	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	5103-71-9	alpha-Chlordane	1.9	UG_KG		1.9	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	319-85-7	beta-BHC	1.9	UG_KG		1.9	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	319-86-8	delta-BHC	1.9	UG_KG		1.9	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	60-57-1	Dieldrin	3.7	UG_KG		3.7	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	959-98-8	Endosulfan I	1.9	UG_KG		1.9	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	33213-65-9	Endosulfan II	3.7	UG_KG		3.7	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	1031-07-8	Endosulfan sulfate	3.7	UG_KG		3.7	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	72-20-8	Endrin	3.7	UG_KG		3.7	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	7421-93-4	Endrin aldehyde	3.7	UG_KG		3.7	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	53494-70-5	Endrin ketone	3.7	UG_KG		3.7	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	58-89-9	gamma-BHC (Lindane)	1.9	UG_KG		1.9	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	5103-74-2	gamma-Chlordane	0.5	UG_KG		1.9	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	76-44-8	Heptachlor	1.9	UG_KG		1.9	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	1024-57-3	Heptachlor epoxide	1.9	UG_KG		1.9	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	72-43-5	Methoxychlor	19	UG_KG		19	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	8001-35-2	Toxaphene	190	UG_KG		190	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	92-52-4	1,1-Biphenyl	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	920	UG_KG		920	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	120-83-2	2,4-Dichlorophenol	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	105-67-9	2,4-Dimethylphenol	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	51-28-5	2,4-Dinitrophenol	920	UG_KG		920	UJ	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	121-14-2	2,4-Dinitrotoluene	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	606-20-2	2,6-Dinitrotoluene	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	91-58-7	2-Chloronaphthalene	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	95-57-8	2-Chlorophenol	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	91-57-6	2-Methylnaphthalene	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	95-48-7	2-Methylphenol	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	88-74-4	2-Nitroaniline	920	UG_KG		920	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	88-75-5	2-Nitrophenol	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	370	UG_KG		370	U	No

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	99-09-2	3-Nitroaniline	920	UG_KG		920	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	920	UG_KG		920	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	106-47-8	4-Chloroaniline	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	106-44-5	4-Methylphenol	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	100-01-6	4-Nitroaniline	920	UG_KG		920	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	100-02-7	4-Nitrophenol	920	UG_KG		920	UJ	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	83-32-9	Acenaphthene	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	208-96-8	Acenaphthylene	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	98-86-2	Acetophenone	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	120-12-7	Anthracene	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	1912-24-9	Atrazine	370	UG_KG		370	UJ	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	100-52-7	Benzaldehyde	370	UG_KG		370	UJ	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	56-55-3	Benzo(a)anthracene	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	50-32-8	Benzo(a)pyrene	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	205-99-2	Benzo(b)fluoranthene	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	191-24-2	Benzo(g,h,i)perylene	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	207-08-9	Benzo(k)fluoranthene	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	85-68-7	Butylbenzylphthalate	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	105-60-2	Caprolactam	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	86-74-8	Carbazole	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	218-01-9	Chrysene	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	53-70-3	Dibenz(a,h)anthracene	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	132-64-9	Dibenzofuran	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	84-66-2	Diethylphthalate	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	131-11-3	Dimethyl phthalate	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	84-74-2	Di-n-butylphthalate	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	117-84-0	Di-n-octylphthalate	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	206-44-0	Fluoranthene	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	86-73-7	Fluorene	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	118-74-1	Hexachlorobenzene	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	87-68-3	Hexachlorobutadiene	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	67-72-1	Hexachloroethane	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	78-59-1	Isophorone	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	91-20-3	Naphthalene	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	98-95-3	Nitrobenzene	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	87-86-5	Pentachlorophenol	920	UG_KG		920	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	85-01-8	Phenanthrene	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	108-95-2	Phenol	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	129-00-0	Pyrene	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	71-55-6	1,1,1-Trichloroethane	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	79-00-5	1,1,2-Trichloroethane	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	75-34-3	1,1-Dichloroethane	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	75-35-4	1,1-Dichloroethene	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	106-93-4	1,2-Dibromoethane	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	95-50-1	1,2-Dichlorobenzene	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	107-06-2	1,2-Dichloroethane	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	78-87-5	1,2-Dichloropropane	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	541-73-1	1,3-Dichlorobenzene	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	106-46-7	1,4-Dichlorobenzene	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	78-93-3	2-Butanone	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	591-78-6	2-Hexanone	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	108-10-1	4-Methyl-2-pentanone	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	67-64-1	Acetone	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	71-43-2	Benzene	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	75-27-4	Bromodichloromethane	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	75-25-2	Bromoform	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	74-83-9	Bromomethane	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	75-15-0	Carbon disulfide	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	56-23-5	Carbon tetrachloride	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	108-90-7	Chlorobenzene	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	75-00-3	Chloroethane	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	67-66-3	Chloroform	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	74-87-3	Chloromethane	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	156-59-2	cis-1,2-Dichloroethene	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	110-82-7	Cyclohexane	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	124-48-1	Dibromochloromethane	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	100-41-4	Ethylbenzene	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	98-82-8	Isopropylbenzene	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	79-20-9	Methyl acetate	11	UG_KG		11	UJ	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	108-87-2	Methylcyclohexane	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	75-09-2	Methylene chloride	11	UG_KG		11	UJ	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	100-42-5	Styrene	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	127-18-4	Tetrachloroethene	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	108-88-3	Toluene	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	156-60-5	trans-1,2-Dichloroethene	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	79-01-6	Trichloroethene	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	75-01-4	Vinyl chloride	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	1330-20-7	Xylene, total	11	UG_KG		11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	METAL	7429-90-5	Aluminum	6100	MG_KG		21.9	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	METAL	7440-36-0	Antimony	6.6	MG_KG		6.6	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	METAL	7440-38-2	Arsenic	1.1	MG_KG		1.1	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	METAL	7440-39-3	Barium	52.1	MG_KG		21.9	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	METAL	7440-41-7	Beryllium	0.55	MG_KG		0.55	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	METAL	7440-43-9	Cadmium	0.55	MG_KG		0.55	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	METAL	7440-70-2	Calcium	4610	MG_KG		546	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	METAL	7440-47-3	Chromium	10.2	MG_KG		1.1	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	METAL	7440-48-4	Cobalt	8.3	MG_KG		5.5	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	METAL	7440-50-8	Copper	39.3	MG_KG		2.7	J	Yes

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	METAL	57-12-5	Cyanide	2.7	MG_KG		2.7	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	METAL	7439-89-6	Iron	14400	MG_KG		10.9	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	METAL	7439-92-1	Lead	7.6	MG_KG		1.1	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	METAL	7439-95-4	Magnesium	1380	MG_KG		546	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	METAL	7439-96-5	Manganese	514	MG_KG		1.6	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	METAL	7439-97-6	Mercury	0.11	MG_KG		0.11	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	METAL	7440-02-0	Nickel	4.4	MG_KG		4.4	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	METAL	7440-09-7	Potassium	753	MG_KG		546	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	METAL	7782-49-2	Selenium	0.54	MG_KG		3.8	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	METAL	7440-22-4	Silver	1.1	MG_KG		1.1	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	METAL	7440-23-5	Sodium	546	MG_KG		546	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	METAL	7440-28-0	Thallium	0.55	MG_KG		0.55	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	METAL	7440-62-2	Vanadium	55.5	MG_KG		5.5	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	METAL	7440-66-6	Zinc	38.7	MG_KG		6.6	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	72-54-8	4,4'-DDD	2.1	UG_KG		7.3	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	72-55-9	4,4'-DDE	620	UG_KG		73		Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	50-29-3	4,4'-DDT	100	UG_KG		7.3		Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	309-00-2	Aldrin	3.7	UG_KG		3.7	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	319-84-6	alpha-BHC	3.7	UG_KG		3.7	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	5103-71-9	alpha-Chlordane	3.7	UG_KG		3.7	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	319-85-7	beta-BHC	3.7	UG_KG		3.7	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	319-86-8	delta-BHC	0.75	UG_KG		3.7	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	60-57-1	Dieldrin	7.3	UG_KG		7.3	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	959-98-8	Endosulfan I	3.7	UG_KG		3.7	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	33213-65-9	Endosulfan II	7.3	UG_KG		7.3	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	7.3	UG_KG		7.3	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	72-20-8	Endrin	7.3	UG_KG		7.3	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	7421-93-4	Endrin aldehyde	7.3	UG_KG		7.3	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	53494-70-5	Endrin ketone	7.3	UG_KG		7.3	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	3.7	UG_KG		3.7	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	5103-74-2	gamma-Chlordane	1	UG_KG		3.7	J	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	76-44-8	Heptachlor	3.7	UG_KG		3.7	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	3.7	UG_KG		3.7	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	72-43-5	Methoxychlor	37	UG_KG		37	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	8001-35-2	Toxaphene	370	UG_KG		370	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	92-52-4	1,1-Biphenyl	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	910	UG_KG		910	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	120-83-2	2,4-Dichlorophenol	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	105-67-9	2,4-Dimethylphenol	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	51-28-5	2,4-Dinitrophenol	910	UG_KG		910	UJ	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	121-14-2	2,4-Dinitrotoluene	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	606-20-2	2,6-Dinitrotoluene	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	91-58-7	2-Chloronaphthalene	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	95-57-8	2-Chlorophenol	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	91-57-6	2-Methylnaphthalene	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	95-48-7	2-Methylphenol	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	88-74-4	2-Nitroaniline	910	UG_KG		910	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	88-75-5	2-Nitrophenol	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	99-09-2	3-Nitroaniline	910	UG_KG		910	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	910	UG_KG		910	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	106-47-8	4-Chloroaniline	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	106-44-5	4-Methylphenol	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	100-01-6	4-Nitroaniline	910	UG_KG		910	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	100-02-7	4-Nitrophenol	910	UG_KG		910	UJ	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	83-32-9	Acenaphthene	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	208-96-8	Acenaphthylene	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	98-86-2	Acetophenone	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	120-12-7	Anthracene	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	1912-24-9	Atrazine	360	UG_KG		360	UJ	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	100-52-7	Benzaldehyde	360	UG_KG		360	UJ	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	56-55-3	Benzo(a)anthracene	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	50-32-8	Benzo(a)pyrene	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	205-99-2	Benzo(b)fluoranthene	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	191-24-2	Benzo(g,h,i)perylene	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	207-08-9	Benzo(k)fluoranthene	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	85-68-7	Butylbenzylphthalate	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	105-60-2	Caprolactam	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	86-74-8	Carbazole	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	218-01-9	Chrysene	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	53-70-3	Dibenz(a,h)anthracene	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	132-64-9	Dibenzofuran	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	84-66-2	Diethylphthalate	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	131-11-3	Dimethyl phthalate	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	84-74-2	Di-n-butylphthalate	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	117-84-0	Di-n-octylphthalate	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	206-44-0	Fluoranthene	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	86-73-7	Fluorene	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	118-74-1	Hexachlorobenzene	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	87-68-3	Hexachlorobutadiene	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	67-72-1	Hexachloroethane	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	78-59-1	Isophorone	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	91-20-3	Naphthalene	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	98-95-3	Nitrobenzene	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	87-86-5	Pentachlorophenol	910	UG_KG		910	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	85-01-8	Phenanthrene	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	108-95-2	Phenol	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	129-00-0	Pyrene	360	UG_KG		360	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	71-55-6	1,1,1-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	79-00-5	1,1,2-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	75-34-3	1,1-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	75-35-4	1,1-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	10	UG_KG		10	U	No

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	106-93-4	1,2-Dibromoethane	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	95-50-1	1,2-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	107-06-2	1,2-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	78-87-5	1,2-Dichloropropane	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	541-73-1	1,3-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	106-46-7	1,4-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	78-93-3	2-Butanone	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	591-78-6	2-Hexanone	10	UG_KG		10	UJ	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	108-10-1	4-Methyl-2-pentanone	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	67-64-1	Acetone	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	71-43-2	Benzene	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	75-27-4	Bromodichloromethane	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	75-25-2	Bromoform	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	74-83-9	Bromomethane	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	75-15-0	Carbon disulfide	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	56-23-5	Carbon tetrachloride	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	108-90-7	Chlorobenzene	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	75-00-3	Chloroethane	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	67-66-3	Chloroform	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	74-87-3	Chloromethane	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	156-59-2	cis-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	110-82-7	Cyclohexane	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	124-48-1	Dibromochloromethane	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	100-41-4	Ethylbenzene	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	98-82-8	Isopropylbenzene	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	79-20-9	Methyl acetate	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	108-87-2	Methylcyclohexane	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	75-09-2	Methylene chloride	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	100-42-5	Styrene	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	127-18-4	Tetrachloroethene	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	108-88-3	Toluene	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	156-60-5	trans-1,2-Dichloroethene	10	UG_KG		10	UJ	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	79-01-6	Trichloroethene	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	75-01-4	Vinyl chloride	10	UG_KG		10	U	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	1330-20-7	Xylene, total	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	METAL	7429-90-5	Aluminum	8380	MG_KG		22.2	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	METAL	7440-36-0	Antimony	6.7	MG_KG		6.7	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	METAL	7440-38-2	Arsenic	1.1	MG_KG		1.1	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	METAL	7440-39-3	Barium	55.8	MG_KG		22.2	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	METAL	7440-41-7	Beryllium	0.56	MG_KG		0.56	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	METAL	7440-43-9	Cadmium	0.56	MG_KG		0.56	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	METAL	7440-70-2	Calcium	2550	MG_KG		556	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	METAL	7440-47-3	Chromium	11.2	MG_KG		1.1	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	METAL	7440-48-4	Cobalt	9.3	MG_KG		5.6	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	METAL	7440-50-8	Copper	48.4	MG_KG		2.8	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	METAL	57-12-5	Cyanide	2.8	MG_KG		2.8	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	METAL	7439-89-6	Iron	18500	MG_KG		11.1	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	METAL	7439-92-1	Lead	1.5	MG_KG		1.1	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	METAL	7439-95-4	Magnesium	3080	MG_KG		556	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	METAL	7439-96-5	Manganese	594	MG_KG		1.7	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	METAL	7439-97-6	Mercury	0.11	MG_KG		0.11	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	METAL	7440-02-0	Nickel	6.7	MG_KG		4.4	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	METAL	7440-09-7	Potassium	556	MG_KG		556	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	METAL	7782-49-2	Selenium	3.9	MG_KG		3.9	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	METAL	7440-22-4	Silver	1.1	MG_KG		1.1	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	METAL	7440-23-5	Sodium	556	MG_KG		556	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	METAL	7440-28-0	Thallium	0.56	MG_KG		0.56	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	METAL	7440-62-2	Vanadium	75.3	MG_KG		5.6	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	METAL	7440-66-6	Zinc	17.2	MG_KG		6.7	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	72-54-8	4,4'-DDD	1.2	UG_KG		3.7	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	72-55-9	4,4'-DDE	1.1	UG_KG		3.7	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	50-29-3	4,4'-DDT	3.7	UG_KG		3.7	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	309-00-2	Aldrin	1.9	UG_KG		1.9	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	319-84-6	alpha-BHC	1.9	UG_KG		1.9	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	5103-71-9	alpha-Chlordane	1.9	UG_KG		1.9	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	319-85-7	beta-BHC	1.9	UG_KG		1.9	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	319-86-8	delta-BHC	1.9	UG_KG		1.9	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	60-57-1	Dieldrin	3.7	UG_KG		3.7	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	959-98-8	Endosulfan I	1.9	UG_KG		1.9	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	33213-65-9	Endosulfan II	3.7	UG_KG		3.7	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	1031-07-8	Endosulfan sulfate	3.7	UG_KG		3.7	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	72-20-8	Endrin	3.7	UG_KG		3.7	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	7421-93-4	Endrin aldehyde	3.7	UG_KG		3.7	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	53494-70-5	Endrin ketone	3.7	UG_KG		3.7	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	58-89-9	gamma-BHC (Lindane)	1.9	UG_KG		1.9	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	5103-74-2	gamma-Chlordane	0.48	UG_KG		1.9	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	76-44-8	Heptachlor	1.9	UG_KG		1.9	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	1024-57-3	Heptachlor epoxide	1.9	UG_KG		1.9	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	72-43-5	Methoxychlor	19	UG_KG		19	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	8001-35-2	Toxaphene	190	UG_KG		190	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	92-52-4	1,1-Biphenyl	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	920	UG_KG		920	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	120-83-2	2,4-Dichlorophenol	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	105-67-9	2,4-Dimethylphenol	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	51-28-5	2,4-Dinitrophenol	920	UG_KG		920	UJ	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	121-14-2	2,4-Dinitrotoluene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	606-20-2	2,6-Dinitrotoluene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	91-58-7	2-Chloronaphthalene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	95-57-8	2-Chlorophenol	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	91-57-6	2-Methylnaphthalene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	95-48-7	2-Methylphenol	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	88-74-4	2-Nitroaniline	920	UG_KG		920	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	88-75-5	2-Nitrophenol	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	99-09-2	3-Nitroaniline	920	UG_KG		920	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	920	UG_KG		920	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	106-47-8	4-Chloroaniline	370	UG_KG		370	U	No

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	106-44-5	4-Methylphenol	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	100-01-6	4-Nitroaniline	920	UG_KG		920	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	100-02-7	4-Nitrophenol	920	UG_KG		920	UJ	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	83-32-9	Acenaphthene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	208-96-8	Acenaphthylene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	98-86-2	Acetophenone	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	120-12-7	Anthracene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	1912-24-9	Atrazine	370	UG_KG		370	UJ	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	100-52-7	Benzaldehyde	370	UG_KG		370	UJ	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	56-55-3	Benzo(a)anthracene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	50-32-8	Benzo(a)pyrene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	205-99-2	Benzo(b)fluoranthene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	191-24-2	Benzo(g,h,i)perylene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	207-08-9	Benzo(k)fluoranthene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	85-68-7	Butylbenzylphthalate	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	105-60-2	Caprolactam	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	86-74-8	Carbazole	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	218-01-9	Chrysene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	53-70-3	Dibenz(a,h)anthracene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	132-64-9	Dibenzofuran	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	84-66-2	Diethylphthalate	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	131-11-3	Dimethyl phthalate	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	84-74-2	Di-n-butylphthalate	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	117-84-0	Di-n-octylphthalate	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	206-44-0	Fluoranthene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	86-73-7	Fluorene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	118-74-1	Hexachlorobenzene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	87-68-3	Hexachlorobutadiene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	67-72-1	Hexachloroethane	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	78-59-1	Isophorone	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	91-20-3	Naphthalene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	98-95-3	Nitrobenzene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	87-86-5	Pentachlorophenol	920	UG_KG		920	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	85-01-8	Phenanthrene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	108-95-2	Phenol	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	129-00-0	Pyrene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	71-55-6	1,1,1-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	79-00-5	1,1,2-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	75-34-3	1,1-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	75-35-4	1,1-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	106-93-4	1,2-Dibromoethane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	95-50-1	1,2-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	107-06-2	1,2-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	78-87-5	1,2-Dichloropropane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	541-73-1	1,3-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	106-46-7	1,4-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	78-93-3	2-Butanone	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	591-78-6	2-Hexanone	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	108-10-1	4-Methyl-2-pentanone	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	67-64-1	Acetone	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	71-43-2	Benzene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	75-27-4	Bromodichloromethane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	75-25-2	Bromoform	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	74-83-9	Bromomethane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	75-15-0	Carbon disulfide	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	56-23-5	Carbon tetrachloride	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	108-90-7	Chlorobenzene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	75-00-3	Chloroethane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	67-66-3	Chloroform	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	74-87-3	Chloromethane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	156-59-2	cis-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	110-82-7	Cyclohexane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	124-48-1	Dibromochloromethane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	100-41-4	Ethylbenzene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	98-82-8	Isopropylbenzene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	79-20-9	Methyl acetate	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	108-87-2	Methylcyclohexane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	75-09-2	Methylene chloride	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	100-42-5	Styrene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	127-18-4	Tetrachloroethene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	108-88-3	Toluene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	156-60-5	trans-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	79-01-6	Trichloroethene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	75-01-4	Vinyl chloride	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	1330-20-7	Xylene, total	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	METAL	7429-90-5	Aluminum	8540	MG_KG		22.3	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	METAL	7440-36-0	Antimony	6.7	MG_KG		6.7	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	METAL	7440-38-2	Arsenic	1.1	MG_KG		1.1	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	METAL	7440-39-3	Barium	50.9	MG_KG		22.3	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	METAL	7440-41-7	Beryllium	0.56	MG_KG		0.56	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	METAL	7440-43-9	Cadmium	0.56	MG_KG		0.56	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	METAL	7440-70-2	Calcium	7410	MG_KG		557	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	METAL	7440-47-3	Chromium	10	MG_KG		1.1	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	METAL	7440-48-4	Cobalt	9.1	MG_KG		5.6	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	METAL	7440-50-8	Copper	38.8	MG_KG		2.8	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	METAL	57-12-5	Cyanide	2.8	MG_KG		2.8	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	METAL	7439-89-6	Iron	16000	MG_KG		11.1	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	METAL	7439-92-1	Lead	6.8	MG_KG		1.1	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	METAL	7439-95-4	Magnesium	2070	MG_KG		557	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	METAL	7439-96-5	Manganese	365	MG_KG		1.7	J	Yes

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	METAL	7439-97-6	Mercury	0.11	MG_KG		0.11	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	METAL	7440-02-0	Nickel	4.5	MG_KG		4.5	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	METAL	7440-09-7	Potassium	823	MG_KG		557	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	METAL	7782-49-2	Selenium	0.44	MG_KG		3.9	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	METAL	7440-22-4	Silver	1.1	MG_KG		1.1	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	METAL	7440-23-5	Sodium	557	MG_KG		557	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	METAL	7440-28-0	Thallium	0.56	MG_KG		0.56	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	METAL	7440-62-2	Vanadium	57.5	MG_KG		5.6	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	METAL	7440-66-6	Zinc	22.7	MG_KG		6.7	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	72-54-8	4,4'-DDD	3.1	UG_KG		3.7	J	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	72-55-9	4,4'-DDE	36	UG_KG		3.7		Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	50-29-3	4,4'-DDT	7.8	UG_KG		3.7		Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	309-00-2	Aldrin	1.9	UG_KG		1.9	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	319-84-6	alpha-BHC	1.9	UG_KG		1.9	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	5103-71-9	alpha-Chlordane	1.9	UG_KG		1.9	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	319-85-7	beta-BHC	1.9	UG_KG		1.9	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	319-86-8	delta-BHC	1.9	UG_KG		1.9	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	60-57-1	Dieldrin	3.7	UG_KG		3.7	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	959-98-8	Endosulfan I	1.9	UG_KG		1.9	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	33213-65-9	Endosulfan II	3.7	UG_KG		3.7	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	3.7	UG_KG		3.7	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	72-20-8	Endrin	3.7	UG_KG		3.7	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	7421-93-4	Endrin aldehyde	3.7	UG_KG		3.7	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	53494-70-5	Endrin ketone	3.7	UG_KG		3.7	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	1.9	UG_KG		1.9	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	5103-74-2	gamma-Chlordane	1.9	UG_KG		1.9	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	76-44-8	Heptachlor	1.9	UG_KG		1.9	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	1.9	UG_KG		1.9	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	72-43-5	Methoxychlor	19	UG_KG		19	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	8001-35-2	Toxaphene	190	UG_KG		190	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	92-52-4	1,1-Biphenyl	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	920	UG_KG		920	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	120-83-2	2,4-Dichlorophenol	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	105-67-9	2,4-Dimethylphenol	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	51-28-5	2,4-Dinitrophenol	920	UG_KG		920	UJ	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	121-14-2	2,4-Dinitrotoluene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	606-20-2	2,6-Dinitrotoluene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	91-58-7	2-Chloronaphthalene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	95-57-8	2-Chlorophenol	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	91-57-6	2-Methylnaphthalene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	95-48-7	2-Methylphenol	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	88-74-4	2-Nitroaniline	920	UG_KG		920	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	88-75-5	2-Nitrophenol	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	99-09-2	3-Nitroaniline	920	UG_KG		920	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	920	UG_KG		920	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	106-47-8	4-Chloroaniline	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	106-44-5	4-Methylphenol	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	100-01-6	4-Nitroaniline	920	UG_KG		920	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	100-02-7	4-Nitrophenol	920	UG_KG		920	UJ	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	83-32-9	Acenaphthene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	208-96-8	Acenaphthylene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	98-86-2	Acetophenone	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	120-12-7	Anthracene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	1912-24-9	Atrazine	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	100-52-7	Benzaldehyde	370	UG_KG		370	UJ	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	56-55-3	Benzo(a)anthracene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	50-32-8	Benzo(a)pyrene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	205-99-2	Benzo(b)fluoranthene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	191-24-2	Benzo(g,h,i)perylene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	207-08-9	Benzo(k)fluoranthene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	85-68-7	Butylbenzylphthalate	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	105-60-2	Caprolactam	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	86-74-8	Carbazole	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	218-01-9	Chrysene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	53-70-3	Dibenz(a,h)anthracene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	132-64-9	Dibenzofuran	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	84-66-2	Diethylphthalate	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	131-11-3	Dimethyl phthalate	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	84-74-2	Di-n-butylphthalate	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	117-84-0	Di-n-octylphthalate	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	206-44-0	Fluoranthene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	86-73-7	Fluorene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	118-74-1	Hexachlorobenzene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	87-68-3	Hexachlorobutadiene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	67-72-1	Hexachloroethane	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	78-59-1	Isophorone	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	91-20-3	Naphthalene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	98-95-3	Nitrobenzene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	87-86-5	Pentachlorophenol	920	UG_KG		920	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	85-01-8	Phenanthrene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	108-95-2	Phenol	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	129-00-0	Pyrene	370	UG_KG		370	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	71-55-6	1,1,1-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	79-00-5	1,1,2-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	75-34-3	1,1-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	75-35-4	1,1-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	106-93-4	1,2-Dibromoethane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	95-50-1	1,2-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	107-06-2	1,2-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	78-87-5	1,2-Dichloropropane	10	UG_KG		10	U	No

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	541-73-1	1,3-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	106-46-7	1,4-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	78-93-3	2-Butanone	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	591-78-6	2-Hexanone	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	108-10-1	4-Methyl-2-pentanone	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	67-64-1	Acetone	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	71-43-2	Benzene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	75-27-4	Bromodichloromethane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	75-25-2	Bromoform	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	74-83-9	Bromomethane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	75-15-0	Carbon disulfide	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	56-23-5	Carbon tetrachloride	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	108-90-7	Chlorobenzene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	75-00-3	Chloroethane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	67-66-3	Chloroform	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	74-87-3	Chloromethane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	156-59-2	cis-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	110-82-7	Cyclohexane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	124-48-1	Dibromochloromethane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	100-41-4	Ethylbenzene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	98-82-8	Isopropylbenzene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	79-20-9	Methyl acetate	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	108-87-2	Methylcyclohexane	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	75-09-2	Methylene chloride	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	100-42-5	Styrene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	127-18-4	Tetrachloroethene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	108-88-3	Toluene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	156-60-5	trans-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	79-01-6	Trichloroethene	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	75-01-4	Vinyl chloride	10	UG_KG		10	U	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	1330-20-7	Xylene, total	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	METAL	7429-90-5	Aluminum	8620	MG_KG		21.1		Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	METAL	7440-36-0	Antimony	0.52	MG_KG		6.3	J	Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	METAL	7440-38-2	Arsenic	0.54	MG_KG		1.1	J	Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	METAL	7440-39-3	Barium	47.3	MG_KG		21.1		Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	METAL	7440-41-7	Beryllium	0.53	MG_KG		0.53	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	METAL	7440-43-9	Cadmium	0.53	MG_KG		0.53	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	METAL	7440-70-2	Calcium	2980	MG_KG		528		Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	METAL	7440-47-3	Chromium	9.6	MG_KG		1.1		Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	METAL	7440-48-4	Cobalt	9.3	MG_KG		5.3		Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	METAL	7440-50-8	Copper	39.3	MG_KG		2.6		Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	METAL	57-12-5	Cyanide	2.6	MG_KG		2.6	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	METAL	7439-89-6	Iron	17600	MG_KG		10.6		Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	METAL	7439-92-1	Lead	1.2	MG_KG		1.1		Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	METAL	7439-95-4	Magnesium	4020	MG_KG		528		Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	METAL	7439-96-5	Manganese	382	MG_KG		1.6		Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	METAL	7439-97-6	Mercury	0.11	MG_KG		0.11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	METAL	7440-02-0	Nickel	4.6	MG_KG		4.2	J	Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	METAL	7440-09-7	Potassium	805	MG_KG		528	J	Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	METAL	7782-49-2	Selenium	3.7	MG_KG		3.7	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	METAL	7440-22-4	Silver	1.1	MG_KG		1.1	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	METAL	7440-23-5	Sodium	528	MG_KG		528	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	METAL	7440-28-0	Thallium	0.53	MG_KG		0.53	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	METAL	7440-62-2	Vanadium	59.3	MG_KG		5.3		Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	METAL	7440-66-6	Zinc	14.2	MG_KG		6.3		Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	72-54-8	4,4'-DDD	3.5	UG_KG		3.5	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	72-55-9	4,4'-DDE	71	UG_KG		6.9		Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	50-29-3	4,4'-DDT	8.5	UG_KG		3.5		Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	309-00-2	Aldrin	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	319-84-6	alpha-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	5103-71-9	alpha-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	12674-11-2	Aroclor-1016	35	UG_KG		35	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	11104-28-2	Aroclor-1221	71	UG_KG		71	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	11141-16-5	Aroclor-1232	35	UG_KG		35	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	53469-21-9	Aroclor-1242	35	UG_KG		35	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	12672-29-6	Aroclor-1248	35	UG_KG		35	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	11097-69-1	Aroclor-1254	35	UG_KG		35	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	11096-82-5	Aroclor-1260	35	UG_KG		35	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	319-85-7	beta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	319-86-8	delta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	60-57-1	Dieldrin	3.5	UG_KG		3.5	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	959-98-8	Endosulfan I	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	33213-65-9	Endosulfan II	3.5	UG_KG		3.5	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	1031-07-8	Endosulfan sulfate	3.5	UG_KG		3.5	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	72-20-8	Endrin	3.5	UG_KG		3.5	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	7421-93-4	Endrin aldehyde	1.5	UG_KG		3.5	J	Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	53494-70-5	Endrin ketone	3.5	UG_KG		3.5	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	58-89-9	gamma-BHC (Lindane)	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	5103-74-2	gamma-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	76-44-8	Heptachlor	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	1024-57-3	Heptachlor epoxide	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	72-43-5	Methoxychlor	18	UG_KG		18	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	8001-35-2	Toxaphene	180	UG_KG		180	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	92-52-4	1,1-Biphenyl	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	870	UG_KG		870	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	120-83-2	2,4-Dichlorophenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	105-67-9	2,4-Dimethylphenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	51-28-5	2,4-Dinitrophenol	870	UG_KG		870	UJ	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	121-14-2	2,4-Dinitrotoluene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	606-20-2	2,6-Dinitrotoluene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	91-58-7	2-Chloronaphthalene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	95-57-8	2-Chlorophenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	91-57-6	2-Methylnaphthalene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	95-48-7	2-Methylphenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	88-74-4	2-Nitroaniline	870	UG_KG		870	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	88-75-5	2-Nitrophenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	99-09-2	3-Nitroaniline	870	UG_KG		870	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	870	UG_KG		870	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	350	UG_KG		350	U	No

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	106-47-8	4-Chloroaniline	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	106-44-5	4-Methylphenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	100-01-6	4-Nitroaniline	870	UG_KG		870	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	100-02-7	4-Nitrophenol	870	UG_KG		870	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	83-32-9	Acenaphthene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	208-96-8	Acenaphthylene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	98-86-2	Acetophenone	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	120-12-7	Anthracene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	1912-24-9	Atrazine	350	UG_KG		350	UJ	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	100-52-7	Benzaldehyde	350	UG_KG		350	UJ	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	56-55-3	Benzo(a)anthracene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	50-32-8	Benzo(a)pyrene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	205-99-2	Benzo(b)fluoranthene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	191-24-2	Benzo(g,h,i)perylene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	207-08-9	Benzo(k)fluoranthene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	85-68-7	Butylbenzylphthalate	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	105-60-2	Caprolactam	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	86-74-8	Carbazole	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	218-01-9	Chrysene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	53-70-3	Dibenz(a,h)anthracene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	132-64-9	Dibenzofuran	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	84-66-2	Diethylphthalate	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	131-11-3	Dimethyl phthalate	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	84-74-2	Di-n-butylphthalate	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	117-84-0	Di-n-octylphthalate	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	206-44-0	Fluoranthene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	86-73-7	Fluorene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	118-74-1	Hexachlorobenzene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	87-68-3	Hexachlorobutadiene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	67-72-1	Hexachloroethane	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	78-59-1	Isophorone	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	91-20-3	Naphthalene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	98-95-3	Nitrobenzene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	87-86-5	Pentachlorophenol	870	UG_KG		870	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	85-01-8	Phenanthrene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	108-95-2	Phenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	129-00-0	Pyrene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	71-55-6	1,1,1-Trichloroethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	79-00-5	1,1,2-Trichloroethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	75-34-3	1,1-Dichloroethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	75-35-4	1,1-Dichloroethene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	106-93-4	1,2-Dibromoethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	95-50-1	1,2-Dichlorobenzene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	107-06-2	1,2-Dichloroethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	78-87-5	1,2-Dichloropropane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	541-73-1	1,3-Dichlorobenzene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	106-46-7	1,4-Dichlorobenzene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	78-93-3	2-Butanone	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	591-78-6	2-Hexanone	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	108-10-1	4-Methyl-2-pentanone	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	67-64-1	Acetone	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	71-43-2	Benzene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	75-27-4	Bromodichloromethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	75-25-2	Bromoform	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	74-83-9	Bromomethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	75-15-0	Carbon disulfide	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	56-23-5	Carbon tetrachloride	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	108-90-7	Chlorobenzene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	75-00-3	Chloroethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	67-66-3	Chloroform	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	74-87-3	Chloromethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	156-59-2	cis-1,2-Dichloroethene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	110-82-7	Cyclohexane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	124-48-1	Dibromochloromethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	100-41-4	Ethylbenzene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	98-82-8	Isopropylbenzene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	79-20-9	Methyl acetate	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	108-87-2	Methylcyclohexane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	75-09-2	Methylene chloride	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	100-42-5	Styrene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	127-18-4	Tetrachloroethene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	108-88-3	Toluene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	156-60-5	trans-1,2-Dichloroethene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	79-01-6	Trichloroethene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	75-01-4	Vinyl chloride	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	1330-20-7	Xylene, total	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	METAL	7429-90-5	Aluminum	8000	MG_KG		21.3		Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	METAL	7440-36-0	Antimony	0.44	MG_KG		6.4	J	Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	METAL	7440-38-2	Arsenic	1.1	MG_KG		1.1	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	METAL	7440-39-3	Barium	42.3	MG_KG		21.3		Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	METAL	7440-41-7	Beryllium	0.53	MG_KG		0.53	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	METAL	7440-43-9	Cadmium	0.53	MG_KG		0.53	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	METAL	7440-70-2	Calcium	2970	MG_KG		532		Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	METAL	7440-47-3	Chromium	11	MG_KG		1.1		Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	METAL	7440-48-4	Cobalt	8	MG_KG		5.3		Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	METAL	7440-50-8	Copper	40.2	MG_KG		2.7		Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	METAL	57-12-5	Cyanide	2.7	MG_KG		2.7	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	METAL	7439-89-6	Iron	17600	MG_KG		10.6		Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	METAL	7439-92-1	Lead	1.1	MG_KG		1.1		Yes

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	METAL	7439-95-4	Magnesium	3330	MG_KG		532		Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	METAL	7439-96-5	Manganese	368	MG_KG		1.6		Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	METAL	7439-97-6	Mercury	0.11	MG_KG		0.11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	METAL	7440-02-0	Nickel	4.4	MG_KG		4.3	J	Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	METAL	7440-09-7	Potassium	715	MG_KG		532	J	Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	METAL	7782-49-2	Selenium	3.7	MG_KG		3.7	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	METAL	7440-22-4	Silver	1.1	MG_KG		1.1	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	METAL	7440-23-5	Sodium	532	MG_KG		532	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	METAL	7440-28-0	Thallium	0.53	MG_KG		0.53	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	METAL	7440-62-2	Vanadium	61.8	MG_KG		5.3		Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	METAL	7440-66-6	Zinc	13.7	MG_KG		6.4		Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	72-54-8	4,4'-DDD	3.5	UG_KG		3.5	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	72-55-9	4,4'-DDE	47	UG_KG		3.5		Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	50-29-3	4,4'-DDT	11	UG_KG		3.5		Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	309-00-2	Aldrin	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	319-84-6	alpha-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	5103-71-9	alpha-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	12674-11-2	Aroclor-1016	35	UG_KG		35	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	11104-28-2	Aroclor-1221	71	UG_KG		71	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	11141-16-5	Aroclor-1232	35	UG_KG		35	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	53469-21-9	Aroclor-1242	35	UG_KG		35	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	12672-29-6	Aroclor-1248	35	UG_KG		35	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	11097-69-1	Aroclor-1254	35	UG_KG		35	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	11096-82-5	Aroclor-1260	35	UG_KG		35	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	319-85-7	beta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	319-86-8	delta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	60-57-1	Dieldrin	3.5	UG_KG		3.5	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	959-98-8	Endosulfan I	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	33213-65-9	Endosulfan II	3.5	UG_KG		3.5	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	1031-07-8	Endosulfan sulfate	3.5	UG_KG		3.5	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	72-20-8	Endrin	3.5	UG_KG		3.5	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	7421-93-4	Endrin aldehyde	3.5	UG_KG		3.5	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	53494-70-5	Endrin ketone	3.5	UG_KG		3.5	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	58-89-9	gamma-BHC (Lindane)	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	5103-74-2	gamma-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	76-44-8	Heptachlor	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	1024-57-3	Heptachlor epoxide	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	72-43-5	Methoxychlor	18	UG_KG		18	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	8001-35-2	Toxaphene	180	UG_KG		180	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	92-52-4	1,1-Biphenyl	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	880	UG_KG		880	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	120-83-2	2,4-Dichlorophenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	105-67-9	2,4-Dimethylphenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	51-28-5	2,4-Dinitrophenol	880	UG_KG		880	UJ	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	121-14-2	2,4-Dinitrotoluene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	606-20-2	2,6-Dinitrotoluene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	91-58-7	2-Chloronaphthalene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	95-57-8	2-Chlorophenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	91-57-6	2-Methylnaphthalene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	95-48-7	2-Methylphenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	88-74-4	2-Nitroaniline	880	UG_KG		880	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	88-75-5	2-Nitrophenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	99-09-2	3-Nitroaniline	880	UG_KG		880	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	880	UG_KG		880	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	106-47-8	4-Chloroaniline	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	106-44-5	4-Methylphenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	100-01-6	4-Nitroaniline	880	UG_KG		880	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	100-02-7	4-Nitrophenol	880	UG_KG		880	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	83-32-9	Acenaphthene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	208-96-8	Acenaphthylene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	98-86-2	Acetophenone	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	120-12-7	Anthracene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	1912-24-9	Atrazine	350	UG_KG		350	UJ	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	100-52-7	Benzaldehyde	350	UG_KG		350	UJ	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	56-55-3	Benzo(a)anthracene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	50-32-8	Benzo(a)pyrene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	205-99-2	Benzo(b)fluoranthene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	191-24-2	Benzo(g,h,i)perylene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	207-08-9	Benzo(k)fluoranthene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	85-68-7	Butylbenzylphthalate	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	105-60-2	Caprolactam	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	86-74-8	Carbazole	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	218-01-9	Chrysene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	53-70-3	Dibenz(a,h)anthracene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	132-64-9	Dibenzofuran	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	84-66-2	Diethylphthalate	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	131-11-3	Dimethyl phthalate	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	84-74-2	Di-n-butylphthalate	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	117-84-0	Di-n-octylphthalate	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	206-44-0	Fluoranthene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	86-73-7	Fluorene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	118-74-1	Hexachlorobenzene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	87-68-3	Hexachlorobutadiene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	67-72-1	Hexachloroethane	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	78-59-1	Isophorone	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	91-20-3	Naphthalene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	98-95-3	Nitrobenzene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	87-86-5	Pentachlorophenol	880	UG_KG		880	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	85-01-8	Phenanthrene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	108-95-2	Phenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	129-00-0	Pyrene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	71-55-6	1,1,1-Trichloroethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	11	UG_KG		11	U	No

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	79-00-5	1,1,2-Trichloroethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	75-34-3	1,1-Dichloroethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	75-35-4	1,1-Dichloroethene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	106-93-4	1,2-Dibromoethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	95-50-1	1,2-Dichlorobenzene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	107-06-2	1,2-Dichloroethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	78-87-5	1,2-Dichloropropane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	541-73-1	1,3-Dichlorobenzene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	106-46-7	1,4-Dichlorobenzene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	78-93-3	2-Butanone	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	591-78-6	2-Hexanone	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	108-10-1	4-Methyl-2-pentanone	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	67-64-1	Acetone	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	71-43-2	Benzene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	75-27-4	Bromodichloromethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	75-25-2	Bromoform	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	74-83-9	Bromomethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	75-15-0	Carbon disulfide	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	56-23-5	Carbon tetrachloride	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	108-90-7	Chlorobenzene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	75-00-3	Chloroethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	67-66-3	Chloroform	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	74-87-3	Chloromethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	156-59-2	cis-1,2-Dichloroethene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	110-82-7	Cyclohexane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	124-48-1	Dibromochloromethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	100-41-4	Ethylbenzene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	98-82-8	Isopropylbenzene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	79-20-9	Methyl acetate	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	108-87-2	Methylcyclohexane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	75-09-2	Methylene chloride	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	100-42-5	Styrene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	127-18-4	Tetrachloroethene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	108-88-3	Toluene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	156-60-5	trans-1,2-Dichloroethene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	79-01-6	Trichloroethene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	75-01-4	Vinyl chloride	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	1330-20-7	Xylene, total	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	METAL	7429-90-5	Aluminum	12200	MG_KG		21.2		Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	METAL	7440-36-0	Antimony	0.62	MG_KG		6.3	J	Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	METAL	7440-38-2	Arsenic	0.58	MG_KG		1.1	J	Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	METAL	7440-39-3	Barium	57.4	MG_KG		21.2		Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	METAL	7440-41-7	Beryllium	0.039	MG_KG		0.53	J	Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	METAL	7440-43-9	Cadmium	0.15	MG_KG		0.53	J	Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	METAL	7440-70-2	Calcium	5290	MG_KG		529		Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	METAL	7440-47-3	Chromium	7.2	MG_KG		1.1		Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	METAL	7440-48-4	Cobalt	13.2	MG_KG		5.3		Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	METAL	7440-50-8	Copper	34.9	MG_KG		2.6		Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	METAL	57-12-5	Cyanide	2.6	MG_KG		2.6	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	METAL	7439-89-6	Iron	24700	MG_KG		10.6		Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	METAL	7439-92-1	Lead	5	MG_KG		1.1		Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	METAL	7439-95-4	Magnesium	8730	MG_KG		529		Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	METAL	7439-96-5	Manganese	549	MG_KG		1.6		Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	METAL	7439-97-6	Mercury	0.11	MG_KG		0.11	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	METAL	7440-02-0	Nickel	4.3	MG_KG		4.2	J	Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	METAL	7440-09-7	Potassium	1500	MG_KG		529	J	Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	METAL	7782-49-2	Selenium	0.59	MG_KG		3.7	J	Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	METAL	7440-22-4	Silver	1.1	MG_KG		1.1	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	METAL	7440-23-5	Sodium	529	MG_KG		529	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	METAL	7440-28-0	Thallium	0.53	MG_KG		0.53	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	METAL	7440-62-2	Vanadium	64.7	MG_KG		5.3		Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	METAL	7440-66-6	Zinc	28.6	MG_KG		6.3		Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	72-54-8	4,4'-DDD	3.5	UG_KG		3.5	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	72-55-9	4,4'-DDE	29	UG_KG		3.5		Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	50-29-3	4,4'-DDT	3.1	UG_KG		3.5	J	Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	309-00-2	Aldrin	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	319-84-6	alpha-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	5103-71-9	alpha-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	12674-11-2	Aroclor-1016	35	UG_KG		35	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	11104-28-2	Aroclor-1221	71	UG_KG		71	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	11141-16-5	Aroclor-1232	35	UG_KG		35	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	53469-21-9	Aroclor-1242	35	UG_KG		35	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	12672-29-6	Aroclor-1248	35	UG_KG		35	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	11097-69-1	Aroclor-1254	35	UG_KG		35	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	11096-82-5	Aroclor-1260	35	UG_KG		35	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	319-85-7	beta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	319-86-8	delta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	60-57-1	Dieldrin	3.5	UG_KG		3.5	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	959-98-8	Endosulfan I	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	33213-65-9	Endosulfan II	3.5	UG_KG		3.5	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	3.5	UG_KG		3.5	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	72-20-8	Endrin	3.5	UG_KG		3.5	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	7421-93-4	Endrin aldehyde	3.5	UG_KG		3.5	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	53494-70-5	Endrin ketone	3.5	UG_KG		3.5	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	5103-74-2	gamma-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	76-44-8	Heptachlor	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	72-43-5	Methoxychlor	18	UG_KG		18	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	8001-35-2	Toxaphene	180	UG_KG		180	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	92-52-4	1,1-Biphenyl	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	870	UG_KG		870	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	120-83-2	2,4-Dichlorophenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	105-67-9	2,4-Dimethylphenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	51-28-5	2,4-Dinitrophenol	870	UG_KG		870	UJ	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	121-14-2	2,4-Dinitrotoluene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	606-20-2	2,6-Dinitrotoluene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	91-58-7	2-Chloronaphthalene	350	UG_KG		350	U	No

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	95-57-8	2-Chlorophenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	91-57-6	2-Methylnaphthalene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	95-48-7	2-Methylphenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	88-74-4	2-Nitroaniline	870	UG_KG		870	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	88-75-5	2-Nitrophenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	99-09-2	3-Nitroaniline	870	UG_KG		870	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	870	UG_KG		870	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	106-47-8	4-Chloroaniline	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	106-44-5	4-Methylphenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	100-01-6	4-Nitroaniline	870	UG_KG		870	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	100-02-7	4-Nitrophenol	870	UG_KG		870	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	83-32-9	Acenaphthene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	208-96-8	Acenaphthylene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	98-86-2	Acetophenone	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	120-12-7	Anthracene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	1912-24-9	Atrazine	350	UG_KG		350	UJ	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	100-52-7	Benzaldehyde	350	UG_KG		350	UJ	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	56-55-3	Benzo(a)anthracene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	50-32-8	Benzo(a)pyrene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	205-99-2	Benzo(b)fluoranthene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	191-24-2	Benzo(g,h,i)perylene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	207-08-9	Benzo(k)fluoranthene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	85-68-7	Butylbenzylphthalate	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	105-60-2	Caprolactam	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	86-74-8	Carbazole	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	218-01-9	Chrysene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	53-70-3	Dibenz(a,h)anthracene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	132-64-9	Dibenzofuran	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	84-66-2	Diethylphthalate	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	131-11-3	Dimethyl phthalate	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	84-74-2	Di-n-butylphthalate	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	117-84-0	Di-n-octylphthalate	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	206-44-0	Fluoranthene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	86-73-7	Fluorene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	118-74-1	Hexachlorobenzene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	87-68-3	Hexachlorobutadiene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	67-72-1	Hexachloroethane	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	78-59-1	Isophorone	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	91-20-3	Naphthalene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	98-95-3	Nitrobenzene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	87-86-5	Pentachlorophenol	870	UG_KG		870	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	85-01-8	Phenanthrene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	108-95-2	Phenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	129-00-0	Pyrene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	71-55-6	1,1,1-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	79-00-5	1,1,2-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	75-34-3	1,1-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	75-35-4	1,1-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	106-93-4	1,2-Dibromoethane	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	95-50-1	1,2-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	107-06-2	1,2-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	78-87-5	1,2-Dichloropropane	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	541-73-1	1,3-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	106-46-7	1,4-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	78-93-3	2-Butanone	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	591-78-6	2-Hexanone	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	108-10-1	4-Methyl-2-pentanone	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	67-64-1	Acetone	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	71-43-2	Benzene	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	75-27-4	Bromodichloromethane	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	75-25-2	Bromoform	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	74-83-9	Bromomethane	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	75-15-0	Carbon disulfide	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	56-23-5	Carbon tetrachloride	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	108-90-7	Chlorobenzene	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	75-00-3	Chloroethane	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	67-66-3	Chloroform	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	74-87-3	Chloromethane	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	156-59-2	cis-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	110-82-7	Cyclohexane	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	124-48-1	Dibromochloromethane	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	100-41-4	Ethylbenzene	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	98-82-8	Isopropylbenzene	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	79-20-9	Methyl acetate	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	108-87-2	Methylcyclohexane	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	75-09-2	Methylene chloride	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	100-42-5	Styrene	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	127-18-4	Tetrachloroethene	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	108-88-3	Toluene	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	156-60-5	trans-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	79-01-6	Trichloroethene	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	75-01-4	Vinyl chloride	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	1330-20-7	Xylene, total	10	UG_KG		10	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	METAL	7429-90-5	Aluminum	12300	MG_KG		21.3		Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	METAL	7440-36-0	Antimony	0.75	MG_KG		6.4	J	Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	METAL	7440-38-2	Arsenic	0.39	MG_KG		1.1	J	Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	METAL	7440-39-3	Barium	58.3	MG_KG		21.3		Yes

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	METAL	7440-41-7	Beryllium	0.53	MG_KG		0.53	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	METAL	7440-43-9	Cadmium	0.53	MG_KG		0.53	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	METAL	7440-70-2	Calcium	6860	MG_KG		532		Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	METAL	7440-47-3	Chromium	8.3	MG_KG		1.1		Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	METAL	7440-48-4	Cobalt	12.5	MG_KG		5.3		Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	METAL	7440-50-8	Copper	36.2	MG_KG		2.7		Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	METAL	57-12-5	Cyanide	2.7	MG_KG		2.7	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	METAL	7439-89-6	Iron	24100	MG_KG		10.6		Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	METAL	7439-92-1	Lead	2.9	MG_KG		1.1		Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	METAL	7439-95-4	Magnesium	7820	MG_KG		532		Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	METAL	7439-96-5	Manganese	540	MG_KG		1.6		Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	METAL	7439-97-6	Mercury	0.11	MG_KG		0.11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	METAL	7440-02-0	Nickel	4.7	MG_KG		4.3	J	Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	METAL	7440-09-7	Potassium	1630	MG_KG		532	J	Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	METAL	7782-49-2	Selenium	3.7	MG_KG		3.7	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	METAL	7440-22-4	Silver	1.1	MG_KG		1.1	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	METAL	7440-23-5	Sodium	532	MG_KG		532	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	METAL	7440-28-0	Thallium	0.53	MG_KG		0.53	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	METAL	7440-62-2	Vanadium	63.8	MG_KG		5.3		Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	METAL	7440-66-6	Zinc	28.6	MG_KG		6.4		Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	72-54-8	4,4'-DDD	3.5	UG_KG		3.5	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	72-55-9	4,4'-DDE	27	UG_KG		3.5		Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	50-29-3	4,4'-DDT	5.3	UG_KG		3.5		Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	309-00-2	Aldrin	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	319-84-6	alpha-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	5103-71-9	alpha-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	12674-11-2	Aroclor-1016	35	UG_KG		35	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	11104-28-2	Aroclor-1221	71	UG_KG		71	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	11141-16-5	Aroclor-1232	35	UG_KG		35	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	53469-21-9	Aroclor-1242	35	UG_KG		35	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	12672-29-6	Aroclor-1248	35	UG_KG		35	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	11097-69-1	Aroclor-1254	35	UG_KG		35	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	11096-82-5	Aroclor-1260	35	UG_KG		35	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	319-85-7	beta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	319-86-8	delta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	60-57-1	Dieldrin	3.5	UG_KG		3.5	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	959-98-8	Endosulfan I	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	33213-65-9	Endosulfan II	3.5	UG_KG		3.5	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	3.5	UG_KG		3.5	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	72-20-8	Endrin	3.5	UG_KG		3.5	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	7421-93-4	Endrin aldehyde	3.5	UG_KG		3.5	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	53494-70-5	Endrin ketone	3.5	UG_KG		3.5	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	5103-74-2	gamma-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	76-44-8	Heptachlor	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	1.8	UG_KG		1.8	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	72-43-5	Methoxychlor	18	UG_KG		18	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	8001-35-2	Toxaphene	180	UG_KG		180	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	92-52-4	1,1-Biphenyl	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	880	UG_KG		880	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	120-83-2	2,4-Dichlorophenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	105-67-9	2,4-Dimethylphenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	51-28-5	2,4-Dinitrophenol	880	UG_KG		880	UJ	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	121-14-2	2,4-Dinitrotoluene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	606-20-2	2,6-Dinitrotoluene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	91-58-7	2-Chloronaphthalene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	95-57-8	2-Chlorophenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	91-57-6	2-Methylnaphthalene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	95-48-7	2-Methylphenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	88-74-4	2-Nitroaniline	880	UG_KG		880	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	88-75-5	2-Nitrophenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	99-09-2	3-Nitroaniline	880	UG_KG		880	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	880	UG_KG		880	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	106-47-8	4-Chloroaniline	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	106-44-5	4-Methylphenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	100-01-6	4-Nitroaniline	880	UG_KG		880	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	100-02-7	4-Nitrophenol	880	UG_KG		880	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	83-32-9	Acenaphthene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	208-96-8	Acenaphthylene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	98-86-2	Acetophenone	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	120-12-7	Anthracene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	1912-24-9	Atrazine	350	UG_KG		350	UJ	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	100-52-7	Benzaldehyde	350	UG_KG		350	UJ	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	56-55-3	Benzo(a)anthracene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	50-32-8	Benzo(a)pyrene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	205-99-2	Benzo(b)fluoranthene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	191-24-2	Benzo(g,h,i)perylene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	207-08-9	Benzo(k)fluoranthene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	85-68-7	Butylbenzylphthalate	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	105-60-2	Caprolactam	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	86-74-8	Carbazole	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	218-01-9	Chrysene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	53-70-3	Dibenz(a,h)anthracene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	132-64-9	Dibenzofuran	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	84-66-2	Diethylphthalate	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	131-11-3	Dimethyl phthalate	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	84-74-2	Di-n-butylphthalate	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	117-84-0	Di-n-octylphthalate	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	206-44-0	Fluoranthene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	86-73-7	Fluorene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	118-74-1	Hexachlorobenzene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	87-68-3	Hexachlorobutadiene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	67-72-1	Hexachloroethane	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	78-59-1	Isophorone	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	91-20-3	Naphthalene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	98-95-3	Nitrobenzene	350	UG_KG		350	U	No

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	87-86-5	Pentachlorophenol	880	UG_KG		880	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	85-01-8	Phenanthrene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	108-95-2	Phenol	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	129-00-0	Pyrene	350	UG_KG		350	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	71-55-6	1,1,1-Trichloroethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	79-00-5	1,1,2-Trichloroethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	75-34-3	1,1-Dichloroethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	75-35-4	1,1-Dichloroethene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	106-93-4	1,2-Dibromoethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	95-50-1	1,2-Dichlorobenzene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	107-06-2	1,2-Dichloroethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	78-87-5	1,2-Dichloropropane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	541-73-1	1,3-Dichlorobenzene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	106-46-7	1,4-Dichlorobenzene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	78-93-3	2-Butanone	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	591-78-6	2-Hexanone	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	108-10-1	4-Methyl-2-pentanone	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	67-64-1	Acetone	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	71-43-2	Benzene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	75-27-4	Bromodichloromethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	75-25-2	Bromoform	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	74-83-9	Bromomethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	75-15-0	Carbon disulfide	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	56-23-5	Carbon tetrachloride	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	108-90-7	Chlorobenzene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	75-00-3	Chloroethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	67-66-3	Chloroform	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	74-87-3	Chloromethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	156-59-2	cis-1,2-Dichloroethene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	110-82-7	Cyclohexane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	124-48-1	Dibromochloromethane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	100-41-4	Ethylbenzene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	98-82-8	Isopropylbenzene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	79-20-9	Methyl acetate	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	108-87-2	Methylcyclohexane	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	75-09-2	Methylene chloride	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	100-42-5	Styrene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	127-18-4	Tetrachloroethene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	108-88-3	Toluene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	156-60-5	trans-1,2-Dichloroethene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	79-01-6	Trichloroethene	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	75-01-4	Vinyl chloride	11	UG_KG		11	U	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	1330-20-7	Xylene, total	11	UG_KG		11	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	METAL	7429-90-5	Aluminum	12000	MG_KG		21.5		Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	METAL	7440-36-0	Antimony	0.61	MG_KG		6.5	J	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	METAL	7440-38-2	Arsenic	1.1	MG_KG		1.1	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	METAL	7440-39-3	Barium	61.1	MG_KG		21.5		Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	METAL	7440-41-7	Beryllium	0.54	MG_KG		0.54	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	METAL	7440-43-9	Cadmium	0.54	MG_KG		0.54	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	METAL	7440-70-2	Calcium	4750	MG_KG		538		Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	METAL	7440-47-3	Chromium	11.7	MG_KG		1.1	J	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	METAL	7440-48-4	Cobalt	10.2	MG_KG		5.4	J	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	METAL	7440-50-8	Copper	43.5	MG_KG		2.7		Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	METAL	57-12-5	Cyanide	2.7	MG_KG		2.7	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	METAL	7439-89-6	Iron	17800	MG_KG		10.8		Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	METAL	7439-92-1	Lead	4.3	MG_KG		1.1	J	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	METAL	7439-95-4	Magnesium	3900	MG_KG		538		Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	METAL	7439-96-5	Manganese	441	MG_KG		1.6		Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	METAL	7439-97-6	Mercury	0.11	MG_KG		0.11	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	METAL	7440-02-0	Nickel	5.9	MG_KG		4.3	J	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	METAL	7440-09-7	Potassium	858	MG_KG		538	J	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	METAL	7782-49-2	Selenium	3.8	MG_KG		3.8	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	METAL	7440-22-4	Silver	1.1	MG_KG		1.1	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	METAL	7440-23-5	Sodium	538	MG_KG		538	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	METAL	7440-28-0	Thallium	0.54	MG_KG		0.54	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	METAL	7440-62-2	Vanadium	61.9	MG_KG		5.4		Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	METAL	7440-66-6	Zinc	17.6	MG_KG		6.5	J	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	72-54-8	4,4'-DDD	0.89	UG_KG		3.5	J	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	72-55-9	4,4'-DDE	44	UG_KG		3.5		Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	50-29-3	4,4'-DDT	56	UG_KG		3.5		Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	309-00-2	Aldrin	1.8	UG_KG		1.8	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	319-84-6	alpha-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	5103-71-9	alpha-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	12674-11-2	Aroclor-1016	35	UG_KG		35	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	11104-28-2	Aroclor-1221	72	UG_KG		72	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	11141-16-5	Aroclor-1232	35	UG_KG		35	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	53469-21-9	Aroclor-1242	35	UG_KG		35	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	12672-29-6	Aroclor-1248	35	UG_KG		35	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	11097-69-1	Aroclor-1254	35	UG_KG		35	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	11096-82-5	Aroclor-1260	35	UG_KG		35	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	319-85-7	beta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	319-86-8	delta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	60-57-1	Dieldrin	3.5	UG_KG		3.5	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	959-98-8	Endosulfan I	1.8	UG_KG		1.8	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	33213-65-9	Endosulfan II	3.5	UG_KG		3.5	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	1031-07-8	Endosulfan sulfate	3.5	UG_KG		3.5	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	72-20-8	Endrin	3.5	UG_KG		3.5	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	7421-93-4	Endrin aldehyde	3.5	UG_KG		3.5	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	53494-70-5	Endrin ketone	3.5	UG_KG		3.5	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	58-89-9	gamma-BHC (Lindane)	1.8	UG_KG		1.8	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	5103-74-2	gamma-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	76-44-8	Heptachlor	1.8	UG_KG		1.8	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	1024-57-3	Heptachlor epoxide	1.8	UG_KG		1.8	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	72-43-5	Methoxychlor	18	UG_KG		18	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	8001-35-2	Toxaphene	180	UG_KG		180	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	92-52-4	1,1-Biphenyl	350	UG_KG		350	U	No

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	890	UG_KG		890	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	120-83-2	2,4-Dichlorophenol	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	105-67-9	2,4-Dimethylphenol	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	51-28-5	2,4-Dinitrophenol	890	UG_KG		890	UJ	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	121-14-2	2,4-Dinitrotoluene	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	606-20-2	2,6-Dinitrotoluene	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	91-58-7	2-Chloronaphthalene	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	95-57-8	2-Chlorophenol	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	91-57-6	2-Methylnaphthalene	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	95-48-7	2-Methylphenol	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	88-74-4	2-Nitroaniline	890	UG_KG		890	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	88-75-5	2-Nitrophenol	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	99-09-2	3-Nitroaniline	890	UG_KG		890	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	890	UG_KG		890	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	106-47-8	4-Chloroaniline	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	106-44-5	4-Methylphenol	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	100-01-6	4-Nitroaniline	890	UG_KG		890	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	100-02-7	4-Nitrophenol	890	UG_KG		890	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	83-32-9	Acenaphthene	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	208-96-8	Acenaphthylene	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	98-86-2	Acetophenone	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	120-12-7	Anthracene	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	1912-24-9	Atrazine	350	UG_KG		350	UJ	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	100-52-7	Benzaldehyde	350	UG_KG		350	UJ	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	56-55-3	Benzo(a)anthracene	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	50-32-8	Benzo(a)pyrene	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	205-99-2	Benzo(b)fluoranthene	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	191-24-2	Benzo(g,h,i)perylene	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	207-08-9	Benzo(k)fluoranthene	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	85-68-7	Butylbenzylphthalate	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	105-60-2	Caprolactam	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	86-74-8	Carbazole	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	218-01-9	Chrysene	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	53-70-3	Dibenz(a,h)anthracene	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	132-64-9	Dibenzofuran	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	84-66-2	Diethylphthalate	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	131-11-3	Dimethyl phthalate	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	84-74-2	Di-n-butylphthalate	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	117-84-0	Di-n-octylphthalate	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	206-44-0	Fluoranthene	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	86-73-7	Fluorene	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	118-74-1	Hexachlorobenzene	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	87-68-3	Hexachlorobutadiene	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	67-72-1	Hexachloroethane	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	78-59-1	Isophorone	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	91-20-3	Naphthalene	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	98-95-3	Nitrobenzene	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	87-86-5	Pentachlorophenol	890	UG_KG		890	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	85-01-8	Phenanthrene	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	108-95-2	Phenol	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	129-00-0	Pyrene	350	UG_KG		350	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	71-55-6	1,1,1-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	79-00-5	1,1,2-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	75-34-3	1,1-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	75-35-4	1,1-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	106-93-4	1,2-Dibromoethane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	95-50-1	1,2-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	107-06-2	1,2-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	78-87-5	1,2-Dichloropropane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	541-73-1	1,3-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	106-46-7	1,4-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	78-93-3	2-Butanone	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	591-78-6	2-Hexanone	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	108-10-1	4-Methyl-2-pentanone	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	67-64-1	Acetone	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	71-43-2	Benzene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	75-27-4	Bromodichloromethane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	75-25-2	Bromoform	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	74-83-9	Bromomethane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	75-15-0	Carbon disulfide	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	56-23-5	Carbon tetrachloride	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	108-90-7	Chlorobenzene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	75-00-3	Chloroethane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	67-66-3	Chloroform	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	74-87-3	Chloromethane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	156-59-2	cis-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	110-82-7	Cyclohexane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	124-48-1	Dibromochloromethane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	100-41-4	Ethylbenzene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	98-82-8	Isopropylbenzene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	79-20-9	Methyl acetate	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	108-87-2	Methylcyclohexane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	75-09-2	Methylene chloride	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	100-42-5	Styrene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	127-18-4	Tetrachloroethene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	108-88-3	Toluene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	156-60-5	trans-1,2-Dichloroethene	10	UG_KG		10	U	No

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	79-01-6	Trichloroethene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	75-01-4	Vinyl chloride	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	1330-20-7	Xylene, total	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	METAL	7429-90-5	Aluminum	9970	MG_KG		22.6	J	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	METAL	7440-36-0	Antimony	6.8	MG_KG		6.8	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	METAL	7440-38-2	Arsenic	1.1	MG_KG		1.1	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	METAL	7440-39-3	Barium	64.9	MG_KG		22.6	J	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	METAL	7440-41-7	Beryllium	0.56	MG_KG		0.56	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	METAL	7440-43-9	Cadmium	0.56	MG_KG		0.56	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	METAL	7440-70-2	Calcium	10000	MG_KG		564	J	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	METAL	7440-47-3	Chromium	11.8	MG_KG		1.1	J	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	METAL	7440-48-4	Cobalt	9.6	MG_KG		5.6	J	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	METAL	7440-50-8	Copper	43	MG_KG		2.8	J	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	METAL	57-12-5	Cyanide	2.8	MG_KG		2.8	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	METAL	7439-89-6	Iron	17300	MG_KG		11.3	J	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	METAL	7439-92-1	Lead	3.5	MG_KG		1.1	J	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	METAL	7439-95-4	Magnesium	4000	MG_KG		564	J	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	METAL	7439-96-5	Manganese	432	MG_KG		1.7	J	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	METAL	7439-97-6	Mercury	0.11	MG_KG		0.11	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	METAL	7440-02-0	Nickel	5.6	MG_KG		4.5	J	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	METAL	7440-09-7	Potassium	1030	MG_KG		564	J	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	METAL	7782-49-2	Selenium	4	MG_KG		4	UJ	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	METAL	7440-22-4	Silver	1.1	MG_KG		1.1	UJ	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	METAL	7440-23-5	Sodium	564	MG_KG		564	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	METAL	7440-28-0	Thallium	0.56	MG_KG		0.56	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	METAL	7440-62-2	Vanadium	63.8	MG_KG		5.6	J	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	METAL	7440-66-6	Zinc	18.7	MG_KG		6.8	J	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	72-54-8	4,4'-DDD	3.7	UG_KG		3.7	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	72-55-9	4,4'-DDE	9.1	UG_KG		3.7		Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	50-29-3	4,4'-DDT	1.4	UG_KG		3.7	J	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	309-00-2	Aldrin	1.9	UG_KG		1.9	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	319-84-6	alpha-BHC	1.9	UG_KG		1.9	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	5103-71-9	alpha-Chlordane	1.9	UG_KG		1.9	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	12674-11-2	Aroclor-1016	37	UG_KG		37	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	11104-28-2	Aroclor-1221	75	UG_KG		75	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	11141-16-5	Aroclor-1232	37	UG_KG		37	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	53469-21-9	Aroclor-1242	37	UG_KG		37	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	12672-29-6	Aroclor-1248	37	UG_KG		37	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	11097-69-1	Aroclor-1254	37	UG_KG		37	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	11096-82-5	Aroclor-1260	37	UG_KG		37	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	319-85-7	beta-BHC	1.9	UG_KG		1.9	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	319-86-8	delta-BHC	1.9	UG_KG		1.9	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	60-57-1	Dieldrin	3.7	UG_KG		3.7	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	959-98-8	Endosulfan I	1.9	UG_KG		1.9	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	33213-65-9	Endosulfan II	3.7	UG_KG		3.7	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	3.7	UG_KG		3.7	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	72-20-8	Endrin	3.7	UG_KG		3.7	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	7421-93-4	Endrin aldehyde	3.7	UG_KG		3.7	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	53494-70-5	Endrin ketone	3.7	UG_KG		3.7	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	1.9	UG_KG		1.9	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	5103-74-2	gamma-Chlordane	0.79	UG_KG		1.9	J	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	76-44-8	Heptachlor	1.9	UG_KG		1.9	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	1.9	UG_KG		1.9	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	72-43-5	Methoxychlor	19	UG_KG		19	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	8001-35-2	Toxaphene	190	UG_KG		190	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	92-52-4	1,1-Biphenyl	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	930	UG_KG		930	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	120-83-2	2,4-Dichlorophenol	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	105-67-9	2,4-Dimethylphenol	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	51-28-5	2,4-Dinitrophenol	930	UG_KG		930	UJ	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	121-14-2	2,4-Dinitrotoluene	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	606-20-2	2,6-Dinitrotoluene	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	91-58-7	2-Chloronaphthalene	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	95-57-8	2-Chlorophenol	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	91-57-6	2-Methylnaphthalene	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	95-48-7	2-Methylphenol	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	88-74-4	2-Nitroaniline	930	UG_KG		930	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	88-75-5	2-Nitrophenol	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	99-09-2	3-Nitroaniline	930	UG_KG		930	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	930	UG_KG		930	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	106-47-8	4-Chloroaniline	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	106-44-5	4-Methylphenol	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	100-01-6	4-Nitroaniline	930	UG_KG		930	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	100-02-7	4-Nitrophenol	930	UG_KG		930	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	83-32-9	Acenaphthene	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	208-96-8	Acenaphthylene	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	98-86-2	Acetophenone	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	120-12-7	Anthracene	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	1912-24-9	Atrazine	370	UG_KG		370	UJ	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	100-52-7	Benzaldehyde	370	UG_KG		370	UJ	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	56-55-3	Benzo(a)anthracene	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	50-32-8	Benzo(a)pyrene	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	205-99-2	Benzo(b)fluoranthene	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	191-24-2	Benzo(g,h,i)perylene	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	207-08-9	Benzo(k)fluoranthene	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	85-68-7	Butylbenzylphthalate	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	105-60-2	Caprolactam	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	86-74-8	Carbazole	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	218-01-9	Chrysene	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	53-70-3	Dibenz(a,h)anthracene	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	132-64-9	Dibenzofuran	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	84-66-2	Diethylphthalate	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	131-11-3	Dimethyl phthalate	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	84-74-2	Di-n-butylphthalate	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	117-84-0	Di-n-octylphthalate	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	206-44-0	Fluoranthene	370	UG_KG		370	U	No

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	86-73-7	Fluorene	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	118-74-1	Hexachlorobenzene	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	87-68-3	Hexachlorobutadiene	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	67-72-1	Hexachloroethane	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	78-59-1	Isophorone	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	91-20-3	Naphthalene	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	98-95-3	Nitrobenzene	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	87-86-5	Pentachlorophenol	930	UG_KG		930	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	85-01-8	Phenanthrene	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	108-95-2	Phenol	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	129-00-0	Pyrene	370	UG_KG		370	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	71-55-6	1,1,1-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	79-00-5	1,1,2-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	75-34-3	1,1-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	75-35-4	1,1-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	106-93-4	1,2-Dibromoethane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	95-50-1	1,2-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	107-06-2	1,2-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	78-87-5	1,2-Dichloropropane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	541-73-1	1,3-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	106-46-7	1,4-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	78-93-3	2-Butanone	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	591-78-6	2-Hexanone	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	108-10-1	4-Methyl-2-pentanone	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	67-64-1	Acetone	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	71-43-2	Benzene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	75-27-4	Bromodichloromethane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	75-25-2	Bromoform	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	74-83-9	Bromomethane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	75-15-0	Carbon disulfide	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	56-23-5	Carbon tetrachloride	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	108-90-7	Chlorobenzene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	75-00-3	Chloroethane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	67-66-3	Chloroform	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	74-87-3	Chloromethane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	156-59-2	cis-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	110-82-7	Cyclohexane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	124-48-1	Dibromochloromethane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	100-41-4	Ethylbenzene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	98-82-8	Isopropylbenzene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	79-20-9	Methyl acetate	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	108-87-2	Methylcyclohexane	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	75-09-2	Methylene chloride	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	100-42-5	Styrene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	127-18-4	Tetrachloroethene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	108-88-3	Toluene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	156-60-5	trans-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	79-01-6	Trichloroethene	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	75-01-4	Vinyl chloride	10	UG_KG		10	U	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	1330-20-7	Xylene, total	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	METAL	7429-90-5	Aluminum	12200	MG_KG		21.7	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	METAL	7440-36-0	Antimony	6.5	MG_KG		6.5	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	METAL	7440-38-2	Arsenic	1.1	MG_KG		1.1	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	METAL	7440-39-3	Barium	75.1	MG_KG		21.7	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	METAL	7440-41-7	Beryllium	0.54	MG_KG		0.54	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	METAL	7440-43-9	Cadmium	0.54	MG_KG		0.54	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	METAL	7440-70-2	Calcium	9410	MG_KG		542	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	METAL	7440-47-3	Chromium	13.1	MG_KG		1.1	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	METAL	7440-48-4	Cobalt	9.5	MG_KG		5.4	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	METAL	7440-50-8	Copper	39.4	MG_KG		2.7	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	METAL	57-12-5	Cyanide	2.7	MG_KG		2.7	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	METAL	7439-89-6	Iron	18300	MG_KG		10.8	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	METAL	7439-92-1	Lead	1.6	MG_KG		1.1	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	METAL	7439-95-4	Magnesium	3110	MG_KG		542	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	METAL	7439-96-5	Manganese	445	MG_KG		1.6	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	METAL	7439-97-6	Mercury	0.11	MG_KG		0.11	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	METAL	7440-02-0	Nickel	5.3	MG_KG		4.3	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	METAL	7440-09-7	Potassium	1050	MG_KG		542	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	METAL	7782-49-2	Selenium	0.59	MG_KG		3.8	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	METAL	7440-22-4	Silver	1.1	MG_KG		1.1	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	METAL	7440-23-5	Sodium	542	MG_KG		542	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	METAL	7440-28-0	Thallium	0.54	MG_KG		0.54	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	METAL	7440-62-2	Vanadium	67	MG_KG		5.4	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	METAL	7440-66-6	Zinc	16.6	MG_KG		6.5	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	72-54-8	4,4'-DDD	3.6	UG_KG		3.6	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	72-55-9	4,4'-DDE	50	UG_KG		3.6		Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	50-29-3	4,4'-DDT	1.9	UG_KG		3.6	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	309-00-2	Aldrin	1.8	UG_KG		1.8	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	319-84-6	alpha-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	5103-71-9	alpha-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	12674-11-2	Aroclor-1016	36	UG_KG		36	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	11104-28-2	Aroclor-1221	73	UG_KG		73	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	11141-16-5	Aroclor-1232	36	UG_KG		36	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	53469-21-9	Aroclor-1242	36	UG_KG		36	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	12672-29-6	Aroclor-1248	36	UG_KG		36	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	11097-69-1	Aroclor-1254	36	UG_KG		36	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	11096-82-5	Aroclor-1260	36	UG_KG		36	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	319-85-7	beta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	319-86-8	delta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	60-57-1	Dieldrin	3.6	UG_KG		3.6	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	959-98-8	Endosulfan I	1.8	UG_KG		1.8	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	33213-65-9	Endosulfan II	3.6	UG_KG		3.6	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	1031-07-8	Endosulfan sulfate	3.6	UG_KG		3.6	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	72-20-8	Endrin	3.6	UG_KG		3.6	U	No

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	7421-93-4	Endrin aldehyde	3.6	UG_KG		3.6	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	53494-70-5	Endrin ketone	3.6	UG_KG		3.6	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	58-89-9	gamma-BHC (Lindane)	1.8	UG_KG		1.8	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	5103-74-2	gamma-Chlordane	1.1	UG_KG		1.8	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	76-44-8	Heptachlor	1.8	UG_KG		1.8	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	1024-57-3	Heptachlor epoxide	1.8	UG_KG		1.8	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	72-43-5	Methoxychlor	18	UG_KG		18	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	8001-35-2	Toxaphene	180	UG_KG		180	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	92-52-4	1,1-Biphenyl	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	900	UG_KG		900	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	120-83-2	2,4-Dichlorophenol	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	105-67-9	2,4-Dimethylphenol	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	51-28-5	2,4-Dinitrophenol	900	UG_KG		900	UJ	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	121-14-2	2,4-Dinitrotoluene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	606-20-2	2,6-Dinitrotoluene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	91-58-7	2-Chloronaphthalene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	95-57-8	2-Chlorophenol	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	91-57-6	2-Methylnaphthalene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	95-48-7	2-Methylphenol	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	88-74-4	2-Nitroaniline	900	UG_KG		900	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	88-75-5	2-Nitrophenol	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	99-09-2	3-Nitroaniline	900	UG_KG		900	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	900	UG_KG		900	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	106-47-8	4-Chloroaniline	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	106-44-5	4-Methylphenol	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	100-01-6	4-Nitroaniline	900	UG_KG		900	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	100-02-7	4-Nitrophenol	900	UG_KG		900	UJ	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	83-32-9	Acenaphthene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	208-96-8	Acenaphthylene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	98-86-2	Acetophenone	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	120-12-7	Anthracene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	1912-24-9	Atrazine	360	UG_KG		360	UJ	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	100-52-7	Benzaldehyde	360	UG_KG		360	UJ	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	56-55-3	Benzo(a)anthracene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	50-32-8	Benzo(a)pyrene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	205-99-2	Benzo(b)fluoranthene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	191-24-2	Benzo(g,h,i)perylene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	207-08-9	Benzo(k)fluoranthene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	85-68-7	Butylbenzylphthalate	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	105-60-2	Caprolactam	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	86-74-8	Carbazole	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	218-01-9	Chrysene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	53-70-3	Dibenz(a,h)anthracene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	132-64-9	Dibenzofuran	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	84-66-2	Diethylphthalate	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	131-11-3	Dimethyl phthalate	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	84-74-2	Di-n-butylphthalate	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	117-84-0	Di-n-octylphthalate	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	206-44-0	Fluoranthene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	86-73-7	Fluorene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	118-74-1	Hexachlorobenzene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	87-68-3	Hexachlorobutadiene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	67-72-1	Hexachloroethane	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	78-59-1	Isophorone	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	91-20-3	Naphthalene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	98-95-3	Nitrobenzene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	87-86-5	Pentachlorophenol	900	UG_KG		900	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	85-01-8	Phenanthrene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	108-95-2	Phenol	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	129-00-0	Pyrene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	71-55-6	1,1,1-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	79-00-5	1,1,2-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	75-34-3	1,1-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	75-35-4	1,1-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	106-93-4	1,2-Dibromoethane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	95-50-1	1,2-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	107-06-2	1,2-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	78-87-5	1,2-Dichloropropane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	541-73-1	1,3-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	106-46-7	1,4-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	78-93-3	2-Butanone	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	591-78-6	2-Hexanone	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	108-10-1	4-Methyl-2-pentanone	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	67-64-1	Acetone	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	71-43-2	Benzene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	75-27-4	Bromodichloromethane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	75-25-2	Bromoform	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	74-83-9	Bromomethane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	75-15-0	Carbon disulfide	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	56-23-5	Carbon tetrachloride	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	108-90-7	Chlorobenzene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	75-00-3	Chloroethane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	67-66-3	Chloroform	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	74-87-3	Chloromethane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	156-59-2	cis-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	110-82-7	Cyclohexane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	124-48-1	Dibromochloromethane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	100-41-4	Ethylbenzene	10	UG_KG		10	U	No

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	98-82-8	Isopropylbenzene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	79-20-9	Methyl acetate	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	108-87-2	Methylcyclohexane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	75-09-2	Methylene chloride	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	100-42-5	Styrene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	127-18-4	Tetrachloroethene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	108-88-3	Toluene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	156-60-5	trans-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	79-01-6	Trichloroethene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	75-01-4	Vinyl chloride	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	1330-20-7	Xylene, total	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	METAL	7429-90-5	Aluminum	8820	MG_KG		21.7	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	METAL	7440-36-0	Antimony	6.5	MG_KG		6.5	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	METAL	7440-38-2	Arsenic	1.1	MG_KG		1.1	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	METAL	7440-39-3	Barium	57.3	MG_KG		21.7	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	METAL	7440-41-7	Beryllium	0.54	MG_KG		0.54	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	METAL	7440-43-9	Cadmium	0.54	MG_KG		0.54	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	METAL	7440-70-2	Calcium	10900	MG_KG		542	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	METAL	7440-47-3	Chromium	11.9	MG_KG		1.1	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	METAL	7440-48-4	Cobalt	9.2	MG_KG		5.4	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	METAL	7440-50-8	Copper	34	MG_KG		2.7	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	METAL	57-12-5	Cyanide	2.7	MG_KG		2.7	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	METAL	7439-89-6	Iron	15900	MG_KG		10.8	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	METAL	7439-92-1	Lead	3.9	MG_KG		1.1	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	METAL	7439-95-4	Magnesium	2910	MG_KG		542	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	METAL	7439-96-5	Manganese	501	MG_KG		1.6	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	METAL	7439-97-6	Mercury	0.11	MG_KG		0.11	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	METAL	7440-02-0	Nickel	4.7	MG_KG		4.3	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	METAL	7440-09-7	Potassium	1120	MG_KG		542	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	METAL	7782-49-2	Selenium	3.8	MG_KG		3.8	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	METAL	7440-22-4	Silver	1.1	MG_KG		1.1	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	METAL	7440-23-5	Sodium	542	MG_KG		542	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	METAL	7440-28-0	Thallium	0.54	MG_KG		0.54	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	METAL	7440-62-2	Vanadium	62.3	MG_KG		5.4	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	METAL	7440-66-6	Zinc	19.4	MG_KG		6.5	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	72-54-8	4,4'-DDD	3.6	UG_KG		3.6	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	72-55-9	4,4'-DDE	84	UG_KG		7.2		Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	50-29-3	4,4'-DDT	2.8	UG_KG		3.6	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	309-00-2	Aldrin	1.8	UG_KG		1.8	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	319-84-6	alpha-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	5103-71-9	alpha-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	12674-11-2	Aroclor-1016	36	UG_KG		36	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	11104-28-2	Aroclor-1221	73	UG_KG		73	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	11141-16-5	Aroclor-1232	36	UG_KG		36	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	53469-21-9	Aroclor-1242	36	UG_KG		36	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	12672-29-6	Aroclor-1248	36	UG_KG		36	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	11097-69-1	Aroclor-1254	36	UG_KG		36	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	11096-82-5	Aroclor-1260	36	UG_KG		36	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	319-85-7	beta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	319-86-8	delta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	60-57-1	Dieldrin	3.6	UG_KG		3.6	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	959-98-8	Endosulfan I	0.44	UG_KG		1.8	J	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	33213-65-9	Endosulfan II	3.6	UG_KG		3.6	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	3.6	UG_KG		3.6	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	72-20-8	Endrin	3.6	UG_KG		3.6	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	7421-93-4	Endrin aldehyde	3.6	UG_KG		3.6	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	53494-70-5	Endrin ketone	3.6	UG_KG		3.6	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	1.8	UG_KG		1.8	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	5103-74-2	gamma-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	76-44-8	Heptachlor	1.8	UG_KG		1.8	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	1.8	UG_KG		1.8	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	72-43-5	Methoxychlor	18	UG_KG		18	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	8001-35-2	Toxaphene	180	UG_KG		180	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	92-52-4	1,1-Biphenyl	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	900	UG_KG		900	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	120-83-2	2,4-Dichlorophenol	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	105-67-9	2,4-Dimethylphenol	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	51-28-5	2,4-Dinitrophenol	900	UG_KG		900	UJ	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	121-14-2	2,4-Dinitrotoluene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	606-20-2	2,6-Dinitrotoluene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	91-58-7	2-Chloronaphthalene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	95-57-8	2-Chlorophenol	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	91-57-6	2-Methylnaphthalene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	95-48-7	2-Methylphenol	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	88-74-4	2-Nitroaniline	900	UG_KG		900	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	88-75-5	2-Nitrophenol	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	99-09-2	3-Nitroaniline	900	UG_KG		900	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	900	UG_KG		900	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	106-47-8	4-Chloroaniline	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	106-44-5	4-Methylphenol	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	100-01-6	4-Nitroaniline	900	UG_KG		900	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	100-02-7	4-Nitrophenol	900	UG_KG		900	UJ	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	83-32-9	Acenaphthene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	208-96-8	Acenaphthylene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	98-86-2	Acetophenone	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	120-12-7	Anthracene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	1912-24-9	Atrazine	360	UG_KG		360	UJ	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	100-52-7	Benzaldehyde	360	UG_KG		360	UJ	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	56-55-3	Benzo(a)anthracene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	50-32-8	Benzo(a)pyrene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	205-99-2	Benzo(b)fluoranthene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	191-24-2	Benzo(g,h,i)perylene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	207-08-9	Benzo(k)fluoranthene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	85-68-7	Butylbenzylphthalate	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	105-60-2	Caprolactam	360	UG_KG		360	U	No

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	86-74-8	Carbazole	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	218-01-9	Chrysene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	53-70-3	Dibenz(a,h)anthracene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	132-64-9	Dibenzofuran	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	84-66-2	Diethylphthalate	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	131-11-3	Dimethyl phthalate	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	84-74-2	Di-n-butylphthalate	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	117-84-0	Di-n-octylphthalate	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	206-44-0	Fluoranthene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	86-73-7	Fluorene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	118-74-1	Hexachlorobenzene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	87-68-3	Hexachlorobutadiene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	67-72-1	Hexachloroethane	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	78-59-1	Isophorone	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	91-20-3	Naphthalene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	98-95-3	Nitrobenzene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	87-86-5	Pentachlorophenol	900	UG_KG		900	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	85-01-8	Phenanthrene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	108-95-2	Phenol	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	129-00-0	Pyrene	360	UG_KG		360	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	71-55-6	1,1,1-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	79-00-5	1,1,2-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	75-34-3	1,1-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	75-35-4	1,1-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	106-93-4	1,2-Dibromoethane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	95-50-1	1,2-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	107-06-2	1,2-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	78-87-5	1,2-Dichloropropane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	541-73-1	1,3-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	106-46-7	1,4-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	78-93-3	2-Butanone	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	591-78-6	2-Hexanone	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	108-10-1	4-Methyl-2-pentanone	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	67-64-1	Acetone	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	71-43-2	Benzene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	75-27-4	Bromodichloromethane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	75-25-2	Bromoform	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	74-83-9	Bromomethane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	75-15-0	Carbon disulfide	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	56-23-5	Carbon tetrachloride	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	108-90-7	Chlorobenzene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	75-00-3	Chloroethane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	67-66-3	Chloroform	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	74-87-3	Chloromethane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	156-59-2	cis-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	110-82-7	Cyclohexane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	124-48-1	Dibromochloromethane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	100-41-4	Ethylbenzene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	98-82-8	Isopropylbenzene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	79-20-9	Methyl acetate	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	108-87-2	Methylcyclohexane	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	75-09-2	Methylene chloride	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	100-42-5	Styrene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	127-18-4	Tetrachloroethene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	108-88-3	Toluene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	156-60-5	trans-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	79-01-6	Trichloroethene	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	75-01-4	Vinyl chloride	10	UG_KG		10	U	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	1330-20-7	Xylene, total	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	METAL	7429-90-5	Aluminum	16700	MG_KG		22.6		Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	METAL	7440-36-0	Antimony	0.79	MG_KG		6.8	J	Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	METAL	7440-38-2	Arsenic	1.1	MG_KG		1.1	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	METAL	7440-39-3	Barium	106	MG_KG		22.6		Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	METAL	7440-41-7	Beryllium	0.56	MG_KG		0.56	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	METAL	7440-43-9	Cadmium	0.56	MG_KG		0.56	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	METAL	7440-70-2	Calcium	5060	MG_KG		565		Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	METAL	7440-47-3	Chromium	18.1	MG_KG		1.1		Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	METAL	7440-48-4	Cobalt	15.8	MG_KG		5.6		Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	METAL	7440-50-8	Copper	111	MG_KG		2.8		Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	METAL	57-12-5	Cyanide	2.8	MG_KG		2.8	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	METAL	7439-89-6	Iron	30000	MG_KG		11.3		Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	METAL	7439-92-1	Lead	1.8	MG_KG		1.1		Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	METAL	7439-95-4	Magnesium	7810	MG_KG		565		Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	METAL	7439-96-5	Manganese	730	MG_KG		1.7		Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	METAL	7439-97-6	Mercury	0.11	MG_KG		0.11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	METAL	7440-02-0	Nickel	11.5	MG_KG		4.5	J	Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	METAL	7440-09-7	Potassium	806	MG_KG		565	J	Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	METAL	7782-49-2	Selenium	0.74	MG_KG		4	J	Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	METAL	7440-22-4	Silver	1.1	MG_KG		1.1	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	METAL	7440-23-5	Sodium	565	MG_KG		565	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	METAL	7440-28-0	Thallium	0.56	MG_KG		0.56	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	METAL	7440-62-2	Vanadium	113	MG_KG		5.6		Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	METAL	7440-66-6	Zinc	38.2	MG_KG		6.8		Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	72-54-8	4,4'-DDD	3.8	UG_KG		3.8	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	72-55-9	4,4'-DDE	0.79	UG_KG		3.8	J	Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	50-29-3	4,4'-DDT	3.8	UG_KG		3.8	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	309-00-2	Aldrin	1.9	UG_KG		1.9	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	319-84-6	alpha-BHC	1.9	UG_KG		1.9	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	5103-71-9	alpha-Chlordane	1.9	UG_KG		1.9	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	12674-11-2	Aroclor-1016	38	UG_KG		38	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	11104-28-2	Aroclor-1221	76	UG_KG		76	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	11141-16-5	Aroclor-1232	38	UG_KG		38	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	53469-21-9	Aroclor-1242	38	UG_KG		38	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	12672-29-6	Aroclor-1248	38	UG_KG		38	U	No

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	11097-69-1	Aroclor-1254	38	UG_KG		38	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	11096-82-5	Aroclor-1260	38	UG_KG		38	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	319-85-7	beta-BHC	1.9	UG_KG		1.9	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	319-86-8	delta-BHC	1.9	UG_KG		1.9	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	60-57-1	Dieldrin	3.8	UG_KG		3.8	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	959-98-8	Endosulfan I	1.9	UG_KG		1.9	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	33213-65-9	Endosulfan II	3.8	UG_KG		3.8	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	1031-07-8	Endosulfan sulfate	3.8	UG_KG		3.8	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	72-20-8	Endrin	3.8	UG_KG		3.8	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	7421-93-4	Endrin aldehyde	3.8	UG_KG		3.8	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	53494-70-5	Endrin ketone	3.8	UG_KG		3.8	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	58-89-9	gamma-BHC (Lindane)	1.9	UG_KG		1.9	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	5103-74-2	gamma-Chlordane	1.9	UG_KG		1.9	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	76-44-8	Heptachlor	1.9	UG_KG		1.9	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	1024-57-3	Heptachlor epoxide	1.9	UG_KG		1.9	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	72-43-5	Methoxychlor	19	UG_KG		19	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	8001-35-2	Toxaphene	190	UG_KG		190	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	92-52-4	1,1-Biphenyl	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	940	UG_KG		940	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	120-83-2	2,4-Dichlorophenol	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	105-67-9	2,4-Dimethylphenol	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	51-28-5	2,4-Dinitrophenol	940	UG_KG		940	UJ	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	121-14-2	2,4-Dinitrotoluene	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	606-20-2	2,6-Dinitrotoluene	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	91-58-7	2-Chloronaphthalene	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	95-57-8	2-Chlorophenol	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	91-57-6	2-Methylnaphthalene	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	95-48-7	2-Methylphenol	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	88-74-4	2-Nitroaniline	940	UG_KG		940	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	88-75-5	2-Nitrophenol	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	99-09-2	3-Nitroaniline	940	UG_KG		940	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	940	UG_KG		940	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	106-47-8	4-Chloroaniline	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	106-44-5	4-Methylphenol	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	100-01-6	4-Nitroaniline	940	UG_KG		940	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	100-02-7	4-Nitrophenol	940	UG_KG		940	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	83-32-9	Acenaphthene	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	208-96-8	Acenaphthylene	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	98-86-2	Acetophenone	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	120-12-7	Anthracene	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	1912-24-9	Atrazine	380	UG_KG		380	UJ	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	100-52-7	Benzaldehyde	380	UG_KG		380	UJ	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	56-55-3	Benzo(a)anthracene	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	50-32-8	Benzo(a)pyrene	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	205-99-2	Benzo(b)fluoranthene	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	191-24-2	Benzo(g,h,i)perylene	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	207-08-9	Benzo(k)fluoranthene	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	85-68-7	Butylbenzylphthalate	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	105-60-2	Caprolactam	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	86-74-8	Carbazole	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	218-01-9	Chrysene	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	53-70-3	Dibenz(a,h)anthracene	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	132-64-9	Dibenzofuran	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	84-66-2	Diethylphthalate	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	131-11-3	Dimethyl phthalate	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	84-74-2	Di-n-butylphthalate	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	117-84-0	Di-n-octylphthalate	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	206-44-0	Fluoranthene	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	86-73-7	Fluorene	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	118-74-1	Hexachlorobenzene	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	87-68-3	Hexachlorobutadiene	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	67-72-1	Hexachloroethane	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	78-59-1	Isophorone	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	91-20-3	Naphthalene	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	98-95-3	Nitrobenzene	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	87-86-5	Pentachlorophenol	940	UG_KG		940	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	85-01-8	Phenanthrene	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	108-95-2	Phenol	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	129-00-0	Pyrene	380	UG_KG		380	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	71-55-6	1,1,1-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	79-00-5	1,1,2-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	75-34-3	1,1-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	75-35-4	1,1-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	106-93-4	1,2-Dibromoethane	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	95-50-1	1,2-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	107-06-2	1,2-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	78-87-5	1,2-Dichloropropane	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	541-73-1	1,3-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	106-46-7	1,4-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	78-93-3	2-Butanone	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	591-78-6	2-Hexanone	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	108-10-1	4-Methyl-2-pentanone	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	67-64-1	Acetone	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	71-43-2	Benzene	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	75-27-4	Bromodichloromethane	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	75-25-2	Bromoform	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	74-83-9	Bromomethane	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	75-15-0	Carbon disulfide	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	56-23-5	Carbon tetrachloride	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	108-90-7	Chlorobenzene	10	UG_KG		10	U	No

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	75-00-3	Chloroethane	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	67-66-3	Chloroform	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	74-87-3	Chloromethane	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	156-59-2	cis-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	110-82-7	Cyclohexane	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	124-48-1	Dibromochloromethane	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	100-41-4	Ethylbenzene	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	98-82-8	Isopropylbenzene	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	79-20-9	Methyl acetate	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	108-87-2	Methylcyclohexane	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	75-09-2	Methylene chloride	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	100-42-5	Styrene	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	127-18-4	Tetrachloroethene	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	108-88-3	Toluene	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	156-60-5	trans-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	79-01-6	Trichloroethene	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	75-01-4	Vinyl chloride	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	1330-20-7	Xylene, total	10	UG_KG		10	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	METAL	7429-90-5	Aluminum	10800	MG_KG		21.8		Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	METAL	7440-36-0	Antimony	0.82	MG_KG		6.5	J	Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	METAL	7440-38-2	Arsenic	1.1	MG_KG		1.1	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	METAL	7440-39-3	Barium	80.5	MG_KG		21.8		Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	METAL	7440-41-7	Beryllium	0.54	MG_KG		0.55	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	METAL	7440-43-9	Cadmium	0.54	MG_KG		0.55	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	METAL	7440-70-2	Calcium	11200	MG_KG		545		Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	METAL	7440-47-3	Chromium	13	MG_KG		1.1		Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	METAL	7440-48-4	Cobalt	11.4	MG_KG		5.5		Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	METAL	7440-50-8	Copper	42.1	MG_KG		2.7		Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	METAL	57-12-5	Cyanide	2.7	MG_KG		2.7	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	METAL	7439-89-6	Iron	19200	MG_KG		10.9		Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	METAL	7439-92-1	Lead	6.6	MG_KG		1.1		Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	METAL	7439-95-4	Magnesium	3720	MG_KG		545		Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	METAL	7439-96-5	Manganese	638	MG_KG		1.6		Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	METAL	7439-97-6	Mercury	0.11	MG_KG		0.11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	METAL	7440-02-0	Nickel	5.7	MG_KG		4.4	J	Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	METAL	7440-09-7	Potassium	1540	MG_KG		545	J	Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	METAL	7782-49-2	Selenium	0.56	MG_KG		3.8	J	Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	METAL	7440-22-4	Silver	1.1	MG_KG		1.1	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	METAL	7440-23-5	Sodium	545	MG_KG		545	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	METAL	7440-28-0	Thallium	0.55	MG_KG		0.55	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	METAL	7440-62-2	Vanadium	73	MG_KG		5.5		Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	METAL	7440-66-6	Zinc	27	MG_KG		6.5		Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	72-54-8	4,4'-DDD	3.6	UG_KG		3.6	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	72-55-9	4,4'-DDE	26	UG_KG		3.6		Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	50-29-3	4,4'-DDT	3.6	UG_KG		3.6		Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	309-00-2	Aldrin	1.8	UG_KG		1.8	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	319-84-6	alpha-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	5103-71-9	alpha-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	12674-11-2	Aroclor-1016	36	UG_KG		36	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	11104-28-2	Aroclor-1221	73	UG_KG		73	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	11141-16-5	Aroclor-1232	36	UG_KG		36	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	53469-21-9	Aroclor-1242	36	UG_KG		36	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	12672-29-6	Aroclor-1248	36	UG_KG		36	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	11097-69-1	Aroclor-1254	36	UG_KG		36	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	11096-82-5	Aroclor-1260	36	UG_KG		36	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	319-85-7	beta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	319-86-8	delta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	60-57-1	Dieldrin	3.6	UG_KG		3.6	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	959-98-8	Endosulfan I	1.8	UG_KG		1.8	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	33213-65-9	Endosulfan II	3.6	UG_KG		3.6	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	3.6	UG_KG		3.6	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	72-20-8	Endrin	3.6	UG_KG		3.6	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	7421-93-4	Endrin aldehyde	3.6	UG_KG		3.6	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	53494-70-5	Endrin ketone	3.6	UG_KG		3.6	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	1.8	UG_KG		1.8	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	5103-74-2	gamma-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	76-44-8	Heptachlor	1.8	UG_KG		1.8	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	1.8	UG_KG		1.8	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	72-43-5	Methoxychlor	18	UG_KG		18	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	8001-35-2	Toxaphene	180	UG_KG		180	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	92-52-4	1,1-Biphenyl	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	900	UG_KG		900	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	120-83-2	2,4-Dichlorophenol	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	105-67-9	2,4-Dimethylphenol	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	51-28-5	2,4-Dinitrophenol	900	UG_KG		900	UJ	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	121-14-2	2,4-Dinitrotoluene	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	606-20-2	2,6-Dinitrotoluene	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	91-58-7	2-Chloronaphthalene	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	95-57-8	2-Chlorophenol	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	91-57-6	2-Methylnaphthalene	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	95-48-7	2-Methylphenol	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	88-74-4	2-Nitroaniline	900	UG_KG		900	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	88-75-5	2-Nitrophenol	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	99-09-2	3-Nitroaniline	900	UG_KG		900	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	900	UG_KG		900	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	106-47-8	4-Chloroaniline	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	106-44-5	4-Methylphenol	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	100-01-6	4-Nitroaniline	900	UG_KG		900	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	100-02-7	4-Nitrophenol	900	UG_KG		900	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	83-32-9	Acenaphthene	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	208-96-8	Acenaphthylene	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	98-86-2	Acetophenone	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	120-12-7	Anthracene	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	1912-24-9	Atrazine	360	UG_KG		360	UJ	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	100-52-7	Benzaldehyde	360	UG_KG		360	UJ	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	56-55-3	Benzo(a)anthracene	360	UG_KG		360	U	No

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	50-32-8	Benzo(a)pyrene	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	205-99-2	Benzo(b)fluoranthene	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	191-24-2	Benzo(g,h,i)perylene	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	207-08-9	Benzo(k)fluoranthene	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	85-68-7	Butylbenzylphthalate	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	105-60-2	Caprolactam	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	86-74-8	Carbazole	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	218-01-9	Chrysene	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	53-70-3	Dibenz(a,h)anthracene	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	132-64-9	Dibenzofuran	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	84-66-2	Diethylphthalate	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	131-11-3	Dimethyl phthalate	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	84-74-2	Di-n-butylphthalate	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	117-84-0	Di-n-octylphthalate	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	206-44-0	Fluoranthene	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	86-73-7	Fluorene	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	118-74-1	Hexachlorobenzene	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	87-68-3	Hexachlorobutadiene	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	67-72-1	Hexachloroethane	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	78-59-1	Isophorone	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	91-20-3	Naphthalene	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	98-95-3	Nitrobenzene	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	87-86-5	Pentachlorophenol	900	UG_KG		900	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	85-01-8	Phenanthrene	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	108-95-2	Phenol	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	129-00-0	Pyrene	360	UG_KG		360	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	71-55-6	1,1,1-Trichloroethane	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	79-00-5	1,1,2-Trichloroethane	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	75-34-3	1,1-Dichloroethane	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	75-35-4	1,1-Dichloroethene	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	106-93-4	1,2-Dibromoethane	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	95-50-1	1,2-Dichlorobenzene	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	107-06-2	1,2-Dichloroethane	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	78-87-5	1,2-Dichloropropane	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	541-73-1	1,3-Dichlorobenzene	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	106-46-7	1,4-Dichlorobenzene	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	78-93-3	2-Butanone	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	591-78-6	2-Hexanone	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	108-10-1	4-Methyl-2-pentanone	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	67-64-1	Acetone	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	71-43-2	Benzene	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	75-27-4	Bromodichloromethane	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	75-25-2	Bromoform	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	74-83-9	Bromomethane	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	75-15-0	Carbon disulfide	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	56-23-5	Carbon tetrachloride	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	108-90-7	Chlorobenzene	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	75-00-3	Chloroethane	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	67-66-3	Chloroform	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	74-87-3	Chloromethane	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	156-59-2	cis-1,2-Dichloroethene	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	110-82-7	Cyclohexane	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	124-48-1	Dibromochloromethane	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	100-41-4	Ethylbenzene	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	98-82-8	Isopropylbenzene	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	79-20-9	Methyl acetate	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	108-87-2	Methylcyclohexane	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	75-09-2	Methylene chloride	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	100-42-5	Styrene	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	127-18-4	Tetrachloroethene	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	108-88-3	Toluene	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	156-60-5	trans-1,2-Dichloroethene	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	79-01-6	Trichloroethene	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	75-01-4	Vinyl chloride	11	UG_KG		11	U	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	1330-20-7	Xylene, total	11	UG_KG		11	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	METAL	7429-90-5	Aluminum	9980	MG_KG		21.6		Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	METAL	7440-36-0	Antimony	0.6	MG_KG		6.5	J	Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	METAL	7440-38-2	Arsenic	1.1	MG_KG		1.1	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	METAL	7440-39-3	Barium	57.6	MG_KG		21.6		Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	METAL	7440-41-7	Beryllium	0.034	MG_KG		0.54	J	Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	METAL	7440-43-9	Cadmium	0.079	MG_KG		0.54	J	Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	METAL	7440-70-2	Calcium	2810	MG_KG		540		Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	METAL	7440-47-3	Chromium	14	MG_KG		1.1		Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	METAL	7440-48-4	Cobalt	10.8	MG_KG		5.4		Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	METAL	7440-50-8	Copper	44.2	MG_KG		2.7		Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	METAL	57-12-5	Cyanide	2.7	MG_KG		2.7	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	METAL	7439-89-6	Iron	18700	MG_KG		10.8		Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	METAL	7439-92-1	Lead	1.5	MG_KG		1.1		Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	METAL	7439-95-4	Magnesium	2930	MG_KG		540		Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	METAL	7439-96-5	Manganese	499	MG_KG		1.6		Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	METAL	7439-97-6	Mercury	0.11	MG_KG		0.11	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	METAL	7440-02-0	Nickel	6.7	MG_KG		4.3	J	Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	METAL	7440-09-7	Potassium	670	MG_KG		540	J	Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	METAL	7782-49-2	Selenium	3.8	MG_KG		3.8	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	METAL	7440-22-4	Silver	1.1	MG_KG		1.1	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	METAL	7440-23-5	Sodium	540	MG_KG		540	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	METAL	7440-28-0	Thallium	0.54	MG_KG		0.54	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	METAL	7440-62-2	Vanadium	72.7	MG_KG		5.4		Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	METAL	7440-66-6	Zinc	16.7	MG_KG		6.5		Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	72-54-8	4,4'-DDD	3.5	UG_KG		3.5	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	72-55-9	4,4'-DDE	220	UG_KG		18		Yes

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	50-29-3	4,4'-DDT	6.1	UG_KG		3.5		Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	309-00-2	Aldrin	1.8	UG_KG		1.8	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	319-84-6	alpha-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	5103-71-9	alpha-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	12674-11-2	Aroclor-1016	35	UG_KG		35	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	11104-28-2	Aroclor-1221	72	UG_KG		72	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	11141-16-5	Aroclor-1232	35	UG_KG		35	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	53469-21-9	Aroclor-1242	35	UG_KG		35	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	12672-29-6	Aroclor-1248	35	UG_KG		35	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	11097-69-1	Aroclor-1254	35	UG_KG		35	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	11096-82-5	Aroclor-1260	35	UG_KG		35	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	319-85-7	beta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	319-86-8	delta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	60-57-1	Dieldrin	3.5	UG_KG		3.5	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	959-98-8	Endosulfan I	1.8	UG_KG		1.8	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	33213-65-9	Endosulfan II	3.5	UG_KG		3.5	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	1031-07-8	Endosulfan sulfate	3.5	UG_KG		3.5	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	72-20-8	Endrin	3.5	UG_KG		3.5	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	7421-93-4	Endrin aldehyde	3.5	UG_KG		3.5	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	53494-70-5	Endrin ketone	3.5	UG_KG		3.5	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	58-89-9	gamma-BHC (Lindane)	1.8	UG_KG		1.8	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	5103-74-2	gamma-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	76-44-8	Heptachlor	1.8	UG_KG		1.8	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	1024-57-3	Heptachlor epoxide	1.8	UG_KG		1.8	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	72-43-5	Methoxychlor	18	UG_KG		18	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	8001-35-2	Toxaphene	180	UG_KG		180	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	92-52-4	1,1-Biphenyl	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	890	UG_KG		890	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	120-83-2	2,4-Dichlorophenol	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	105-67-9	2,4-Dimethylphenol	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	51-28-5	2,4-Dinitrophenol	890	UG_KG		890	UJ	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	121-14-2	2,4-Dinitrotoluene	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	606-20-2	2,6-Dinitrotoluene	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	91-58-7	2-Chloronaphthalene	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	95-57-8	2-Chlorophenol	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	91-57-6	2-Methylnaphthalene	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	95-48-7	2-Methylphenol	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	88-74-4	2-Nitroaniline	890	UG_KG		890	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	88-75-5	2-Nitrophenol	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	99-09-2	3-Nitroaniline	890	UG_KG		890	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	890	UG_KG		890	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	106-47-8	4-Chloroaniline	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	106-44-5	4-Methylphenol	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	100-01-6	4-Nitroaniline	890	UG_KG		890	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	100-02-7	4-Nitrophenol	890	UG_KG		890	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	83-32-9	Acenaphthene	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	208-96-8	Acenaphthylene	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	98-86-2	Acetophenone	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	120-12-7	Anthracene	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	1912-24-9	Atrazine	350	UG_KG		350	UJ	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	100-52-7	Benzaldehyde	350	UG_KG		350	UJ	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	56-55-3	Benzo(a)anthracene	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	50-32-8	Benzo(a)pyrene	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	205-99-2	Benzo(b)fluoranthene	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	191-24-2	Benzo(g,h,i)perylene	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	207-08-9	Benzo(k)fluoranthene	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	85-68-7	Butylbenzylphthalate	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	105-60-2	Caprolactam	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	86-74-8	Carbazole	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	218-01-9	Chrysene	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	53-70-3	Dibenz(a,h)anthracene	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	132-64-9	Dibenzofuran	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	84-66-2	Diethylphthalate	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	131-11-3	Dimethyl phthalate	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	84-74-2	Di-n-butylphthalate	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	117-84-0	Di-n-octylphthalate	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	206-44-0	Fluoranthene	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	86-73-7	Fluorene	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	118-74-1	Hexachlorobenzene	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	87-68-3	Hexachlorobutadiene	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	67-72-1	Hexachloroethane	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	78-59-1	Isophorone	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	91-20-3	Naphthalene	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	98-95-3	Nitrobenzene	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	87-86-5	Pentachlorophenol	890	UG_KG		890	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	85-01-8	Phenanthrene	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	108-95-2	Phenol	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	129-00-0	Pyrene	350	UG_KG		350	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	71-55-6	1,1,1-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	79-00-5	1,1,2-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	75-34-3	1,1-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	75-35-4	1,1-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	106-93-4	1,2-Dibromoethane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	95-50-1	1,2-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	107-06-2	1,2-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	78-87-5	1,2-Dichloropropane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	541-73-1	1,3-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	106-46-7	1,4-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	78-93-3	2-Butanone	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	591-78-6	2-Hexanone	10	UG_KG		10	U	No

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	108-10-1	4-Methyl-2-pentanone	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	67-64-1	Acetone	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	71-43-2	Benzene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	75-27-4	Bromodichloromethane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	75-25-2	Bromoform	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	74-83-9	Bromomethane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	75-15-0	Carbon disulfide	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	56-23-5	Carbon tetrachloride	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	108-90-7	Chlorobenzene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	75-00-3	Chloroethane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	67-66-3	Chloroform	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	74-87-3	Chloromethane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	156-59-2	cis-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	110-82-7	Cyclohexane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	124-48-1	Dibromochloromethane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	100-41-4	Ethylbenzene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	98-82-8	Isopropylbenzene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	79-20-9	Methyl acetate	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	108-87-2	Methylcyclohexane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	75-09-2	Methylene chloride	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	100-42-5	Styrene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	127-18-4	Tetrachloroethene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	108-88-3	Toluene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	156-60-5	trans-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	79-01-6	Trichloroethene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	75-01-4	Vinyl chloride	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	1330-20-7	Xylene, total	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	METAL	7429-90-5	Aluminum	8290	MG_KG		21.8		Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	METAL	7440-36-0	Antimony	0.58	MG_KG		6.5	J	Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	METAL	7440-38-2	Arsenic	1.1	MG_KG		1.1	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	METAL	7440-39-3	Barium	62.9	MG_KG		21.8		Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	METAL	7440-41-7	Beryllium	0.07	MG_KG		0.55	J	Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	METAL	7440-43-9	Cadmium	0.11	MG_KG		0.55	J	Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	METAL	7440-70-2	Calcium	6060	MG_KG		545		Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	METAL	7440-47-3	Chromium	9.6	MG_KG		1.1		Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	METAL	7440-48-4	Cobalt	9.1	MG_KG		5.5		Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	METAL	7440-50-8	Copper	32.4	MG_KG		2.7		Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	METAL	57-12-5	Cyanide	2.7	MG_KG		2.7	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	METAL	7439-89-6	Iron	15900	MG_KG		10.9		Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	METAL	7439-92-1	Lead	2.8	MG_KG		1.1		Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	METAL	7439-95-4	Magnesium	2720	MG_KG		545		Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	METAL	7439-96-5	Manganese	536	MG_KG		1.6		Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	METAL	7439-97-6	Mercury	0.11	MG_KG		0.11	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	METAL	7440-02-0	Nickel	4.6	MG_KG		4.4	J	Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	METAL	7440-09-7	Potassium	1030	MG_KG		545	J	Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	METAL	7782-49-2	Selenium	0.68	MG_KG		3.8	J	Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	METAL	7440-22-4	Silver	1.1	MG_KG		1.1	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	METAL	7440-23-5	Sodium	545	MG_KG		545	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	METAL	7440-28-0	Thallium	0.55	MG_KG		0.55	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	METAL	7440-62-2	Vanadium	54.2	MG_KG		5.5		Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	METAL	7440-66-6	Zinc	20.4	MG_KG		6.5		Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	72-54-8	4,4'-DDD	3.6	UG_KG		3.6	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	72-55-9	4,4'-DDE	180	UG_KG		18		Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	50-29-3	4,4'-DDT	22	UG_KG		3.6		Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	309-00-2	Aldrin	1.8	UG_KG		1.8	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	319-84-6	alpha-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	5103-71-9	alpha-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	12674-11-2	Aroclor-1016	36	UG_KG		36	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	11104-28-2	Aroclor-1221	73	UG_KG		73	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	11141-16-5	Aroclor-1232	36	UG_KG		36	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	53469-21-9	Aroclor-1242	36	UG_KG		36	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	12672-29-6	Aroclor-1248	36	UG_KG		36	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	11097-69-1	Aroclor-1254	36	UG_KG		36	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	11096-82-5	Aroclor-1260	28	UG_KG		36	J	Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	319-85-7	beta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	319-86-8	delta-BHC	1.8	UG_KG		1.8	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	60-57-1	Dieldrin	3.6	UG_KG		3.6	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	959-98-8	Endosulfan I	1.8	UG_KG		1.8	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	33213-65-9	Endosulfan II	3.6	UG_KG		3.6	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	3.6	UG_KG		3.6	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	72-20-8	Endrin	3.6	UG_KG		3.6	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	7421-93-4	Endrin aldehyde	3.6	UG_KG		3.6	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	53494-70-5	Endrin ketone	3.6	UG_KG		3.6	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	1.8	UG_KG		1.8	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	5103-74-2	gamma-Chlordane	1.8	UG_KG		1.8	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	76-44-8	Heptachlor	1.8	UG_KG		1.8	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	1.8	UG_KG		1.8	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	72-43-5	Methoxychlor	18	UG_KG		18	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	8001-35-2	Toxaphene	180	UG_KG		180	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	92-52-4	1,1-Biphenyl	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	900	UG_KG		900	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	120-83-2	2,4-Dichlorophenol	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	105-67-9	2,4-Dimethylphenol	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	51-28-5	2,4-Dinitrophenol	900	UG_KG		900	UJ	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	121-14-2	2,4-Dinitrotoluene	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	606-20-2	2,6-Dinitrotoluene	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	91-58-7	2-Chloronaphthalene	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	95-57-8	2-Chlorophenol	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	91-57-6	2-Methylnaphthalene	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	95-48-7	2-Methylphenol	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	88-74-4	2-Nitroaniline	900	UG_KG		900	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	88-75-5	2-Nitrophenol	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	99-09-2	3-Nitroaniline	900	UG_KG		900	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	900	UG_KG		900	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	106-47-8	4-Chloroaniline	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	106-44-5	4-Methylphenol	360	UG_KG		360	U	No

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	100-01-6	4-Nitroaniline	900	UG_KG		900	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	100-02-7	4-Nitrophenol	900	UG_KG		900	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	83-32-9	Acenaphthene	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	208-96-8	Acenaphthylene	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	98-86-2	Acetophenone	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	120-12-7	Anthracene	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	1912-24-9	Atrazine	360	UG_KG		360	UJ	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	100-52-7	Benzaldehyde	360	UG_KG		360	UJ	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	56-55-3	Benzo(a)anthracene	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	50-32-8	Benzo(a)pyrene	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	205-99-2	Benzo(b)fluoranthene	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	191-24-2	Benzo(g,h,i)perylene	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	207-08-9	Benzo(k)fluoranthene	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	85-68-7	Butylbenzylphthalate	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	105-60-2	Caprolactam	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	86-74-8	Carbazole	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	218-01-9	Chrysene	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	53-70-3	Dibenz(a,h)anthracene	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	132-64-9	Dibenzofuran	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	84-66-2	Diethylphthalate	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	131-11-3	Dimethyl phthalate	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	84-74-2	Di-n-butylphthalate	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	117-84-0	Di-n-octylphthalate	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	206-44-0	Fluoranthene	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	86-73-7	Fluorene	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	118-74-1	Hexachlorobenzene	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	87-68-3	Hexachlorobutadiene	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	67-72-1	Hexachloroethane	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	78-59-1	Isophorone	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	91-20-3	Naphthalene	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	98-95-3	Nitrobenzene	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	87-86-5	Pentachlorophenol	900	UG_KG		900	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	85-01-8	Phenanthrene	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	108-95-2	Phenol	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	129-00-0	Pyrene	360	UG_KG		360	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	71-55-6	1,1,1-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	79-00-5	1,1,2-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	75-34-3	1,1-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	75-35-4	1,1-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	106-93-4	1,2-Dibromoethane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	95-50-1	1,2-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	107-06-2	1,2-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	78-87-5	1,2-Dichloropropane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	541-73-1	1,3-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	106-46-7	1,4-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	78-93-3	2-Butanone	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	591-78-6	2-Hexanone	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	108-10-1	4-Methyl-2-pentanone	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	67-64-1	Acetone	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	71-43-2	Benzene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	75-27-4	Bromodichloromethane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	75-25-2	Bromoform	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	74-83-9	Bromomethane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	75-15-0	Carbon disulfide	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	56-23-5	Carbon tetrachloride	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	108-90-7	Chlorobenzene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	75-00-3	Chloroethane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	67-66-3	Chloroform	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	74-87-3	Chloromethane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	156-59-2	cis-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	110-82-7	Cyclohexane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	124-48-1	Dibromochloromethane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	100-41-4	Ethylbenzene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	98-82-8	Isopropylbenzene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	79-20-9	Methyl acetate	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	108-87-2	Methylcyclohexane	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	75-09-2	Methylene chloride	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	100-42-5	Styrene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	127-18-4	Tetrachloroethene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	108-88-3	Toluene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	156-60-5	trans-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	79-01-6	Trichloroethene	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	75-01-4	Vinyl chloride	10	UG_KG		10	U	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	1330-20-7	Xylene, total	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	METAL	7429-90-5	Aluminum	10100	MG_KG		23.1	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	METAL	7440-36-0	Antimony	6.9	MG_KG		6.9	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	METAL	7440-38-2	Arsenic	1.2	MG_KG		1.2	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	METAL	7440-39-3	Barium	68.6	MG_KG		23.1	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	METAL	7440-41-7	Beryllium	0.58	MG_KG		0.58	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	METAL	7440-43-9	Cadmium	0.58	MG_KG		0.58	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	METAL	7440-70-2	Calcium	4530	MG_KG		578	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	METAL	7440-47-3	Chromium	12.4	MG_KG		1.2	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	METAL	7440-48-4	Cobalt	11.5	MG_KG		5.8	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	METAL	7440-50-8	Copper	56.3	MG_KG		2.9	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	METAL	57-12-5	Cyanide	2.9	MG_KG		2.9	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	METAL	7439-89-6	Iron	18700	MG_KG		11.6	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	METAL	7439-92-1	Lead	1.5	MG_KG		1.2	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	METAL	7439-95-4	Magnesium	4900	MG_KG		578	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	METAL	7439-96-5	Manganese	626	MG_KG		1.7	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	METAL	7439-97-6	Mercury	0.12	MG_KG		0.12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	METAL	7440-02-0	Nickel	8.8	MG_KG		4.6	J	Yes

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	METAL	7440-09-7	Potassium	883	MG_KG		578	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	METAL	7782-49-2	Selenium	4	MG_KG		4	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	METAL	7440-22-4	Silver	1.2	MG_KG		1.2	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	METAL	7440-23-5	Sodium	636	MG_KG		578	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	METAL	7440-28-0	Thallium	0.58	MG_KG		0.58	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	METAL	7440-62-2	Vanadium	76.2	MG_KG		5.8	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	METAL	7440-66-6	Zinc	22.8	MG_KG		6.9	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	72-54-8	4,4'-DDD	3.8	UG_KG		3.8	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	72-55-9	4,4'-DDE	3.8	UG_KG		3.8	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	50-29-3	4,4'-DDT	3.8	UG_KG		3.8	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	309-00-2	Aldrin	2	UG_KG		2	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	319-84-6	alpha-BHC	2	UG_KG		2	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	5103-71-9	alpha-Chlordane	2	UG_KG		2	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	12674-11-2	Aroclor-1016	38	UG_KG		38	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	11104-28-2	Aroclor-1221	77	UG_KG		77	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	11141-16-5	Aroclor-1232	38	UG_KG		38	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	53469-21-9	Aroclor-1242	38	UG_KG		38	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	12672-29-6	Aroclor-1248	38	UG_KG		38	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	11097-69-1	Aroclor-1254	38	UG_KG		38	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	11096-82-5	Aroclor-1260	38	UG_KG		38	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	319-85-7	beta-BHC	2	UG_KG		2	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	319-86-8	delta-BHC	2	UG_KG		2	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	60-57-1	Dieldrin	3.8	UG_KG		3.8	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	959-98-8	Endosulfan I	2	UG_KG		2	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	33213-65-9	Endosulfan II	3.8	UG_KG		3.8	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	1031-07-8	Endosulfan sulfate	3.8	UG_KG		3.8	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	72-20-8	Endrin	3.8	UG_KG		3.8	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	7421-93-4	Endrin aldehyde	3.8	UG_KG		3.8	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	53494-70-5	Endrin ketone	3.8	UG_KG		3.8	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	58-89-9	gamma-BHC (Lindane)	2	UG_KG		2	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	5103-74-2	gamma-Chlordane	2	UG_KG		2	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	76-44-8	Heptachlor	2	UG_KG		2	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	1024-57-3	Heptachlor epoxide	2	UG_KG		2	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	72-43-5	Methoxychlor	20	UG_KG		20	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	8001-35-2	Toxaphene	200	UG_KG		200	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	92-52-4	1,1-Biphenyl	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	950	UG_KG		950	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	120-83-2	2,4-Dichlorophenol	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	105-67-9	2,4-Dimethylphenol	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	51-28-5	2,4-Dinitrophenol	950	UG_KG		950	UJ	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	121-14-2	2,4-Dinitrotoluene	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	606-20-2	2,6-Dinitrotoluene	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	91-58-7	2-Chloronaphthalene	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	95-57-8	2-Chlorophenol	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	91-57-6	2-Methylnaphthalene	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	95-48-7	2-Methylphenol	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	88-74-4	2-Nitroaniline	950	UG_KG		950	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	88-75-5	2-Nitrophenol	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	99-09-2	3-Nitroaniline	950	UG_KG		950	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	950	UG_KG		950	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	106-47-8	4-Chloroaniline	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	106-44-5	4-Methylphenol	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	100-01-6	4-Nitroaniline	950	UG_KG		950	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	100-02-7	4-Nitrophenol	950	UG_KG		950	UJ	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	83-32-9	Acenaphthene	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	208-96-8	Acenaphthylene	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	98-86-2	Acetophenone	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	120-12-7	Anthracene	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	1912-24-9	Atrazine	380	UG_KG		380	UJ	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	100-52-7	Benzaldehyde	380	UG_KG		380	UJ	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	56-55-3	Benzo(a)anthracene	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	50-32-8	Benzo(a)pyrene	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	205-99-2	Benzo(b)fluoranthene	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	191-24-2	Benzo(g,h,i)perylene	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	207-08-9	Benzo(k)fluoranthene	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	85-68-7	Butylbenzylphthalate	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	105-60-2	Caprolactam	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	86-74-8	Carbazole	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	218-01-9	Chrysene	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	53-70-3	Dibenz(a,h)anthracene	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	132-64-9	Dibenzofuran	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	84-66-2	Diethylphthalate	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	131-11-3	Dimethyl phthalate	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	84-74-2	Di-n-butylphthalate	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	117-84-0	Di-n-octylphthalate	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	206-44-0	Fluoranthene	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	86-73-7	Fluorene	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	118-74-1	Hexachlorobenzene	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	87-68-3	Hexachlorobutadiene	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	67-72-1	Hexachloroethane	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	78-59-1	Isophorone	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	91-20-3	Naphthalene	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	98-95-3	Nitrobenzene	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	87-86-5	Pentachlorophenol	950	UG_KG		950	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	85-01-8	Phenanthrene	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	108-95-2	Phenol	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	129-00-0	Pyrene	380	UG_KG		380	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	71-55-6	1,1,1-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	79-00-5	1,1,2-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	75-34-3	1,1-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	75-35-4	1,1-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	10	UG_KG		10	U	No

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	106-93-4	1,2-Dibromoethane	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	95-50-1	1,2-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	107-06-2	1,2-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	78-87-5	1,2-Dichloropropane	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	541-73-1	1,3-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	106-46-7	1,4-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	78-93-3	2-Butanone	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	591-78-6	2-Hexanone	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	108-10-1	4-Methyl-2-pentanone	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	67-64-1	Acetone	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	71-43-2	Benzene	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	75-27-4	Bromodichloromethane	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	75-25-2	Bromoform	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	74-83-9	Bromomethane	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	75-15-0	Carbon disulfide	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	56-23-5	Carbon tetrachloride	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	108-90-7	Chlorobenzene	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	75-00-3	Chloroethane	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	67-66-3	Chloroform	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	74-87-3	Chloromethane	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	156-59-2	cis-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	110-82-7	Cyclohexane	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	124-48-1	Dibromochloromethane	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	100-41-4	Ethylbenzene	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	98-82-8	Isopropylbenzene	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	79-20-9	Methyl acetate	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	108-87-2	Methylcyclohexane	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	75-09-2	Methylene chloride	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	100-42-5	Styrene	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	127-18-4	Tetrachloroethene	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	108-88-3	Toluene	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	156-60-5	trans-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	79-01-6	Trichloroethene	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	75-01-4	Vinyl chloride	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	1330-20-7	Xylene, total	10	UG_KG		10	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	METAL	7429-90-5	Aluminum	8590	MG_KG		22.2	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	METAL	7440-36-0	Antimony	6.6	MG_KG		6.7	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	METAL	7440-38-2	Arsenic	1.1	MG_KG		1.1	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	METAL	7440-39-3	Barium	63.1	MG_KG		22.2	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	METAL	7440-41-7	Beryllium	0.55	MG_KG		0.55	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	METAL	7440-43-9	Cadmium	0.55	MG_KG		0.55	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	METAL	7440-70-2	Calcium	11000	MG_KG		554	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	METAL	7440-47-3	Chromium	13	MG_KG		1.1	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	METAL	7440-48-4	Cobalt	11.7	MG_KG		5.5	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	METAL	7440-50-8	Copper	31.9	MG_KG		2.8	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	METAL	57-12-5	Cyanide	2.8	MG_KG		2.8	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	METAL	7439-89-6	Iron	16900	MG_KG		11.1	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	METAL	7439-92-1	Lead	3.4	MG_KG		1.1	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	METAL	7439-95-4	Magnesium	2870	MG_KG		554	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	METAL	7439-96-5	Manganese	707	MG_KG		1.7	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	METAL	7439-97-6	Mercury	0.11	MG_KG		0.11	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	METAL	7440-02-0	Nickel	5.2	MG_KG		4.4	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	METAL	7440-09-7	Potassium	1110	MG_KG		554	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	METAL	7782-49-2	Selenium	0.61	MG_KG		3.9	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	METAL	7440-22-4	Silver	1.1	MG_KG		1.1	UJ	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	METAL	7440-23-5	Sodium	554	MG_KG		554	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	METAL	7440-28-0	Thallium	0.55	MG_KG		0.55	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	METAL	7440-62-2	Vanadium	68.5	MG_KG		5.5	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	METAL	7440-66-6	Zinc	13.8	MG_KG		6.7	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	72-54-8	4,4'-DDD	3.7	UG_KG		3.7	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	72-55-9	4,4'-DDE	5.9	UG_KG		3.7		Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	50-29-3	4,4'-DDT	3.7	UG_KG		3.7	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	309-00-2	Aldrin	1.9	UG_KG		1.9	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	319-84-6	alpha-BHC	1.9	UG_KG		1.9	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	5103-71-9	alpha-Chlordane	1.9	UG_KG		1.9	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	12674-11-2	Aroclor-1016	37	UG_KG		37	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	11104-28-2	Aroclor-1221	74	UG_KG		74	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	11141-16-5	Aroclor-1232	37	UG_KG		37	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	53469-21-9	Aroclor-1242	37	UG_KG		37	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	12672-29-6	Aroclor-1248	37	UG_KG		37	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	11097-69-1	Aroclor-1254	37	UG_KG		37	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	11096-82-5	Aroclor-1260	37	UG_KG		37	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	319-85-7	beta-BHC	1.9	UG_KG		1.9	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	319-86-8	delta-BHC	1.9	UG_KG		1.9	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	60-57-1	Dieldrin	3.7	UG_KG		3.7	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	959-98-8	Endosulfan I	1.9	UG_KG		1.9	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	33213-65-9	Endosulfan II	3.7	UG_KG		3.7	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	3.7	UG_KG		3.7	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	72-20-8	Endrin	3.7	UG_KG		3.7	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	7421-93-4	Endrin aldehyde	3.7	UG_KG		3.7	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	53494-70-5	Endrin ketone	3.7	UG_KG		3.7	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	1.9	UG_KG		1.9	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	5103-74-2	gamma-Chlordane	0.57	UG_KG		1.9	J	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	76-44-8	Heptachlor	1.9	UG_KG		1.9	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	1.9	UG_KG		1.9	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	72-43-5	Methoxychlor	19	UG_KG		19	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	8001-35-2	Toxaphene	190	UG_KG		190	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	92-52-4	1,1-Biphenyl	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	920	UG_KG		920	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	120-83-2	2,4-Dichlorophenol	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	105-67-9	2,4-Dimethylphenol	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	51-28-5	2,4-Dinitrophenol	920	UG_KG		920	UJ	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	121-14-2	2,4-Dinitrotoluene	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	606-20-2	2,6-Dinitrotoluene	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	91-58-7	2-Chloronaphthalene	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	95-57-8	2-Chlorophenol	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	91-57-6	2-Methylnaphthalene	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	95-48-7	2-Methylphenol	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	88-74-4	2-Nitroaniline	920	UG_KG		920	U	No

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	88-75-5	2-Nitrophenol	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	99-09-2	3-Nitroaniline	920	UG_KG		920	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	920	UG_KG		920	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	106-47-8	4-Chloroaniline	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	106-44-5	4-Methylphenol	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	100-01-6	4-Nitroaniline	920	UG_KG		920	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	100-02-7	4-Nitrophenol	920	UG_KG		920	UJ	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	83-32-9	Acenaphthene	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	208-96-8	Acenaphthylene	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	98-86-2	Acetophenone	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	120-12-7	Anthracene	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	1912-24-9	Atrazine	370	UG_KG		370	UJ	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	100-52-7	Benzaldehyde	370	UG_KG		370	UJ	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	56-55-3	Benzo(a)anthracene	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	50-32-8	Benzo(a)pyrene	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	205-99-2	Benzo(b)fluoranthene	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	191-24-2	Benzo(g,h,i)perylene	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	207-08-9	Benzo(k)fluoranthene	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	85-68-7	Butylbenzylphthalate	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	105-60-2	Caprolactam	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	86-74-8	Carbazole	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	218-01-9	Chrysene	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	53-70-3	Dibenz(a,h)anthracene	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	132-64-9	Dibenzofuran	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	84-66-2	Diethylphthalate	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	131-11-3	Dimethyl phthalate	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	84-74-2	Di-n-butylphthalate	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	117-84-0	Di-n-octylphthalate	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	206-44-0	Fluoranthene	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	86-73-7	Fluorene	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	118-74-1	Hexachlorobenzene	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	87-68-3	Hexachlorobutadiene	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	67-72-1	Hexachloroethane	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	78-59-1	Isophorone	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	91-20-3	Naphthalene	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	98-95-3	Nitrobenzene	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	87-86-5	Pentachlorophenol	920	UG_KG		920	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	85-01-8	Phenanthrene	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	108-95-2	Phenol	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	129-00-0	Pyrene	370	UG_KG		370	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	71-55-6	1,1,1-Trichloroethane	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	79-00-5	1,1,2-Trichloroethane	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	75-34-3	1,1-Dichloroethane	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	75-35-4	1,1-Dichloroethene	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	106-93-4	1,2-Dibromoethane	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	95-50-1	1,2-Dichlorobenzene	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	107-06-2	1,2-Dichloroethane	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	78-87-5	1,2-Dichloropropane	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	541-73-1	1,3-Dichlorobenzene	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	106-46-7	1,4-Dichlorobenzene	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	78-93-3	2-Butanone	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	591-78-6	2-Hexanone	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	108-10-1	4-Methyl-2-pentanone	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	67-64-1	Acetone	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	71-43-2	Benzene	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	75-27-4	Bromodichloromethane	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	75-25-2	Bromoform	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	74-83-9	Bromomethane	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	75-15-0	Carbon disulfide	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	56-23-5	Carbon tetrachloride	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	108-90-7	Chlorobenzene	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	75-00-3	Chloroethane	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	67-66-3	Chloroform	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	74-87-3	Chloromethane	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	156-59-2	cis-1,2-Dichloroethene	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	110-82-7	Cyclohexane	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	124-48-1	Dibromochloromethane	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	100-41-4	Ethylbenzene	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	98-82-8	Isopropylbenzene	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	79-20-9	Methyl acetate	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	108-87-2	Methylcyclohexane	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	75-09-2	Methylene chloride	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	100-42-5	Styrene	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	127-18-4	Tetrachloroethene	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	108-88-3	Toluene	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	156-60-5	trans-1,2-Dichloroethene	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	79-01-6	Trichloroethene	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	75-01-4	Vinyl chloride	12	UG_KG		12	U	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	1330-20-7	Xylene, total	12	UG_KG		12	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	METAL	7429-90-5	Aluminum	6820	MG_KG		20.8		Yes
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	METAL	7440-36-0	Antimony	0.2	MG_KG		6.2	J	Yes
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	METAL	7440-38-2	Arsenic	1	MG_KG		1	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	METAL	7440-39-3	Barium	52.4	MG_KG		20.8	J	Yes
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	METAL	7440-41-7	Beryllium	0.52	MG_KG		0.52	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	METAL	7440-43-9	Cadmium	0.52	MG_KG		0.52	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	METAL	7440-70-2	Calcium	3080	MG_KG		521		Yes
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	METAL	7440-47-3	Chromium	10.2	MG_KG		1	J	Yes

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	METAL	7440-48-4	Cobalt	7.6	MG_KG		5.2	J	Yes
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	METAL	7440-50-8	Copper	41.1	MG_KG		2.6	J	Yes
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	METAL	57-12-5	Cyanide	2.6	MG_KG		2.6	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	METAL	7439-89-6	Iron	14600	MG_KG		10.4		Yes
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	METAL	7439-92-1	Lead	1	MG_KG		1	J	Yes
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	METAL	7439-95-4	Magnesium	2340	MG_KG		521		Yes
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	METAL	7439-96-5	Manganese	367	MG_KG		1.6	J	Yes
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	METAL	7439-97-6	Mercury	0.1	MG_KG		0.1	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	METAL	7440-02-0	Nickel	4.6	MG_KG		4.2	J	Yes
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	METAL	7440-09-7	Potassium	521	MG_KG		521	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	METAL	7782-49-2	Selenium	0.54	MG_KG		3.6	J	Yes
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	METAL	7440-22-4	Silver	1	MG_KG		1	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	METAL	7440-23-5	Sodium	521	MG_KG		521	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	METAL	7440-28-0	Thallium	0.52	MG_KG		0.52	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	METAL	7440-62-2	Vanadium	55.8	MG_KG		5.2	J	Yes
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	METAL	7440-66-6	Zinc	19.6	MG_KG		6.2	J	Yes
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	92-52-4	1,1-Biphenyl	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	860	UG_KG		860	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	120-83-2	2,4-Dichlorophenol	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	105-67-9	2,4-Dimethylphenol	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	51-28-5	2,4-Dinitrophenol	860	UG_KG		860	R	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	121-14-2	2,4-Dinitrotoluene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	606-20-2	2,6-Dinitrotoluene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	91-58-7	2-Chloronaphthalene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	95-57-8	2-Chlorophenol	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	91-57-6	2-Methylnaphthalene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	95-48-7	2-Methylphenol	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	88-74-4	2-Nitroaniline	860	UG_KG		860	UJ	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	88-75-5	2-Nitrophenol	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	99-09-2	3-Nitroaniline	860	UG_KG		860	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	860	UG_KG		860	UJ	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	106-47-8	4-Chloroaniline	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	106-44-5	4-Methylphenol	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	100-01-6	4-Nitroaniline	860	UG_KG		860	UJ	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	100-02-7	4-Nitrophenol	860	UG_KG		860	UJ	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	83-32-9	Acenaphthene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	208-96-8	Acenaphthylene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	98-86-2	Acetophenone	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	120-12-7	Anthracene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	1912-24-9	Atrazine	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	100-52-7	Benzaldehyde	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	56-55-3	Benzo(a)anthracene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	50-32-8	Benzo(a)pyrene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	205-99-2	Benzo(b)fluoranthene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	191-24-2	Benzo(g,h,i)perylene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	207-08-9	Benzo(k)fluoranthene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	85-68-7	Butylbenzylphthalate	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	105-60-2	Caprolactam	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	86-74-8	Carbazole	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	218-01-9	Chrysene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	53-70-3	Dibenz(a,h)anthracene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	132-64-9	Dibenzofuran	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	84-66-2	Diethylphthalate	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	131-11-3	Dimethyl phthalate	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	84-74-2	Di-n-butylphthalate	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	117-84-0	Di-n-octylphthalate	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	206-44-0	Fluoranthene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	86-73-7	Fluorene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	118-74-1	Hexachlorobenzene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	87-68-3	Hexachlorobutadiene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	67-72-1	Hexachloroethane	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	78-59-1	Isophorone	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	91-20-3	Naphthalene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	98-95-3	Nitrobenzene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	87-86-5	Pentachlorophenol	860	UG_KG		860	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	85-01-8	Phenanthrene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	108-95-2	Phenol	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	129-00-0	Pyrene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	71-55-6	1,1,1-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	79-00-5	1,1,2-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	75-34-3	1,1-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	75-35-4	1,1-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	106-93-4	1,2-Dibromoethane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	95-50-1	1,2-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	107-06-2	1,2-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	78-87-5	1,2-Dichloropropane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	541-73-1	1,3-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	106-46-7	1,4-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	78-93-3	2-Butanone	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	591-78-6	2-Hexanone	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	108-10-1	4-Methyl-2-pentanone	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	67-64-1	Acetone	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	71-43-2	Benzene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	75-27-4	Bromodichloromethane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	75-25-2	Bromoform	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	74-83-9	Bromomethane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	75-15-0	Carbon disulfide	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	56-23-5	Carbon tetrachloride	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	108-90-7	Chlorobenzene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	75-00-3	Chloroethane	10	UG_KG		10	U	No

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	67-66-3	Chloroform	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	74-87-3	Chloromethane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	156-59-2	cis-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	110-82-7	Cyclohexane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	124-48-1	Dibromochloromethane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	100-41-4	Ethylbenzene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	98-82-8	Isopropylbenzene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	79-20-9	Methyl acetate	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	108-87-2	Methylcyclohexane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	75-09-2	Methylene chloride	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	100-42-5	Styrene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	127-18-4	Tetrachloroethene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	108-88-3	Toluene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	156-60-5	trans-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	79-01-6	Trichloroethene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	75-01-4	Vinyl chloride	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	1330-20-7	Xylene, total	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	METAL	7429-90-5	Aluminum	6950	MG_KG		20.7		Yes
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	METAL	7440-36-0	Antimony	0.27	MG_KG		6.2	J	Yes
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	METAL	7440-38-2	Arsenic	1	MG_KG		1	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	METAL	7440-39-3	Barium	45.9	MG_KG		20.7	J	Yes
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	METAL	7440-41-7	Beryllium	0.52	MG_KG		0.52	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	METAL	7440-43-9	Cadmium	0.52	MG_KG		0.52	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	METAL	7440-70-2	Calcium	3900	MG_KG		519		Yes
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	METAL	7440-47-3	Chromium	9.1	MG_KG		1	J	Yes
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	METAL	7440-48-4	Cobalt	7.6	MG_KG		5.2	J	Yes
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	METAL	7440-50-8	Copper	41.5	MG_KG		2.6	J	Yes
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	METAL	57-12-5	Cyanide	2.6	MG_KG		2.6	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	METAL	7439-89-6	Iron	13900	MG_KG		10.4		Yes
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	METAL	7439-92-1	Lead	1.2	MG_KG		1	J	Yes
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	METAL	7439-95-4	Magnesium	2450	MG_KG		519		Yes
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	METAL	7439-96-5	Manganese	328	MG_KG		1.6	J	Yes
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	METAL	7439-97-6	Mercury	0.1	MG_KG		0.1	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	METAL	7440-02-0	Nickel	4.5	MG_KG		4.1	J	Yes
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	METAL	7440-09-7	Potassium	519	MG_KG		519	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	METAL	7782-49-2	Selenium	0.57	MG_KG		3.6	J	Yes
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	METAL	7440-22-4	Silver	1	MG_KG		1	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	METAL	7440-23-5	Sodium	519	MG_KG		519	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	METAL	7440-28-0	Thallium	0.52	MG_KG		0.52	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	METAL	7440-62-2	Vanadium	51.3	MG_KG		5.2	J	Yes
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	METAL	7440-66-6	Zinc	17.1	MG_KG		6.2	J	Yes
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	92-52-4	1,1-Biphenyl	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	860	UG_KG		860	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	120-83-2	2,4-Dichlorophenol	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	105-67-9	2,4-Dimethylphenol	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	51-28-5	2,4-Dinitrophenol	860	UG_KG		860	R	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	121-14-2	2,4-Dinitrotoluene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	606-20-2	2,6-Dinitrotoluene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	91-58-7	2-Chloronaphthalene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	95-57-8	2-Chlorophenol	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	91-57-6	2-Methylnaphthalene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	95-48-7	2-Methylphenol	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	88-74-4	2-Nitroaniline	860	UG_KG		860	UJ	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	88-75-5	2-Nitrophenol	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	99-09-2	3-Nitroaniline	860	UG_KG		860	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	860	UG_KG		860	UJ	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	106-47-8	4-Chloroaniline	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	106-44-5	4-Methylphenol	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	100-01-6	4-Nitroaniline	860	UG_KG		860	UJ	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	100-02-7	4-Nitrophenol	860	UG_KG		860	UJ	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	83-32-9	Acenaphthene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	208-96-8	Acenaphthylene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	98-86-2	Acetophenone	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	120-12-7	Anthracene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	1912-24-9	Atrazine	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	100-52-7	Benzaldehyde	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	56-55-3	Benzo(a)anthracene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	50-32-8	Benzo(a)pyrene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	205-99-2	Benzo(b)fluoranthene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	191-24-2	Benzo(g,h,i)perylene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	207-08-9	Benzo(k)fluoranthene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	85-68-7	Butylbenzylphthalate	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	105-60-2	Caprolactam	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	86-74-8	Carbazole	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	218-01-9	Chrysene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	53-70-3	Dibenz(a,h)anthracene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	132-64-9	Dibenzofuran	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	84-66-2	Diethylphthalate	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	131-11-3	Dimethyl phthalate	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	84-74-2	Di-n-butylphthalate	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	117-84-0	Di-n-octylphthalate	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	206-44-0	Fluoranthene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	86-73-7	Fluorene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	118-74-1	Hexachlorobenzene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	87-68-3	Hexachlorobutadiene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	67-72-1	Hexachloroethane	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	78-59-1	Isophorone	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	91-20-3	Naphthalene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	98-95-3	Nitrobenzene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	340	UG_KG		340	U	No

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	87-86-5	Pentachlorophenol	860	UG_KG		860	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	85-01-8	Phenanthrene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	108-95-2	Phenol	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	129-00-0	Pyrene	340	UG_KG		340	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	71-55-6	1,1,1-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	79-00-5	1,1,2-Trichloroethane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	75-34-3	1,1-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	75-35-4	1,1-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	106-93-4	1,2-Dibromoethane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	95-50-1	1,2-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	107-06-2	1,2-Dichloroethane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	78-87-5	1,2-Dichloropropane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	541-73-1	1,3-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	106-46-7	1,4-Dichlorobenzene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	78-93-3	2-Butanone	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	591-78-6	2-Hexanone	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	108-10-1	4-Methyl-2-pentanone	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	67-64-1	Acetone	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	71-43-2	Benzene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	75-27-4	Bromodichloromethane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	75-25-2	Bromoform	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	74-83-9	Bromomethane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	75-15-0	Carbon disulfide	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	56-23-5	Carbon tetrachloride	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	108-90-7	Chlorobenzene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	75-00-3	Chloroethane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	67-66-3	Chloroform	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	74-87-3	Chloromethane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	156-59-2	cis-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	110-82-7	Cyclohexane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	124-48-1	Dibromochloromethane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	100-41-4	Ethylbenzene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	98-82-8	Isopropylbenzene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	79-20-9	Methyl acetate	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	108-87-2	Methylcyclohexane	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	75-09-2	Methylene chloride	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	100-42-5	Styrene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	127-18-4	Tetrachloroethene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	108-88-3	Toluene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	156-60-5	trans-1,2-Dichloroethene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	79-01-6	Trichloroethene	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	75-01-4	Vinyl chloride	10	UG_KG		10	U	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	1330-20-7	Xylene, total	10	UG_KG		10	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	METAL	7429-90-5	Aluminum	13300	MG_KG		22		Yes
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	METAL	7440-36-0	Antimony	6.6	MG_KG		6.6	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	METAL	7440-38-2	Arsenic	0.83	MG_KG		1.1	J	Yes
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	METAL	7440-39-3	Barium	168	MG_KG		22		Yes
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	METAL	7440-41-7	Beryllium	0.55	MG_KG		0.55	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	METAL	7440-43-9	Cadmium	0.55	MG_KG		0.55	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	METAL	7440-70-2	Calcium	21100	MG_KG		549		Yes
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	METAL	7440-47-3	Chromium	14.3	MG_KG		1.1		Yes
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	METAL	7440-48-4	Cobalt	14.9	MG_KG		5.5		Yes
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	METAL	7440-50-8	Copper	52.8	MG_KG		2.7		Yes
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	METAL	57-12-5	Cyanide	0.23	MG_KG		2.7	J	Yes
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	METAL	7439-89-6	Iron	20100	MG_KG		11		Yes
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	METAL	7439-92-1	Lead	2.3	MG_KG		1.1	J	Yes
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	METAL	7439-95-4	Magnesium	4590	MG_KG		549		Yes
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	METAL	7439-96-5	Manganese	968	MG_KG		1.6		Yes
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	METAL	7439-97-6	Mercury	0.11	MG_KG		0.11	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	METAL	7440-02-0	Nickel	8.2	MG_KG		4.4		Yes
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	METAL	7440-09-7	Potassium	2420	MG_KG		549	J	Yes
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	METAL	7782-49-2	Selenium	0.78	MG_KG		3.8	J	Yes
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	METAL	7440-22-4	Silver	1.1	MG_KG		1.1	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	METAL	7440-23-5	Sodium	549	MG_KG		549	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	METAL	7440-28-0	Thallium	0.55	MG_KG		0.55	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	METAL	7440-62-2	Vanadium	86.1	MG_KG		5.5		Yes
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	METAL	7440-66-6	Zinc	24.8	MG_KG		6.6	J	Yes
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	92-52-4	1,1-Biphenyl	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	95-95-4	2,4,5-Trichlorophenol	910	UG_KG		910	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	88-06-2	2,4,6-Trichlorophenol	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	120-83-2	2,4-Dichlorophenol	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	105-67-9	2,4-Dimethylphenol	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	51-28-5	2,4-Dinitrophenol	910	UG_KG		910	R	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	121-14-2	2,4-Dinitrotoluene	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	606-20-2	2,6-Dinitrotoluene	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	91-58-7	2-Chloronaphthalene	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	95-57-8	2-Chlorophenol	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	91-57-6	2-Methylnaphthalene	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	95-48-7	2-Methylphenol	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	88-74-4	2-Nitroaniline	910	UG_KG		910	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	88-75-5	2-Nitrophenol	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	91-94-1	3,3'-Dichlorobenzidine	360	UG_KG		360	UJ	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	99-09-2	3-Nitroaniline	910	UG_KG		910	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	910	UG_KG		910	UJ	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	101-55-3	4-Bromophenyl-phenylether	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	59-50-7	4-Chloro-3-methylphenol	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	106-47-8	4-Chloroaniline	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	7005-72-3	4-Chlorophenyl-phenylether	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	106-44-5	4-Methylphenol	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	100-01-6	4-Nitroaniline	910	UG_KG		910	UJ	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	100-02-7	4-Nitrophenol	910	UG_KG		910	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	83-32-9	Acenaphthene	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	208-96-8	Acenaphthylene	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	98-86-2	Acetophenone	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	120-12-7	Anthracene	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	1912-24-9	Atrazine	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	100-52-7	Benzaldehyde	360	UG_KG		360	U	No

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	56-55-3	Benzo(a)anthracene	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	50-32-8	Benzo(a)pyrene	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	205-99-2	Benzo(b)fluoranthene	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	191-24-2	Benzo(g,h,i)perylene	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	207-08-9	Benzo(k)fluoranthene	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	111-91-1	bis(2-Chloroethoxy)methane	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	111-44-4	bis(2-Chloroethyl)ether	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	130	UG_KG		360	J	Yes
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	85-68-7	Butylbenzylphthalate	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	105-60-2	Caprolactam	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	86-74-8	Carbazole	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	218-01-9	Chrysene	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	53-70-3	Dibenz(a,h)anthracene	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	132-64-9	Dibenzofuran	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	84-66-2	Diethylphthalate	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	131-11-3	Dimethyl phthalate	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	84-74-2	Di-n-butylphthalate	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	117-84-0	Di-n-octylphthalate	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	206-44-0	Fluoranthene	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	86-73-7	Fluorene	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	118-74-1	Hexachlorobenzene	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	87-68-3	Hexachlorobutadiene	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	77-47-4	Hexachlorocyclopentadiene	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	67-72-1	Hexachloroethane	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	78-59-1	Isophorone	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	91-20-3	Naphthalene	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	98-95-3	Nitrobenzene	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	621-64-7	n-Nitroso-di-n-propylamine	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	86-30-6	n-Nitrosodiphenylamine	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	87-86-5	Pentachlorophenol	910	UG_KG		910	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	85-01-8	Phenanthrene	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	108-95-2	Phenol	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	129-00-0	Pyrene	360	UG_KG		360	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	71-55-6	1,1,1-Trichloroethane	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	79-34-5	1,1,2,2-Tetrachloroethane	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	79-00-5	1,1,2-Trichloroethane	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	75-34-3	1,1-Dichloroethane	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	75-35-4	1,1-Dichloroethene	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	120-82-1	1,2,4-Trichlorobenzene	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	96-12-8	1,2-Dibromo-3-chloropropane	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	106-93-4	1,2-Dibromoethane	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	95-50-1	1,2-Dichlorobenzene	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	107-06-2	1,2-Dichloroethane	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	78-87-5	1,2-Dichloropropane	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	541-73-1	1,3-Dichlorobenzene	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	106-46-7	1,4-Dichlorobenzene	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	78-93-3	2-Butanone	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	591-78-6	2-Hexanone	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	108-10-1	4-Methyl-2-pentanone	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	67-64-1	Acetone	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	71-43-2	Benzene	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	75-27-4	Bromodichloromethane	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	75-25-2	Bromoform	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	74-83-9	Bromomethane	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	75-15-0	Carbon disulfide	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	56-23-5	Carbon tetrachloride	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	108-90-7	Chlorobenzene	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	75-00-3	Chloroethane	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	67-66-3	Chloroform	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	74-87-3	Chloromethane	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	156-59-2	cis-1,2-Dichloroethene	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	10061-01-5	cis-1,3-Dichloropropene	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	110-82-7	Cyclohexane	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	124-48-1	Dibromochloromethane	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	100-41-4	Ethylbenzene	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	98-82-8	Isopropylbenzene	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	79-20-9	Methyl acetate	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	108-87-2	Methylcyclohexane	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	75-09-2	Methylene chloride	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	100-42-5	Styrene	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	127-18-4	Tetrachloroethene	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	108-88-3	Toluene	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	156-60-5	trans-1,2-Dichloroethene	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	10061-02-6	trans-1,3-Dichloropropene	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	79-01-6	Trichloroethene	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	75-01-4	Vinyl chloride	14	UG_KG		14	U	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	1330-20-7	Xylene, total	14	UG_KG		14	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	METAL	7429-90-5	Aluminum	11900	MG_KG		21.6		Yes
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	METAL	7440-36-0	Antimony	0.32	MG_KG		6.5	J	Yes
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	METAL	7440-38-2	Arsenic	1.1	MG_KG		1.1	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	METAL	7440-39-3	Barium	62.6	MG_KG		21.6	J	Yes
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	METAL	7440-41-7	Beryllium	0.54	MG_KG		0.54	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	METAL	7440-43-9	Cadmium	0.54	MG_KG		0.54	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	METAL	7440-70-2	Calcium	3740	MG_KG		539		Yes
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	METAL	7440-47-3	Chromium	10.5	MG_KG		1.1	J	Yes
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	METAL	7440-48-4	Cobalt	11.3	MG_KG		5.4	J	Yes
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	METAL	7440-50-8	Copper	65.9	MG_KG		2.7	J	Yes
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	METAL	57-12-5	Cyanide	0.21	MG_KG		2.7	J	Yes
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	METAL	7439-89-6	Iron	18100	MG_KG		10.8		Yes
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	METAL	7439-92-1	Lead	1.4	MG_KG		1.1	J	Yes
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	METAL	7439-95-4	Magnesium	3550	MG_KG		539		Yes
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	METAL	7439-96-5	Manganese	507	MG_KG		1.6	J	Yes
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	METAL	7439-97-6	Mercury	0.11	MG_KG		0.11	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	METAL	7440-02-0	Nickel	6	MG_KG		4.3	J	Yes
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	METAL	7440-09-7	Potassium	742	MG_KG		539		Yes
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	METAL	7782-49-2	Selenium	0.71	MG_KG		3.8	J	Yes
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	METAL	7440-22-4	Silver	1.1	MG_KG		1.1	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	METAL	7440-23-5	Sodium	539	MG_KG		539	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	METAL	7440-28-0	Thallium	0.54	MG_KG		0.54	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	METAL	7440-62-2	Vanadium	61.3	MG_KG		5.4	J	Yes
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	METAL	7440-66-6	Zinc	20.2	MG_KG		6.5	J	Yes
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	92-52-4	1,1-Biphenyl	350	UG_KG		350	U	No

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	890	UG_KG		890	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	120-83-2	2,4-Dichlorophenol	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	105-67-9	2,4-Dimethylphenol	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	51-28-5	2,4-Dinitrophenol	890	UG_KG		890	R	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	121-14-2	2,4-Dinitrotoluene	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	606-20-2	2,6-Dinitrotoluene	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	91-58-7	2-Chloronaphthalene	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	95-57-8	2-Chlorophenol	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	91-57-6	2-Methylnaphthalene	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	95-48-7	2-Methylphenol	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	88-74-4	2-Nitroaniline	890	UG_KG		890	UJ	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	88-75-5	2-Nitrophenol	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	99-09-2	3-Nitroaniline	890	UG_KG		890	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	890	UG_KG		890	UJ	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	106-47-8	4-Chloroaniline	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	106-44-5	4-Methylphenol	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	100-01-6	4-Nitroaniline	890	UG_KG		890	UJ	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	100-02-7	4-Nitrophenol	890	UG_KG		890	UJ	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	83-32-9	Acenaphthene	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	208-96-8	Acenaphthylene	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	98-86-2	Acetophenone	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	120-12-7	Anthracene	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	1912-24-9	Atrazine	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	100-52-7	Benzaldehyde	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	56-55-3	Benzo(a)anthracene	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	50-32-8	Benzo(a)pyrene	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	205-99-2	Benzo(b)fluoranthene	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	191-24-2	Benzo(g,h,i)perylene	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	207-08-9	Benzo(k)fluoranthene	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	85-68-7	Butylbenzylphthalate	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	105-60-2	Caprolactam	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	86-74-8	Carbazole	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	218-01-9	Chrysene	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	53-70-3	Dibenz(a,h)anthracene	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	132-64-9	Dibenzofuran	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	84-66-2	Diethylphthalate	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	131-11-3	Dimethyl phthalate	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	84-74-2	Di-n-butylphthalate	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	117-84-0	Di-n-octylphthalate	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	206-44-0	Fluoranthene	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	86-73-7	Fluorene	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	118-74-1	Hexachlorobenzene	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	87-68-3	Hexachlorobutadiene	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	67-72-1	Hexachloroethane	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	78-59-1	Isophorone	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	91-20-3	Naphthalene	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	98-95-3	Nitrobenzene	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	87-86-5	Pentachlorophenol	890	UG_KG		890	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	85-01-8	Phenanthrene	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	108-95-2	Phenol	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	129-00-0	Pyrene	350	UG_KG		350	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	71-55-6	1,1,1-Trichloroethane	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	79-00-5	1,1,2-Trichloroethane	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	75-34-3	1,1-Dichloroethane	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	75-35-4	1,1-Dichloroethene	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	106-93-4	1,2-Dibromoethane	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	95-50-1	1,2-Dichlorobenzene	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	107-06-2	1,2-Dichloroethane	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	78-87-5	1,2-Dichloropropane	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	541-73-1	1,3-Dichlorobenzene	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	106-46-7	1,4-Dichlorobenzene	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	78-93-3	2-Butanone	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	591-78-6	2-Hexanone	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	108-10-1	4-Methyl-2-pentanone	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	67-64-1	Acetone	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	71-43-2	Benzene	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	75-27-4	Bromodichloromethane	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	75-25-2	Bromoform	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	74-83-9	Bromomethane	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	75-15-0	Carbon disulfide	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	56-23-5	Carbon tetrachloride	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	108-90-7	Chlorobenzene	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	75-00-3	Chloroethane	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	67-66-3	Chloroform	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	74-87-3	Chloromethane	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	156-59-2	cis-1,2-Dichloroethene	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	110-82-7	Cyclohexane	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	124-48-1	Dibromochloromethane	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	100-41-4	Ethylbenzene	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	98-82-8	Isopropylbenzene	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	79-20-9	Methyl acetate	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	108-87-2	Methylcyclohexane	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	75-09-2	Methylene chloride	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	100-42-5	Styrene	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	127-18-4	Tetrachloroethene	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	108-88-3	Toluene	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	156-60-5	trans-1,2-Dichloroethene	12	UG_KG		12	U	No

Attachment K-3
Analytical Data Used in the HHRA
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	79-01-6	Trichloroethene	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	75-01-4	Vinyl chloride	12	UG_KG		12	U	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	1330-20-7	Xylene, total	12	UG_KG		12	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	METAL	7429-90-5	Aluminum	14400	MG_KG		21.8		Yes
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	METAL	7440-36-0	Antimony	6.6	MG_KG		6.6	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	METAL	7440-38-2	Arsenic	0.86	MG_KG		1.1	J	Yes
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	METAL	7440-39-3	Barium	99.1	MG_KG		21.8		Yes
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	METAL	7440-41-7	Beryllium	0.55	MG_KG		0.55	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	METAL	7440-43-9	Cadmium	0.55	MG_KG		0.55	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	METAL	7440-70-2	Calcium	12500	MG_KG		546		Yes
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	METAL	7440-47-3	Chromium	13.6	MG_KG		1.1		Yes
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	METAL	7440-48-4	Cobalt	10	MG_KG		5.5		Yes
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	METAL	7440-50-8	Copper	51	MG_KG		2.7		Yes
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	METAL	57-12-5	Cyanide	2.7	MG_KG		2.7	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	METAL	7439-89-6	Iron	20200	MG_KG		10.9		Yes
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	METAL	7439-92-1	Lead	2	MG_KG		1.1	J	Yes
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	METAL	7439-95-4	Magnesium	4600	MG_KG		546		Yes
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	METAL	7439-96-5	Manganese	427	MG_KG		1.6		Yes
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	METAL	7439-97-6	Mercury	0.11	MG_KG		0.11	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	METAL	7440-02-0	Nickel	7.1	MG_KG		4.4		Yes
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	METAL	7440-09-7	Potassium	1590	MG_KG		546	J	Yes
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	METAL	7782-49-2	Selenium	3.8	MG_KG		3.8	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	METAL	7440-22-4	Silver	1.1	MG_KG		1.1	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	METAL	7440-23-5	Sodium	546	MG_KG		546	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	METAL	7440-28-0	Thallium	0.55	MG_KG		0.55	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	METAL	7440-62-2	Vanadium	78.4	MG_KG		5.5		Yes
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	METAL	7440-66-6	Zinc	26.5	MG_KG		6.6	J	Yes
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	92-52-4	1,1-Biphenyl	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	95-95-4	2,4,5-Trichlorophenol	900	UG_KG		900	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	88-06-2	2,4,6-Trichlorophenol	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	120-83-2	2,4-Dichlorophenol	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	105-67-9	2,4-Dimethylphenol	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	51-28-5	2,4-Dinitrophenol	900	UG_KG		900	UJ	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	121-14-2	2,4-Dinitrotoluene	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	606-20-2	2,6-Dinitrotoluene	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	91-58-7	2-Chloronaphthalene	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	95-57-8	2-Chlorophenol	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	91-57-6	2-Methylnaphthalene	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	95-48-7	2-Methylphenol	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	88-74-4	2-Nitroaniline	900	UG_KG		900	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	88-75-5	2-Nitrophenol	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	91-94-1	3,3'-Dichlorobenzidine	360	UG_KG		360	UJ	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	99-09-2	3-Nitroaniline	900	UG_KG		900	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	900	UG_KG		900	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	101-55-3	4-Bromophenyl-phenylether	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	59-50-7	4-Chloro-3-methylphenol	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	106-47-8	4-Chloroaniline	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	7005-72-3	4-Chlorophenyl-phenylether	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	106-44-5	4-Methylphenol	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	100-01-6	4-Nitroaniline	900	UG_KG		900	UJ	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	100-02-7	4-Nitrophenol	900	UG_KG		900	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	83-32-9	Acenaphthene	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	208-96-8	Acenaphthylene	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	98-86-2	Acetophenone	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	120-12-7	Anthracene	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	1912-24-9	Atrazine	360	UG_KG		360	UJ	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	100-52-7	Benzaldehyde	360	UG_KG		360	UJ	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	56-55-3	Benzo(a)anthracene	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	50-32-8	Benzo(a)pyrene	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	205-99-2	Benzo(b)fluoranthene	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	191-24-2	Benzo(g,h,i)perylene	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	207-08-9	Benzo(k)fluoranthene	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	111-91-1	bis(2-Chloroethoxy)methane	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	111-44-4	bis(2-Chloroethyl)ether	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	117-81-7	bis(2-Ethylhexyl)phthalate	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	85-68-7	Butylbenzylphthalate	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	105-60-2	Caprolactam	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	86-74-8	Carbazole	360	UG_KG		360	UJ	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	218-01-9	Chrysene	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	53-70-3	Dibenz(a,h)anthracene	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	132-64-9	Dibenzofuran	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	84-66-2	Diethylphthalate	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	131-11-3	Dimethyl phthalate	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	84-74-2	Di-n-butylphthalate	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	117-84-0	Di-n-octylphthalate	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	206-44-0	Fluoranthene	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	86-73-7	Fluorene	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	118-74-1	Hexachlorobenzene	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	87-68-3	Hexachlorobutadiene	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	77-47-4	Hexachlorocyclopentadiene	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	67-72-1	Hexachloroethane	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	193-39-5	Indeno(1,2,3-cd)pyrene	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	78-59-1	Isophorone	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	91-20-3	Naphthalene	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	98-95-3	Nitrobenzene	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	621-64-7	n-Nitroso-di-n-propylamine	360	UG_KG		360	UJ	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	86-30-6	n-Nitrosodiphenylamine	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	87-86-5	Pentachlorophenol	900	UG_KG		900	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	85-01-8	Phenanthrene	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	108-95-2	Phenol	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	129-00-0	Pyrene	360	UG_KG		360	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	71-55-6	1,1,1-Trichloroethane	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	79-34-5	1,1,2,2-Tetrachloroethane	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	79-00-5	1,1,2-Trichloroethane	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	75-34-3	1,1-Dichloroethane	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	75-35-4	1,1-Dichloroethene	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	120-82-1	1,2,4-Trichlorobenzene	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	96-12-8	1,2-Dibromo-3-chloropropane	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	106-93-4	1,2-Dibromoethane	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	95-50-1	1,2-Dichlorobenzene	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	107-06-2	1,2-Dichloroethane	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	78-87-5	1,2-Dichloropropane	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	541-73-1	1,3-Dichlorobenzene	14	UG_KG		14	U	No

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Value	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Detection
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	106-46-7	1,4-Dichlorobenzene	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	78-93-3	2-Butanone	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	591-78-6	2-Hexanone	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	108-10-1	4-Methyl-2-pentanone	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	67-64-1	Acetone	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	71-43-2	Benzene	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	75-27-4	Bromodichloromethane	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	75-25-2	Bromoform	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	74-83-9	Bromomethane	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	75-15-0	Carbon disulfide	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	56-23-5	Carbon tetrachloride	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	108-90-7	Chlorobenzene	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	75-00-3	Chloroethane	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	67-66-3	Chloroform	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	74-87-3	Chloromethane	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	156-59-2	cis-1,2-Dichloroethene	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	10061-01-5	cis-1,3-Dichloropropene	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	110-82-7	Cyclohexane	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	124-48-1	Dibromochloromethane	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	100-41-4	Ethylbenzene	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	98-82-8	Isopropylbenzene	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	79-20-9	Methyl acetate	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	108-87-2	Methylcyclohexane	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	75-09-2	Methylene chloride	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	100-42-5	Styrene	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	127-18-4	Tetrachloroethene	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	108-88-3	Toluene	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	156-60-5	trans-1,2-Dichloroethene	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	10061-02-6	trans-1,3-Dichloropropene	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	79-01-6	Trichloroethene	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	75-01-4	Vinyl chloride	14	UG_KG		14	U	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	1330-20-7	Xylene, total	14	UG_KG		14	U	No
EPI04-SO21	SO	17-Sep-14	N	VEP4-SB21-0406	VOA	75-35-4	1,1-Dichloroethene	2.57	UG_KG	1.29	5.14	U	No
EPI04-SO21	SO	17-Sep-14	N	VEP4-SB21-0406	VOA	156-59-2	cis-1,2-Dichloroethene	2.57	UG_KG	1.29	5.14	U	No
EPI04-SO21	SO	17-Sep-14	N	VEP4-SB21-0406	VOA	127-18-4	Tetrachloroethene	2.57	UG_KG	1.29	5.14	U	No
EPI04-SO21	SO	17-Sep-14	N	VEP4-SB21-0406	VOA	156-60-5	trans-1,2-Dichloroethene	2.57	UG_KG	1.29	5.14	U	No
EPI04-SO21	SO	17-Sep-14	N	VEP4-SB21-0406	VOA	79-01-6	Trichloroethene	2.57	UG_KG	1.29	5.14	U	No
EPI04-SO21	SO	17-Sep-14	N	VEP4-SB21-0406	VOA	75-01-4	Vinyl chloride	2.57	UG_KG	1.29	5.14	U	No
EPI04-SO21	SO	17-Sep-14	N	VEP4-SS21-0001	VOA	75-35-4	1,1-Dichloroethene	2.4	UG_KG	1.2	4.79	U	No
EPI04-SO21	SO	17-Sep-14	N	VEP4-SS21-0001	VOA	156-59-2	cis-1,2-Dichloroethene	2.4	UG_KG	1.2	4.79	U	No
EPI04-SO21	SO	17-Sep-14	N	VEP4-SS21-0001	VOA	127-18-4	Tetrachloroethene	2.4	UG_KG	1.2	4.79	U	No
EPI04-SO21	SO	17-Sep-14	N	VEP4-SS21-0001	VOA	156-60-5	trans-1,2-Dichloroethene	2.4	UG_KG	1.2	4.79	U	No
EPI04-SO21	SO	17-Sep-14	N	VEP4-SS21-0001	VOA	79-01-6	Trichloroethene	2.4	UG_KG	1.2	4.79	U	No
EPI04-SO21	SO	17-Sep-14	N	VEP4-SS21-0001	VOA	75-01-4	Vinyl chloride	2.4	UG_KG	1.2	4.79	U	No
EPI04-SO21	SO	17-Sep-14	FD	VEP4-SS21P-0001	VOA	75-35-4	1,1-Dichloroethene	2.49	UG_KG	1.25	4.98	U	No
EPI04-SO21	SO	17-Sep-14	FD	VEP4-SS21P-0001	VOA	156-59-2	cis-1,2-Dichloroethene	2.49	UG_KG	1.25	4.98	U	No
EPI04-SO21	SO	17-Sep-14	FD	VEP4-SS21P-0001	VOA	127-18-4	Tetrachloroethene	2.49	UG_KG	1.25	4.98	U	No
EPI04-SO21	SO	17-Sep-14	FD	VEP4-SS21P-0001	VOA	156-60-5	trans-1,2-Dichloroethene	2.49	UG_KG	1.25	4.98	U	No
EPI04-SO21	SO	17-Sep-14	FD	VEP4-SS21P-0001	VOA	79-01-6	Trichloroethene	2.49	UG_KG	1.25	4.98	U	No
EPI04-SO21	SO	17-Sep-14	FD	VEP4-SS21P-0001	VOA	75-01-4	Vinyl chloride	2.49	UG_KG	1.25	4.98	U	No
EPI04-SO22	SO	16-Sep-14	N	VEP4-SB22-0406	VOA	75-35-4	1,1-Dichloroethene	2.43	UG_KG	1.22	4.86	U	No
EPI04-SO22	SO	16-Sep-14	N	VEP4-SB22-0406	VOA	156-59-2	cis-1,2-Dichloroethene	2.43	UG_KG	1.22	4.86	U	No
EPI04-SO22	SO	16-Sep-14	N	VEP4-SB22-0406	VOA	127-18-4	Tetrachloroethene	2.43	UG_KG	1.22	4.86	U	No
EPI04-SO22	SO	16-Sep-14	N	VEP4-SB22-0406	VOA	156-60-5	trans-1,2-Dichloroethene	2.43	UG_KG	1.22	4.86	U	No
EPI04-SO22	SO	16-Sep-14	N	VEP4-SB22-0406	VOA	79-01-6	Trichloroethene	2.43	UG_KG	1.22	4.86	U	No
EPI04-SO22	SO	16-Sep-14	N	VEP4-SB22-0406	VOA	75-01-4	Vinyl chloride	2.43	UG_KG	1.22	4.86	U	No
EPI04-SO22	SO	16-Sep-14	N	VEP4-SS22-0001	VOA	75-35-4	1,1-Dichloroethene	2.55	UG_KG	1.28	5.11	U	No
EPI04-SO22	SO	16-Sep-14	N	VEP4-SS22-0001	VOA	156-59-2	cis-1,2-Dichloroethene	2.55	UG_KG	1.28	5.11	U	No
EPI04-SO22	SO	16-Sep-14	N	VEP4-SS22-0001	VOA	127-18-4	Tetrachloroethene	2.55	UG_KG	1.28	5.11	UJ	No
EPI04-SO22	SO	16-Sep-14	N	VEP4-SS22-0001	VOA	156-60-5	trans-1,2-Dichloroethene	2.55	UG_KG	1.28	5.11	U	No
EPI04-SO22	SO	16-Sep-14	N	VEP4-SS22-0001	VOA	79-01-6	Trichloroethene	2.55	UG_KG	1.28	5.11	U	No
EPI04-SO22	SO	16-Sep-14	N	VEP4-SS22-0001	VOA	75-01-4	Vinyl chloride	2.55	UG_KG	1.28	5.11	U	No
EPI04-SO23	SO	22-Sep-14	N	VEP4-SB23-0406	VOA	75-35-4	1,1-Dichloroethene	3.4	UG_KG	1.7	6.81	U	No
EPI04-SO23	SO	22-Sep-14	N	VEP4-SB23-0406	VOA	156-59-2	cis-1,2-Dichloroethene	3.4	UG_KG	1.7	6.81	U	No
EPI04-SO23	SO	22-Sep-14	N	VEP4-SB23-0406	VOA	127-18-4	Tetrachloroethene	3.4	UG_KG	1.7	6.81	U	No
EPI04-SO23	SO	22-Sep-14	N	VEP4-SB23-0406	VOA	156-60-5	trans-1,2-Dichloroethene	3.4	UG_KG	1.7	6.81	U	No
EPI04-SO23	SO	22-Sep-14	N	VEP4-SB23-0406	VOA	79-01-6	Trichloroethene	3.4	UG_KG	1.7	6.81	U	No
EPI04-SO23	SO	22-Sep-14	N	VEP4-SB23-0406	VOA	75-01-4	Vinyl chloride	3.4	UG_KG	1.7	6.81	U	No
EPI04-SO23	SO	22-Sep-14	N	VEP4-SS23-0001	VOA	75-35-4	1,1-Dichloroethene	3.01	UG_KG	1.51	6.02	U	No
EPI04-SO23	SO	22-Sep-14	N	VEP4-SS23-0001	VOA	156-59-2	cis-1,2-Dichloroethene	3.01	UG_KG	1.51	6.02	U	No
EPI04-SO23	SO	22-Sep-14	N	VEP4-SS23-0001	VOA	127-18-4	Tetrachloroethene	3.01	UG_KG	1.51	6.02	U	No
EPI04-SO23	SO	22-Sep-14	N	VEP4-SS23-0001	VOA	156-60-5	trans-1,2-Dichloroethene	3.01	UG_KG	1.51	6.02	U	No
EPI04-SO23	SO	22-Sep-14	N	VEP4-SS23-0001	VOA	79-01-6	Trichloroethene	3.01	UG_KG	1.51	6.02	U	No
EPI04-SO23	SO	22-Sep-14	N	VEP4-SS23-0001	VOA	75-01-4	Vinyl chloride	3.01	UG_KG	1.51	6.02	U	No
EPI04-SO24	SO	18-Sep-14	N	VEP4-SB24-0406	VOA	75-35-4	1,1-Dichloroethene	3.32	UG_KG	1.66	6.64	U	No
EPI04-SO24	SO	18-Sep-14	N	VEP4-SB24-0406	VOA	156-59-2	cis-1,2-Dichloroethene	3.32	UG_KG	1.66	6.64	U	No
EPI04-SO24	SO	18-Sep-14	N	VEP4-SB24-0406	VOA	127-18-4	Tetrachloroethene	3.32	UG_KG	1.66	6.64	U	No
EPI04-SO24	SO	18-Sep-14	N	VEP4-SB24-0406	VOA	156-60-5	trans-1,2-Dichloroethene	3.32	UG_KG	1.66	6.64	U	No
EPI04-SO24	SO	18-Sep-14	N	VEP4-SB24-0406	VOA	79-01-6	Trichloroethene	3.32	UG_KG	1.66	6.64	U	No
EPI04-SO24	SO	18-Sep-14	N	VEP4-SB24-0406	VOA	75-01-4	Vinyl chloride	3.32	UG_KG	1.66	6.64	U	No
EPI04-SO24	SO	18-Sep-14	N	VEP4-SS24-0001	VOA	75-35-4	1,1-Dichloroethene	2.58	UG_KG	1.29	5.15	U	No
EPI04-SO24	SO	18-Sep-14	N	VEP4-SS24-0001	VOA	156-59-2	cis-1,2-Dichloroethene	2.58	UG_KG	1.29	5.15	U	No
EPI04-SO24	SO	18-Sep-14	N	VEP4-SS24-0001	VOA	127-18-4	Tetrachloroethene	2.58	UG_KG	1.29	5.15	U	No
EPI04-SO24	SO	18-Sep-14	N	VEP4-SS24-0001	VOA	156-60-5	trans-1,2-Dichloroethene	2.58	UG_KG	1.29	5.15	U	No
EPI04-SO24	SO	18-Sep-14	N	VEP4-SS24-0001	VOA	79-01-6	Trichloroethene	2.58	UG_KG	1.29	5.15	U	No
EPI04-SO24	SO	18-Sep-14	N	VEP4-SS24-0001	VOA	75-01-4	Vinyl chloride	2.58	UG_KG	1.29	5.15	U	No
EPI04-SO25	SO	22-Sep-14	N	VEP4-SB25-0406	VOA	75-35-4	1,1-Dichloroethene	2.7	UG_KG	1.35	5.4	U	No
EPI04-SO25	SO	22-Sep-14	N	VEP4-SB25-0406	VOA	156-59-2	cis-1,2-Dichloroethene	2.7	UG_KG	1.35	5.4	U	No
EPI04-SO25	SO	22-Sep-14	N	VEP4-SB25-0406	VOA	127-18-4	Tetrachloroethene	2.7	UG_KG	1.35	5.4	U	No
EPI04-SO25	SO	22-Sep-14	N	VEP4-SB25-0406	VOA	156-60-5	trans-1,2-Dichloroethene	2.7	UG_KG	1.35	5.4	U	No
EPI04-SO25	SO	22-Sep-14	N	VEP4-SB25-0406	VOA	79-01-6	Trichloroethene	2.7	UG_KG	1.35	5.4	U	No
EPI04-SO25	SO	22-Sep-14	N	VEP4-SB25-0406	VOA	75-01-4	Vinyl chloride	2.7	UG_KG	1.35	5.4	U	No
EPI04-SO25	SO	22-Sep-14	N	VEP4-SS25-0001	VOA	75-35-4	1,1-Dichloroethene	3.02	UG_KG	1.51	6.03	U	No
EPI04-SO25	SO	22-Sep-14	N	VEP4-SS25-0001	VOA	156-59-2	cis-1,2-Dichloroethene	3.02	UG_KG	1.51	6.03	U	No
EPI04-SO25	SO	22-Sep-14	N	VEP4-SS25-0001	VOA	127-18-4	Tetrachloroethene	3.02	UG_KG	1.51	6.03	U	No
EPI04-SO25	SO	22-Sep-14	N	VEP4-SS25-0001	VOA	156-60-5	trans-1,2-Dichloroethene	3.02	UG_KG	1.51	6.03	U	No
EPI04-SO25	SO	22-Sep-14	N	VEP4-SS25-0001	VOA	79-01-6	Trichloroethene	3.02	UG_KG	1.51	6.03	U	No
EPI04-SO25	SO	22-Sep-14	N	VEP4-SS25-0001	VOA	75-01-4	Vinyl chloride	3.02	UG_KG	1.51	6.03	U	No

Attachment K-4
VISL Calculator Output

OSWER VAPOR INTRUSION ASSESSMENT
Vapor Intrusion Screening Level (VISL) Calculator Version 3.4, June 2015 RSLs

The primary objective of risk-based screening is to identify sites or buildings unlikely to pose a health concern through the vapor intrusion pathway. Generally, at properties where subsurface concentrations of vapor-forming chemicals (e.g., groundwater or "near source" soil gas concentrations) fall below screening levels (i.e., VISLs), no further action or study is warranted, so long as the exposure assumptions match those taken into account by the calculations and the site fulfills the conditions and assumptions of the generic conceptual model underlying the screening levels. In a similar fashion, the results of risk-based screening can help the data review team identify areas, buildings, and/or chemicals that can be eliminated from further assessment. The generic conceptual model underlying these screening levels is described in OSWER Publication 9200.2-154 (OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway From Subsurface Vapor Sources to Indoor Air) (EPA 2015; Section 6.5)

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens
Average Groundwater Temperature (^oC)	Tgw	29.4	Enter average of the stabilized groundwater temperature to correct Henry's Law Constant for groundwater target concentrations

CAS	Chemical Name	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Soil Source?	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Groundwater Source?	Target Indoor Air Conc. @ TCR = 1E-06 or THQ = 1	Toxicity Basis	Target Sub-Slab and Exterior Soil Gas Conc. @ TCR = 1E-06 or THQ = 1	Target Ground Water Conc. @ TCR = 1E-06 or THQ = 1	Is Target Ground Water Conc. < MCL?	Temperature for Groundwater Vapor Conc.	Lower Explosive Limit**	LEL Source
		Cvp > Cia,target?	Chc > Cia,target?	MIN(Cia,c;Cia,nc)		Csg	Cgw	Cgw<MCL?	Tgw or 25	LEL	
		Yes/No	Yes/No	(ug/m^3)	C/NC	(ug/m^3)	(ug/L)	Yes/No (MCL ug/L)	C	(% by vol)	
75-35-4	Dichloroethylene, 1,1-	Yes	Yes	2.1E+02	NC	7.0E+03	1.7E+02	No (7)	29.4	6.5	N
127-18-4	Tetrachloroethylene	Yes	Yes	1.1E+01	C	3.6E+02	1.2E+01	No (5)	29.4		
79-01-6	Trichloroethylene	Yes	Yes	4.8E-01	C	1.6E+01	9.7E-01	Yes (5)	29.4	8	N
75-01-4	Vinyl Chloride	Yes	Yes	1.7E-01	C	5.6E+00	1.3E-01	Yes (2)	29.4	3.6	N

CAS	Chemical Name	Inhalation Unit Risk	IUR Source*	Reference Concentration	RFC Source*	Mutagenic Indicator	Target Indoor Air Conc. for Carcinogens @ TCR = 1E-06	Target Indoor Air Conc. for Non-Carcinogens @ THQ = 1
		IUR		RfC		i	Cia,c	Cia,nc
		(ug/m^3)$^{-1}$		(mg/m^3)			(ug/m^3)	(ug/m^3)
75-35-4	Dichloroethylene, 1,1-			2.00E-01	I			2.1E+02
127-18-4	Tetrachloroethylene	2.60E-07	I	4.00E-02	I		1.1E+01	4.2E+01
79-01-6	Trichloroethylene	see note	I	2.00E-03	I	TCE	4.8E-01	2.1E+00
75-01-4	Vinyl Chloride	4.40E-06	I	1.00E-01	I	VC	1.7E-01	1.0E+02

Notes:

(1) **Inhalation Pathway Exposure Parameters (RME):**

Exposure Scenario	Units	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on residential scenario) Symbol	Selected (based on residential scenario) Value
Averaging time for carcinogens	(yrs)	ATc_R	70	ATc_C	70	ATc	70
Averaging time for non-carcinogens	(yrs)	ATnc_R	26	ATnc_C	25	ATnc	26
Exposure duration	(yrs)	ED_R	26	ED_C	25	ED	26
Exposure frequency	(days/yr)	EF_R	350	EF_C	250	EF	350
Exposure time	(hr/day)	ET_R	24	ET_C	8	ET	24

(2) **Generic Attenuation Factors:**

Source Medium of Vapors	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on residential scenario) Symbol	Selected (based on residential scenario) Value
Groundwater (-)	AFgw_R	0.001	AFgw_C	0.001	AFgw	0.001
Sub-Slab and Exterior Soil Gas (-)	AFss_R	0.03	AFss_C	0.03	AFss	0.03

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)
Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

Trichloroethylene

	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on residential scenario) Symbol	Selected (based on residential scenario) Value
	mIURTCE_R	1.00E-06	mIURTCE_C	0.00E+00	mIURTCE	1.00E-06
	IURTCE_R	3.10E-06	IURTCE_C	4.10E-06	IURTCE	3.10E-06

Mutagenic Chemicals — The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration (years)	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 72 This factor is used in the equations for mutagenic chemicals.

Vinyl Chloride — See the Navigation Guide equation for Cia,c for vinyl chloride.

Notation:

NVT = Not sufficiently volatile and/or toxic to pose inhalation risk in selected exposure scenario for the indicated medium
C = Carcinogenic
NC = Non-carcinogenic
I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at:
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5
X = PPRTV Appendix
E = The Engineering ToolBox. Available online at http://www.engineeringtoolbox.com/explosive-concentration-limits-d_423.html
N = Centers for Disease Control and Prevention (CDC) National Institute for Occupational Safety and Health (NIOSH). Pocket Guide to Chemical Hazards. Available online at: http://www.cdc.gov/niosh/npg/default.html
M = Chemical-specific MSDS
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
Yellow highlighting indicates site-specific parameters that may be edited by the user.
Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.
**Lower explosive limit is the minimum concentration of the compound in air (% by volume) that is needed for the gas to ignite and explode.

OSWER VAPOR INTRUSION ASSESSMENT

Vapor Intrusion Screening Level (VISL) Calculator Version 3.4, June 2015 RSLs

The primary objective of risk-based screening is to identify sites or buildings unlikely to pose a health concern through the vapor intrusion pathway. Generally, at properties where subsurface concentrations of vapor-forming chemicals (e.g., groundwater or "near source" soil gas concentrations) fall below screening levels (i.e., VISLs), no further action or study is warranted, so long as the exposure assumptions match those taken into account by the calculations and the site fulfills the conditions and assumptions of the generic conceptual model underlying the screening levels. In a similar fashion, the results of risk-based screening can help the data review team identify areas, buildings, and/or chemicals that can be eliminated from further assessment. The generic conceptual model underlying these screening levels is described in OSWER Publication 9200.2-154 (OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway From Subsurface Vapor Sources to Indoor Air) (EPA 2015; Section 6.5)

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Commercial	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens
Average Groundwater Temperature (°C)	Tgw	29.4	Enter average of the stabilized groundwater temperature to correct Henry's Law Constant for groundwater target concentrations

CAS	Chemical Name	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Soil Source?	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Groundwater Source?	Target Indoor Air Conc. @ TCR = 1E-06 or THQ = 1	Toxicity Basis	Target Sub-Slab and Exterior Soil Gas Conc. @ TCR = 1E-06 or THQ = 1	Target Ground Water Conc. @ TCR = 1E-06 or THQ = 1	Is Target Ground Water Conc. < MCL?	Temperature for Groundwater Vapor Conc.	Lower Explosive Limit**	LEL Source
		Cvp > Cia,target?	Chc > Cia,target?	MIN(Cia,c;Cia,nc)		Csg	Cgw	Cgw<MCL?	Tgw or 25	LEL	
		Yes/No	Yes/No	(ug/m^3)	C/NC	(ug/m^3)	(ug/L)	Yes/No (MCL ug/L)	C	(% by vol)	
75-35-4	Dichloroethylene, 1,1-	Yes	Yes	8.8E+02	NC	2.9E+04	7.0E+02	No (7)	29.4	6.5	N
127-18-4	Tetrachloroethylene	Yes	Yes	4.7E+01	C	1.6E+03	5.2E+01	No (5)	29.4		
79-01-6	Trichloroethylene	Yes	Yes	3.0E+00	C	1.0E+02	6.1E+00	No (5)	29.4	8	N
75-01-4	Vinyl Chloride	Yes	Yes	2.8E+00	C	9.3E+01	2.2E+00	No (2)	29.4	3.6	N

CAS	Chemical Name	Inhalation Unit Risk	IUR Source*	Reference Concentration	RFC Source*	Mutagenic Indicator	Target Indoor Air Conc. for Carcinogens @ TCR = 1E-06	Target Indoor Air Conc. for Non-Carcinogens @ THQ = 1
		IUR		RfC		i	Cia,c	Cia,nc
		(ug/m^3)$^{-1}$		(mg/m^3)			(ug/m^3)	(ug/m^3)
75-35-4	Dichloroethylene, 1,1-			2.00E-01	I			8.8E+02
127-18-4	Tetrachloroethylene	2.60E-07	I	4.00E-02	I		4.7E+01	1.8E+02
79-01-6	Trichloroethylene	see note	I	2.00E-03	I	TCE	3.0E+00	8.8E+00
75-01-4	Vinyl Chloride	4.40E-06	I	1.00E-01	I	VC	2.8E+00	4.4E+02

Notes:

(1) **Inhalation Pathway Exposure Parameters (RME):**

Exposure Scenario	Units	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on commercial scenario) Symbol	Selected Value
Averaging time for carcinogens	(yrs)	ATc_R	70	ATc_C	70	ATc	70
Averaging time for non-carcinogens	(yrs)	ATnc_R	26	ATnc_C	25	ATnc	25
Exposure duration	(yrs)	ED_R	26	ED_C	25	ED	25
Exposure frequency	(days/yr)	EF_R	350	EF_C	250	EF	250
Exposure time	(hr/day)	ET_R	24	ET_C	8	ET	8

(2) **Generic Attenuation Factors:**

Source Medium of Vapors		Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on commercial scenario) Symbol	Selected Value
Groundwater	(-)	AFgw_R	0.001	AFgw_C	0.001	AFgw	0.001
Sub-Slab and Exterior Soil Gas	(-)	AFss_R	0.03	AFss_C	0.03	AFss	0.03

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)

Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)

Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

Trichloroethylene	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on commercial scenario) Symbol	Selected Value
	mIURTCE_R	1.00E-06	mIURTCE_C	0.00E+00	mIURTCE	0.00E+00
	IURTCE_R	3.10E-06	IURTCE_C	4.10E-06	IURTCE	4.10E-06

Mutagenic Chemicals — The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 25 — This factor is used in the equations for mutagenic chemicals

Vinyl Chloride — See the Navigation Guide equation for Cia,c for vinyl chloride

Notation:

NVT = Not sufficiently volatile and/or toxic to pose inhalation risk in selected exposure scenario for the indicated mediu

C = Carcinogenic

NC = Non-carcinogenic

I = IRIS: EPA Integrated Risk Information System (IRIS). Available online a http://www.epa.gov/iris/subst/index.htm

P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at http://hhpprtv.ornl.gov/pprtv.shtm

A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online a http://www.atsdr.cdc.gov/mrls/index.htm

CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online a http://www.oehha.ca.gov/risk/ChemicalDB/index.asp

H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtm

S = See RSL User Guide, Section 5

X = PPRTV Appendix

E = The Engineering ToolBox. Available online at http://www.engineeringtoolbox.com/explosive-concentration-limits-d_423.htr

N = Centers for Disease Control and Prevention (CDC) National Institute for Occupational Safety and Health (NIOSH). Pocket Guide to Chemical Hazards. Available online a http://www.cdc.gov/niosh/npg/default.htm http://www.cdc.gov/niosh/npg/default.htm

M = Chemical-specific MSDS

Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above

VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation)

TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above

Yellow highlighting indicates site-specific parameters that may be edited by the use

Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be change

**Lower explosive limit is the minimum concentration of the compound in air (% by volume) that is needed for the gas to ignite and explod

OSWER VAPOR INTRUSION ASSESSMENT
Groundwater Concentration to Indoor Air Concentration (GWC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)
Average Groundwater Temperature (^{o}C)	Tgw	29.4	Enter average of the stabilized groundwater temperature to correct Henry's Law Constant for groundwater target concentrations

CAS	Chemical Name	Site Groundwater Concentration Cgw (ug/L)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ
79-01-6	Trichloroethylene	3.3E+02	1.65E+02	**3.4E-04**	**7.9E+01**
75-01-4	Vinyl Chloride	2.3E-01	2.94E-01	**1.8E-06**	2.8E-03

Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
see note	I	2.00E-03	I	TCE
4.40E-06	I	1.00E-01	I	VC

Notes:

(1) **Inhalation Pathway Exposure Parameters (RME):**

Exposure Scenario	Units	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Averaging time for carcinogens	(yrs)	ATc_R_GW	70	ATc_C_GW	70	ATc_GW	70
Averaging time for non-carcinogens	(yrs)	ATnc_R_GW	26	ATnc_C_GW	25	Atnc_GW	26
Exposure duration	(yrs)	ED_R_GW	26	ED_C_GW	25	ED_GW	26
Exposure frequency	(days/yr)	EF_R_GW	350	EF_C_GW	250	EF_GW	350
Exposure time	(hr/day)	ET_R_GW	24	ET_C_GW	8	ET_GW	24

(2) **Generic Attenuation Factors:**

Source Medium of Vapors		Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Groundwater	(-)	AFgw_R_GW	0.001	AFgw_C_GW	0.001	AFgw_GW	0.001
Sub-Slab and Exterior Soil Gas	(-)	AFss_R_GW	0.03	AFss_C_GW	0.03	AFss_GW	0.03

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)
Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

Trichloroethylene	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
	mIURTCE_R_GW	1.00E-06	mIURTCE_C_GW	0.00E+00	mIURTCE_GW	1.00E-06
	IURTCE_R_GW	3.10E-06	IURTCE_C_GW	4.10E-06	IURTCE_GW	3.10E-06

Mutagenic Chemicals — The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 72 This factor is used in the equations for mutagenic chemicals.

Vinyl Chloride — See the Navigation Guide equation for Cia,c for vinyl chloride.

Notation:

I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5
X = PPRTV Appendix
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
Yellow highlighting indicates site-specific parameters that may be edited by the user.
Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.
Pink highlighting indicates VI carcinogenic risk greater than the target risk for carcinogens (TCR) or VI Hazard greater than or equal to the target hazard quotient for non-carcinogens (THQ).

OSWER VAPOR INTRUSION ASSESSMENT
Groundwater Concentration to Indoor Air Concentration (GWC-IAC) Calculator Version 3.4, June 2015 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Commercial	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)
Average Groundwater Temperature (^{o}C)	Tgw	29.4	Enter average of the stabilized groundwater temperature to correct Henry's Law Constant for groundwater target concentrations

CAS	Chemical Name	Site Groundwater Concentration Cgw (ug/L)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ
79-01-6	Trichloroethylene	3.3E+02	1.65E+02	**5.5E-05**	**1.9E+01**

Inhalation Unit Risk IUR (ug/m^3)$^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
see note	I	2.00E-03	I	TCE

Notes:

(1) **Inhalation Pathway Exposure Parameters (RME):**

Exposure Scenario	Units	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Averaging time for carcinogens	(yrs)	ATc_R_GW	70	ATc_C_GW	70	ATc_GW	70
Averaging time for non-carcinogens	(yrs)	ATnc_R_GW	26	ATnc_C_GW	25	Atnc_GW	25
Exposure duration	(yrs)	ED_R_GW	26	ED_C_GW	25	ED_GW	25
Exposure frequency	(days/yr)	EF_R_GW	350	EF_C_GW	250	EF_GW	250
Exposure time	(hr/day)	ET_R_GW	24	ET_C_GW	8	ET_GW	8

(2) **Generic Attenuation Factors:**

Source Medium of Vapors		Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Groundwater	(-)	AFgw_R_GW	0.001	AFgw_C_GW	0.001	AFgw_GW	0.001
Sub-Slab and Exterior Soil Gas	(-)	AFss_R_GW	0.03	AFss_C_GW	0.03	AFss_GW	0.03

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)
Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

Trichloroethylene	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
	mIURTCE_R_GW	1.00E-06	mIURTCE_C_GW	0.00E+00	mIURTCE_GW	0.00E+00
	IURTCE_R_GW	3.10E-06	IURTCE_C_GW	4.10E-06	IURTCE_GW	4.10E-06

Mutagenic Chemicals — The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 25 — This factor is used in the equations for mutagenic chemicals.

Vinyl Chloride — See the Navigation Guide equation for Cia,c for vinyl chloride.

Notation:

I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5
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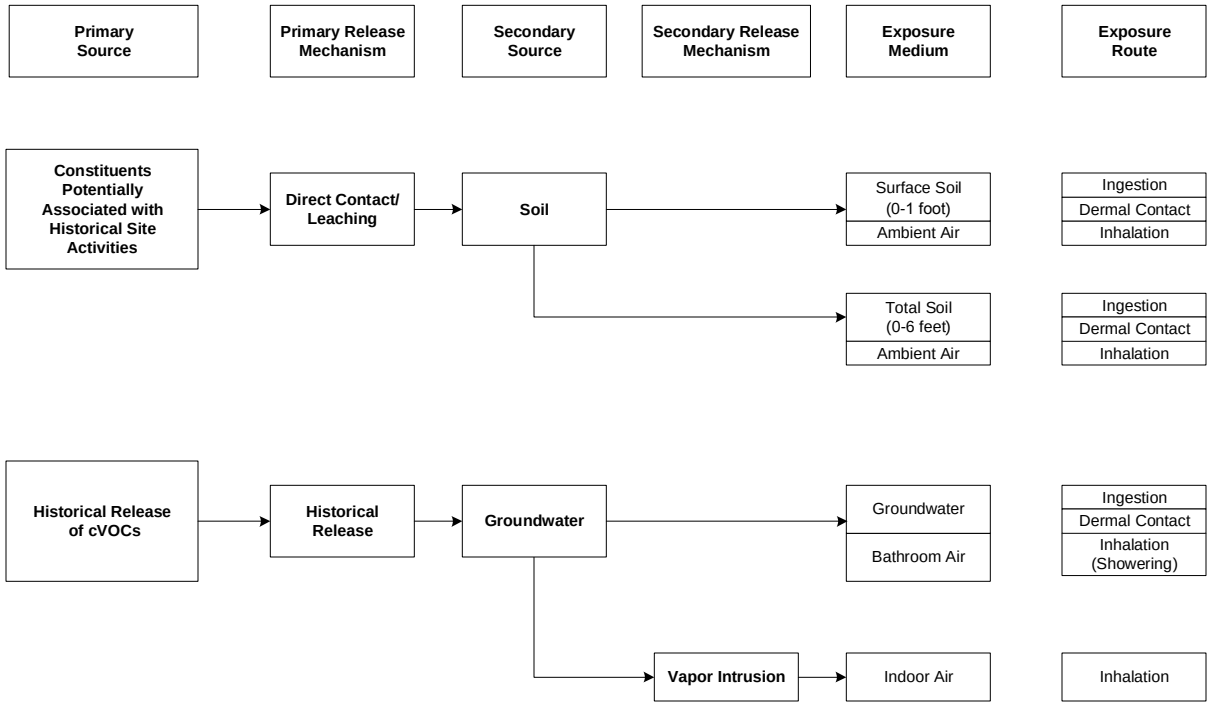
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
Yellow highlighting indicates site-specific parameters that may be edited by the user.
Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.
Pink highlighting indicates VI carcinogenic risk greater than the target risk for carcinogens (TCR) or VI Hazard greater than or equal to the target hazard quotient for non-carcinogens (THQ).

Attachment K-5
Figures



Exposure Route	Potential Human Receptor Populations: Current/Future, Recreational User, Adult	Current/Future, Recreational User, Youth	Current/Future, Recreational User, Child	Future, Maintenance Worker	Future, Resident, Adult	Future, Resident, Child	Future, Industrial Worker	Future, Construction Worker
Ingestion (Surface Soil (0-1 foot))	X	X	X	X	X	X		
Dermal Contact (Surface Soil (0-1 foot))	X	X	X	X	X	X		
Inhalation (Ambient Air)	X	X	X	X	X	X		
Ingestion (Total Soil (0-6 feet))					X	X	X	X
Dermal Contact (Total Soil (0-6 feet))					X	X	X	X
Inhalation (Ambient Air)					X	X	X	X
Ingestion (Groundwater)					X	X	X	
Dermal Contact (Groundwater)					X	X	X	
Inhalation (Showering) (Bathroom Air)					X	X		
Inhalation (Indoor Air)					X	X	X	

Legend
X – Potentially complete exposure pathways identified
cVOC – Chlorinated volatile organic compounds

Figure 1- Conceptual Site Model for SWMU 20
Former Vieques Naval Training Range, Vieques, Puerto Rico

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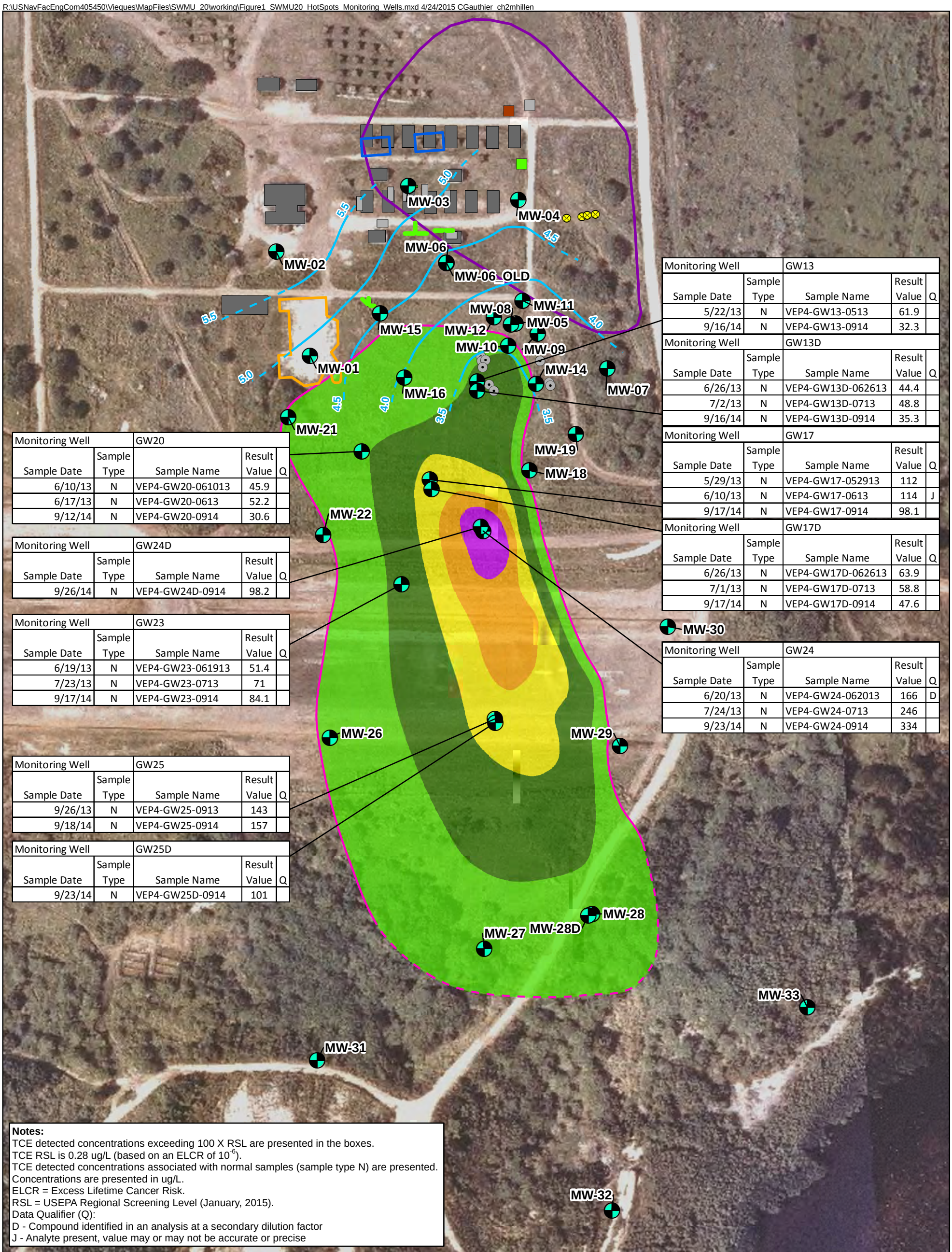

Monitoring Well		GW13		
Sample Date	Sample Type	Sample Name	Result Value	Q
5/22/13	N	VEP4-GW13-0513	61.9	
9/16/14	N	VEP4-GW13-0914	32.3	

Monitoring Well		GW13D		
Sample Date	Sample Type	Sample Name	Result Value	Q
6/26/13	N	VEP4-GW13D-062613	44.4	
7/2/13	N	VEP4-GW13D-0713	48.8	
9/16/14	N	VEP4-GW13D-0914	35.3	

Monitoring Well		GW17		
Sample Date	Sample Type	Sample Name	Result Value	Q
5/29/13	N	VEP4-GW17-052913	112	
6/10/13	N	VEP4-GW17-0613	114	J
9/17/14	N	VEP4-GW17-0914	98.1	

Monitoring Well		GW17D		
Sample Date	Sample Type	Sample Name	Result Value	Q
6/26/13	N	VEP4-GW17D-062613	63.9	
7/1/13	N	VEP4-GW17D-0713	58.8	
9/17/14	N	VEP4-GW17D-0914	47.6	

Monitoring Well		GW24		
Sample Date	Sample Type	Sample Name	Result Value	Q
6/20/13	N	VEP4-GW24-062013	166	D
7/24/13	N	VEP4-GW24-0713	246	
9/23/14	N	VEP4-GW24-0914	334	

Monitoring Well		GW20		
Sample Date	Sample Type	Sample Name	Result Value	Q
6/10/13	N	VEP4-GW20-061013	45.9	
6/17/13	N	VEP4-GW20-0613	52.2	
9/12/14	N	VEP4-GW20-0914	30.6	

Monitoring Well		GW24D		
Sample Date	Sample Type	Sample Name	Result Value	Q
9/26/14	N	VEP4-GW24D-0914	98.2	

Monitoring Well		GW23		
Sample Date	Sample Type	Sample Name	Result Value	Q
6/19/13	N	VEP4-GW23-061913	51.4	
7/23/13	N	VEP4-GW23-0713	71	
9/17/14	N	VEP4-GW23-0914	84.1	

Monitoring Well		GW25		
Sample Date	Sample Type	Sample Name	Result Value	Q
9/26/13	N	VEP4-GW25-0913	143	
9/18/14	N	VEP4-GW25-0914	157	

Monitoring Well		GW25D		
Sample Date	Sample Type	Sample Name	Result Value	Q
9/23/14	N	VEP4-GW25D-0914	101	

Notes:
TCE detected concentrations exceeding 100 X RSL are presented in the boxes.
TCE RSL is 0.28 ug/L (based on an ELCR of 10^{-6}).
TCE detected concentrations associated with normal samples (sample type N) are presented.
Concentrations are presented in ug/L.
ELCR = Excess Lifetime Cancer Risk.
RSL = USEPA Regional Screening Level (January, 2015).
Data Qualifier (Q):
D - Compound identified in an analysis at a secondary dilution factor
J - Analyte present, value may or may not be accurate or precise

Legend
- Monitoring Well
- Ground Surface Depressions
- PVC Pipes

Concrete Pipes/Foundation Slab/Vault Box
- Concrete Pad
- Staging Area for Concrete Pipes and Vaults Never Used
- Concrete Vault Box
- Estimated Potentiometric Contour Water Levels taken on 12/10/11 (dashed where inferred)
- Subsurface Pipes
- 5 ppb TCE Isoconcentration Line 2013 Sampling (dashed where inferred)
- Estimated Location of Bermed Area used for Fuel Bladder Storage
- Former Trenched Area
- Disturbed Areas (1962)
- Former Location of Structures

Isoconcentration
- 5-50 ppb
- 50-100 ppb
- 100-150 ppb
- 150-200 ppb
- 200-250 ppb

N W E S

0 200 400 Feet

Reference: 1962 Aerial Photography

Figure 2
TCE Detected Concentrations Exceeding 100 times RSL
Former Vieques Naval Training Range
Vieques, Puerto Rico

CH2MHILL

Attachment K-6
ProUCL Output

Attachment K-6
ProUCL Output - Surface Soil (0-1 foot)
SWMU 20
Former Vieques Naval Training Range, Vieques, Puerto Rico

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/3/2015 9:04:36 AM
From File	Vieques_SWMU20_ProUCL_SO_SURF_0_2_re1_030215.xls
Full Precision	OFF
Confidence Coefficient	95%
mber of Bootstrap Operations	2000

Aluminum (MG/KG)

General Statistics

Total Number of Observations	14	Number of Distinct Observations	14
		Number of Missing Observations	0
Minimum	5720	Mean	8862
Maximum	13300	Median	8565
SD	2160	Std. Error of Mean	577.4
Coefficient of Variation	0.244	Skewness	0.659

Normal GOF Test

Shapiro Wilk Test Statistic	0.948	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.874	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.181	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.237	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	9885	95% Adjusted-CLT UCL (Chen-1995)	9921
		95% Modified-t UCL (Johnson-1978)	9902

Gamma GOF Test

A-D Test Statistic	0.249	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.734	etected data appear Gamma Distributed at 5% Significance Lev
K-S Test Statistic	0.149	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.228	etected data appear Gamma Distributed at 5% Significance Lev

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	18.75	k star (bias corrected MLE)	14.78
Theta hat (MLE)	472.5	Theta star (bias corrected MLE)	599.5
nu hat (MLE)	525.1	nu star (bias corrected)	413.9
MLE Mean (bias corrected)	8862	MLE Sd (bias corrected)	2305
		Approximate Chi Square Value (0.05)	367.8
Adjusted Level of Significance	0.0312	Adjusted Chi Square Value	362

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	9975	95% Adjusted Gamma UCL (use when n<50)	10134

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.972	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.874	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.137	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.237	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	8.652	Mean of logged Data	9.063
Maximum of Logged Data	9.496	SD of logged Data	0.24

Assuming Lognormal Distribution

95% H-UCL	10042	90% Chebyshev (MVUE) UCL	10579
95% Chebyshev (MVUE) UCL	11357	97.5% Chebyshev (MVUE) UCL	12437
99% Chebyshev (MVUE) UCL	14559		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	9812	95% Jackknife UCL	9885
95% Standard Bootstrap UCL	9770	95% Bootstrap-t UCL	10026
95% Hall's Bootstrap UCL	10207	95% Percentile Bootstrap UCL	9789
95% BCA Bootstrap UCL	9849		
90% Chebyshev(Mean, Sd) UCL	10594	95% Chebyshev(Mean, Sd) UCL	11379
97.5% Chebyshev(Mean, Sd) UCL	12468	99% Chebyshev(Mean, Sd) UCL	14607

Suggested UCL to Use

95% Student's-t UCL	9885

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Arsenic (MG/KG)

General Statistics

Total Number of Observations	14	Number of Distinct Observations	5
Number of Detects	4	Number of Non-Detects	10
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	0.35	Minimum Non-Detect	1.1
Maximum Detect	3.2	Maximum Non-Detect	1.1
Variance Detects	1.746	Percent Non-Detects	71.43%
Mean Detects	1.24	SD Detects	1.321
Median Detects	0.705	CV Detects	1.066
Skewness Detects	1.869	Kurtosis Detects	3.565
Mean of Logged Detects	-0.154	SD of Logged Detects	0.947

Attachment K-6

ProUCL Output - Surface Soil (0-1 foot)

SWMU 20

Former Vieques Naval Training Range, Vieques, Puerto Rico

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.764	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.372	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.443	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.773	Standard Error of Mean	0.241
SD	0.699	95% KM (BCA) UCL	N/A
95% KM (t) UCL	1.199	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	1.169	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	1.495	95% KM Chebyshev UCL	1.822
97.5% KM Chebyshev UCL	2.276	99% KM Chebyshev UCL	3.167

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.427	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.662	etected data appear Gamma Distributed at 5% Significance Lev	
K-S Test Statistic	0.321	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.4	etected data appear Gamma Distributed at 5% Significance Lev	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.498	k star (bias corrected MLE)	0.541
Theta hat (MLE)	0.828	Theta star (bias corrected MLE)	2.291
nu hat (MLE)	11.98	nu star (bias corrected)	4.329
MLE Mean (bias corrected)	1.24	MLE Sd (bias corrected)	1.686

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	1.224	nu hat (KM)	34.27
Approximate Chi Square Value (34.27, α)	21.88	Adjusted Chi Square Value (34.27, β)	20.57
5% Gamma Approximate KM-UCL (use when n>=50)	1.211	95% Gamma Adjusted KM-UCL (use when n<50)	1.288

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.839
Maximum	3.2	Median	0.617
SD	0.843	CV	1.005
k hat (MLE)	0.918	k star (bias corrected MLE)	0.769
Theta hat (MLE)	0.914	Theta star (bias corrected MLE)	1.091
nu hat (MLE)	25.71	nu star (bias corrected)	21.53
MLE Mean (bias corrected)	0.839	MLE Sd (bias corrected)	0.957
		Adjusted Level of Significance (β)	0.0312
Approximate Chi Square Value (21.53, α)	11.99	Adjusted Chi Square Value (21.53, β)	11.05
95% Gamma Approximate UCL (use when n>=50)	1.507	95% Gamma Adjusted UCL (use when n<50)	N/A

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.929	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.263	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.443	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.832	Mean in Log Scale	-0.462
SD in Original Scale	0.771	SD in Log Scale	0.739
95% t UCL (assumes normality of ROS data)	1.197	95% Percentile Bootstrap UCL	1.195
95% BCA Bootstrap UCL	1.359	95% Bootstrap t UCL	1.617
95% H-UCL (Log ROS)	1.351		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-0.468	95% H-UCL (KM -Log)	1.026
KM SD (logged)	0.567	95% Critical H Value (KM-Log)	2.121
KM Standard Error of Mean (logged)	0.26		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.747	Mean in Log Scale	-0.471
SD in Original Scale	0.712	SD in Log Scale	0.5
95% t UCL (Assumes normality)	1.084	95% H-Stat UCL	0.935

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	1.199	95% KM (Percentile Bootstrap) UCL	N/A

Warning: One or more Recommended UCL(s) not available!

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
lowever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia

Chromium (MG/KG)

General Statistics

Total Number of Observations	14	Number of Distinct Observations	13
		Number of Missing Observations	0
Minimum	8.3	Mean	11.22
Maximum	14.3	Median	11
SD	1.99	Std. Error of Mean	0.532
Coefficient of Variation	0.177	Skewness	0.16

Normal GOF Test

Shapiro Wilk Test Statistic	0.93	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.196	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.237	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	12.16	95% Adjusted-CLT UCL (Chen-1995)	12.12
		95% Modified-t UCL (Johnson-1978)	12.17

Gamma GOF Test

A-D Test Statistic	0.44	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.734	etected data appear Gamma Distributed at 5% Significance Lev	
K-S Test Statistic	0.188	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.228	etected data appear Gamma Distributed at 5% Significance Lev	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	34.15	k star (bias corrected MLE)	26.88
Theta hat (MLE)	0.329	Theta star (bias corrected MLE)	0.417
nu hat (MLE)	956.3	nu star (bias corrected)	752.7
MLE Mean (bias corrected)	11.22	MLE Sd (bias corrected)	2.164
		Approximate Chi Square Value (0.05)	690.1
Adjusted Level of Significance	0.0312	Adjusted Chi Square Value	682.1

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	12.24	95% Adjusted Gamma UCL (use when n<50)	12.38

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.935	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.175	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.237	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.116	Mean of logged Data	2.403
Maximum of Logged Data	2.66	SD of logged Data	0.178

Assuming Lognormal Distribution

95% H-UCL	12.28	90% Chebyshev (MVUE) UCL	12.83
95% Chebyshev (MVUE) UCL	13.56	97.5% Chebyshev (MVUE) UCL	14.58
99% Chebyshev (MVUE) UCL	16.57		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	12.1	95% Jackknife UCL	12.16
95% Standard Bootstrap UCL	12.05	95% Bootstrap-t UCL	12.2
95% Hall's Bootstrap UCL	12.09	95% Percentile Bootstrap UCL	12.09
95% BCA Bootstrap UCL	12.05		
90% Chebyshev(Mean, Sd) UCL	12.82	95% Chebyshev(Mean, Sd) UCL	13.54
97.5% Chebyshev(Mean, Sd) UCL	14.54	99% Chebyshev(Mean, Sd) UCL	16.51

Suggested UCL to Use

95% Student's-t UCL	12.16

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). However, simulations results will not cover all Real World data sets. For additional insight the user may want to consult a statistician.

Cobalt (MG/KG)

General Statistics

Total Number of Observations	14	Number of Distinct Observations	12
Number of Detects	13	Number of Non-Detects	1
Number of Distinct Detects	11	Number of Distinct Non-Detects	1
Minimum Detect	8.3	Minimum Non-Detect	5.6
Maximum Detect	14.9	Maximum Non-Detect	5.6
Variance Detects	3.966	Percent Non-Detects	7.143%
Mean Detects	10.25	SD Detects	1.991
Median Detects	9.6	CV Detects	0.194
Skewness Detects	1.356	Kurtosis Detects	1.193
Mean of Logged Detects	2.312	SD of Logged Detects	0.179

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.838	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.282	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.246	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	9.921	Standard Error of Mean	0.612
SD	2.199	95% KM (BCA) UCL	10.97
95% KM (t) UCL	11	95% KM (Percentile Bootstrap) UCL	10.9
95% KM (z) UCL	10.93	95% KM Bootstrap t UCL	11.15
90% KM Chebyshev UCL	11.76	95% KM Chebyshev UCL	12.59
97.5% KM Chebyshev UCL	13.74	99% KM Chebyshev UCL	16.01

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.795	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.733	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.27	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.236	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	32.19	k star (bias corrected MLE)	24.82
Theta hat (MLE)	0.319	Theta star (bias corrected MLE)	0.413
nu hat (MLE)	837	nu star (bias corrected)	645.2
MLE Mean (bias corrected)	10.25	MLE Sd (bias corrected)	2.058

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	20.35	nu hat (KM)	569.9
Approximate Chi Square Value (569.93, α)	515.6	Adjusted Chi Square Value (569.93, β)	508.7
5% Gamma Approximate KM-UCL (use when n>=50)	10.97	95% Gamma Adjusted KM-UCL (use when n<50)	11.12

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	6.042	Mean	9.953
Maximum	14.9	Median	9.4
SD	2.22	CV	0.223
k hat (MLE)	22.39	k star (bias corrected MLE)	17.64
Theta hat (MLE)	0.445	Theta star (bias corrected MLE)	0.564
nu hat (MLE)	627	nu star (bias corrected)	493.9
MLE Mean (bias corrected)	9.953	MLE Sd (bias corrected)	2.37
		Adjusted Level of Significance (β)	0.0312
Approximate Chi Square Value (493.94, α)	443.4	Adjusted Chi Square Value (493.94, β)	437
95% Gamma Approximate UCL (use when n>=50)	11.09	95% Gamma Adjusted UCL (use when n<50)	11.25

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.875	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.258	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.246	Detected Data Not Lognormal at 5% Significance Level

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	9.993	Mean in Log Scale	2.282
SD in Original Scale	2.148	SD in Log Scale	0.206
95% t UCL (assumes normality of ROS data)	11.01	95% Percentile Bootstrap UCL	10.91
95% BCA Bootstrap UCL	11.04	95% Bootstrap t UCL	11.29
95% H-UCL (Log ROS)	11.1		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	2.27	95% H-UCL (KM -Log)	11.13
KM SD (logged)	0.225	95% Critical H Value (KM-Log)	1.836
KM Standard Error of Mean (logged)	0.0625		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	9.721	Mean in Log Scale	2.22
SD in Original Scale	2.762	SD in Log Scale	0.384
95% t UCL (Assumes normality)	11.03	95% H-Stat UCL	12.22

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Approximate Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL	12.59

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
lowever, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statisticia

Iron (MG/KG)

General Statistics

Total Number of Observations	14	Number of Distinct Observations	12
		Number of Missing Observations	0
Minimum	13600	Mean	16679
Maximum	24700	Median	15950
SD	2969	Std. Error of Mean	793.6
Coefficient of Variation	0.178	Skewness	1.696

Normal GOF Test

Shapiro Wilk Test Statistic	0.836	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.874	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.22	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.237	Data appear Normal at 5% Significance Level

Data appear Approximate Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	18084	95% Adjusted-CLT UCL (Chen-1995)	18368
		95% Modified-t UCL (Johnson-1978)	18144

Gamma GOF Test

A-D Test Statistic	0.65	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.733	etected data appear Gamma Distributed at 5% Significance Lev
K-S Test Statistic	0.208	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.228	etected data appear Gamma Distributed at 5% Significance Lev

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	38.75	k star (bias corrected MLE)	30.5
Theta hat (MLE)	430.4	Theta star (bias corrected MLE)	546.9
nu hat (MLE)	1085	nu star (bias corrected)	853.9
MLE Mean (bias corrected)	16679	MLE Sd (bias corrected)	3020
		Approximate Chi Square Value (0.05)	787.1
Adjusted Level of Significance	0.0312	Adjusted Chi Square Value	778.5

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	18095	95% Adjusted Gamma UCL (use when n<50)	18292

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.891	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.874	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.198	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.237	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	9.518	Mean of logged Data	9.709
Maximum of Logged Data	10.11	SD of logged Data	0.162

Assuming Lognormal Distribution

95% H-UCL	18082	90% Chebyshev (MVUE) UCL	18839
95% Chebyshev (MVUE) UCL	19824	97.5% Chebyshev (MVUE) UCL	21191
99% Chebyshev (MVUE) UCL	23875		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	17984	95% Jackknife UCL	18084
95% Standard Bootstrap UCL	17909	95% Bootstrap-t UCL	18788
95% Hall's Bootstrap UCL	20075	95% Percentile Bootstrap UCL	17993
95% BCA Bootstrap UCL	18350		
90% Chebyshev(Mean, Sd) UCL	19059	95% Chebyshev(Mean, Sd) UCL	20138
97.5% Chebyshev(Mean, Sd) UCL	21635	99% Chebyshev(Mean, Sd) UCL	24575

Suggested UCL to Use

95% Student's-t UCL	18084

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Manganese (MG/KG)

General Statistics

Total Number of Observations	14	Number of Distinct Observations	14
		Number of Missing Observations	0
Minimum	265	Mean	545.9
Maximum	968	Median	542.5
SD	164.9	Std. Error of Mean	44.06
Coefficient of Variation	0.302	Skewness	0.991

Normal GOF Test

Shapiro Wilk Test Statistic	0.925	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.194	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.237	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	624	95% Adjusted-CLT UCL (Chen-1995)	630.9
		95% Modified-t UCL (Johnson-1978)	625.9

Gamma GOF Test

A-D Test Statistic	0.352	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.734	etected data appear Gamma Distributed at 5% Significance Lev	
K-S Test Statistic	0.155	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.229	etected data appear Gamma Distributed at 5% Significance Lev	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	12.15	k star (bias corrected MLE)	9.592
Theta hat (MLE)	44.94	Theta star (bias corrected MLE)	56.91
nu hat (MLE)	340.1	nu star (bias corrected)	268.6
MLE Mean (bias corrected)	545.9	MLE Sd (bias corrected)	176.3
		Approximate Chi Square Value (0.05)	231.6
Adjusted Level of Significance	0.0312	Adjusted Chi Square Value	227.1

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	633	95% Adjusted Gamma UCL (use when n<50)	645.7

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.956	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.156	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.237	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	5.58	Mean of logged Data	6.261
Maximum of Logged Data	6.875	SD of logged Data	0.303

Assuming Lognormal Distribution

95% H-UCL	643.2	90% Chebyshev (MVUE) UCL	680.8
95% Chebyshev (MVUE) UCL	741.6	97.5% Chebyshev (MVUE) UCL	826.1
99% Chebyshev (MVUE) UCL	992.1		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	618.4	95% Jackknife UCL	624
95% Standard Bootstrap UCL	615.6	95% Bootstrap-t UCL	642.1
95% Hall's Bootstrap UCL	694	95% Percentile Bootstrap UCL	615.9
95% BCA Bootstrap UCL	626.3		
90% Chebyshev(Mean, Sd) UCL	678.1	95% Chebyshev(Mean, Sd) UCL	738
97.5% Chebyshev(Mean, Sd) UCL	821.1	99% Chebyshev(Mean, Sd) UCL	984.4

Suggested UCL to Use

95% Student's-t UCL 624

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). However, simulations results will not cover all Real World data sets. For additional insight the user may want to consult a statistician.

Vanadium (MG/KG)

General Statistics

Total Number of Observations	14	Number of Distinct Observations	14
		Number of Missing Observations	0
Minimum	37.9	Mean	59.27
Maximum	86.1	Median	56.8
SD	11.83	Std. Error of Mean	3.16
Coefficient of Variation	0.2	Skewness	0.576

Normal GOF Test

Shapiro Wilk Test Statistic	0.967	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.874	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.133	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.237	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	64.87	95% Adjusted-CLT UCL (Chen-1995)	64.99
		95% Modified-t UCL (Johnson-1978)	64.95

Gamma GOF Test

A-D Test Statistic	0.209	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.734	etected data appear Gamma Distributed at 5% Significance Lev
K-S Test Statistic	0.126	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.228	etected data appear Gamma Distributed at 5% Significance Lev

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	27.43	k star (bias corrected MLE)	21.6
Theta hat (MLE)	2.161	Theta star (bias corrected MLE)	2.744
nu hat (MLE)	768	nu star (bias corrected)	604.7
MLE Mean (bias corrected)	59.27	MLE Sd (bias corrected)	12.75
		Approximate Chi Square Value (0.05)	548.7
Adjusted Level of Significance	0.0312	Adjusted Chi Square Value	541.6

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	65.33	95% Adjusted Gamma UCL (use when n<50)	66.18

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.977	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.874	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.137	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.237	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	3.635	Mean of logged Data	4.064
Maximum of Logged Data	4.456	SD of logged Data	0.199

Assuming Lognormal Distribution

95% H-UCL	65.64	90% Chebyshev (MVUE) UCL	68.8
95% Chebyshev (MVUE) UCL	73.11	97.5% Chebyshev (MVUE) UCL	79.1
99% Chebyshev (MVUE) UCL	90.86		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	64.47	95% Jackknife UCL	64.87
95% Standard Bootstrap UCL	64.4	95% Bootstrap-t UCL	65.48
95% Hall's Bootstrap UCL	66.64	95% Percentile Bootstrap UCL	64.24
95% BCA Bootstrap UCL	64.59		
90% Chebyshev(Mean, Sd) UCL	68.75	95% Chebyshev(Mean, Sd) UCL	73.05
97.5% Chebyshev(Mean, Sd) UCL	79.01	99% Chebyshev(Mean, Sd) UCL	90.72

Suggested UCL to Use

95% Student's-t UCL	64.87

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/3/2015 9:05:25 AM
From File	Vieques_SWMU20_ProUCL_SO_TOT_0_6_re1_030215.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Aluminum (MG/KG)

General Statistics

Total Number of Observations	30	Number of Distinct Observations	30
		Number of Missing Observations	0
Minimum	5720	Mean	9513
Maximum	16700	Median	8720
SD	2636	Std. Error of Mean	481.3
Coefficient of Variation	0.277	Skewness	0.884

Normal GOF Test

Shapiro Wilk Test Statistic	0.932	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.927	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.168	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.162	Data Not Normal at 5% Significance Level

Data appear Approximate Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	10331	95% Adjusted-CLT UCL (Chen-1995)	10387
		95% Modified-t UCL (Johnson-1978)	10343

Gamma GOF Test

A-D Test Statistic	0.45	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.745	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.138	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.16	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	14.54	k star (bias corrected MLE)	13.11
Theta hat (MLE)	654.3	Theta star (bias corrected MLE)	725.7
nu hat (MLE)	872.4	nu star (bias corrected)	786.5
MLE Mean (bias corrected)	9513	MLE Sd (bias corrected)	2627
		Approximate Chi Square Value (0.05)	722.4
Adjusted Level of Significance	0.041	Adjusted Chi Square Value	718.8

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	10356	95% Adjusted Gamma UCL (use when n<50)	10407

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.972	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.927	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.121	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.162	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	8.652	Mean of logged Data	9.126
Maximum of Logged Data	9.723	SD of logged Data	0.265

Assuming Lognormal Distribution

95% H-UCL	10392	90% Chebyshev (MVUE) UCL	10902
95% Chebyshev (MVUE) UCL	11536	97.5% Chebyshev (MVUE) UCL	12414
99% Chebyshev (MVUE) UCL	14141		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	10304	95% Jackknife UCL	10331
95% Standard Bootstrap UCL	10297	95% Bootstrap-t UCL	10437
95% Hall's Bootstrap UCL	10434	95% Percentile Bootstrap UCL	10327
95% BCA Bootstrap UCL	10367		
90% Chebyshev(Mean, Sd) UCL	10957	95% Chebyshev(Mean, Sd) UCL	11611
97.5% Chebyshev(Mean, Sd) UCL	12519	99% Chebyshev(Mean, Sd) UCL	14302

Suggested UCL to Use

95% Student's-t UCL	10331

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Arsenic (MG/KG)

General Statistics

Total Number of Observations	30	Number of Distinct Observations	9
Number of Detects	6	Number of Non-Detects	24
Number of Distinct Detects	6	Number of Distinct Non-Detects	3
Minimum Detect	0.35	Minimum Non-Detect	1
Maximum Detect	3.2	Maximum Non-Detect	1.2
Variance Detects	1.135	Percent Non-Detects	80%
Mean Detects	1.06	SD Detects	1.066
Median Detects	0.705	CV Detects	1.005
Skewness Detects	2.274	Kurtosis Detects	5.345
Mean of Logged Detects	-0.231	SD of Logged Detects	0.758

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.666	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.408	**Lilliefors GOF Test**	

5% Lilliefors Critical Value	0.362	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.718	Standard Error of Mean	0.129
SD	0.498	95% KM (BCA) UCL	0.928
95% KM (t) UCL	0.937	95% KM (Percentile Bootstrap) UCL	0.939
95% KM (z) UCL	0.93	95% KM Bootstrap t UCL	0.999
90% KM Chebyshev UCL	1.105	95% KM Chebyshev UCL	1.28
97.5% KM Chebyshev UCL	1.524	99% KM Chebyshev UCL	2.002

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.67	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.705	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.344	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.336	Detected Data Not Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.879	k star (bias corrected MLE)	1.051
Theta hat (MLE)	0.564	Theta star (bias corrected MLE)	1.009
nu hat (MLE)	22.55	nu star (bias corrected)	12.61
MLE Mean (bias corrected)	1.06	MLE Sd (bias corrected)	1.034

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	2.079	nu hat (KM)	124.8
Approximate Chi Square Value (124.76, α)	99.96	Adjusted Chi Square Value (124.76, β)	98.68
95% Gamma Approximate KM-UCL (use when n>=50)	0.896	95% Gamma Adjusted KM-UCL (use when n<50)	0.907

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.774
Maximum	3.2	Median	0.612
SD	0.654	CV	0.845
k hat (MLE)	1.341	k star (bias corrected MLE)	1.229
Theta hat (MLE)	0.578	Theta star (bias corrected MLE)	0.63
nu hat (MLE)	80.46	nu star (bias corrected)	73.75
MLE Mean (bias corrected)	0.774	MLE Sd (bias corrected)	0.699
		Adjusted Level of Significance (β)	0.041
Approximate Chi Square Value (73.75, α)	54.97	Adjusted Chi Square Value (73.75, β)	54.04
95% Gamma Approximate UCL (use when n>=50)	1.039	95% Gamma Adjusted UCL (use when n<50)	1.057

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.876	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.291	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.774	Mean in Log Scale	-0.43
SD in Original Scale	0.566	SD in Log Scale	0.571
95% t UCL (assumes normality of ROS data)	0.949	95% Percentile Bootstrap UCL	0.953
95% BCA Bootstrap UCL	1.014	95% Bootstrap t UCL	1.068
95% H-UCL (Log ROS)	0.947		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-0.454	95% H-UCL (KM -Log)	0.818
KM SD (logged)	0.441	95% Critical H Value (KM-Log)	1.904
KM Standard Error of Mean (logged)	0.166		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.65	Mean in Log Scale	-0.528
SD in Original Scale	0.489	SD in Log Scale	0.351
95% t UCL (Assumes normality)	0.802	95% H-Stat UCL	0.707

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Approximate Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.937	95% GROS Adjusted Gamma UCL	1.057
95% Adjusted Gamma KM-UCL	0.907		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Chromium (MG/KG)

General Statistics

Total Number of Observations	30	Number of Distinct Observations	28
		Number of Missing Observations	0
Minimum	8.3	Mean	11.83
Maximum	18.1	Median	11.5
SD	2.145	Std. Error of Mean	0.392
Coefficient of Variation	0.181	Skewness	0.956

Normal GOF Test

Shapiro Wilk Test Statistic	0.949	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.927	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.12	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.162	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	12.49	95% Adjusted-CLT UCL (Chen-1995)	12.54

95% Modified-t UCL (Johnson-1978)	12.5

Gamma GOF Test

A-D Test Statistic	0.229	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.744	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0961	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.16	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	33.52	k star (bias corrected MLE)	30.19
Theta hat (MLE)	0.353	Theta star (bias corrected MLE)	0.392
nu hat (MLE)	2011	nu star (bias corrected)	1811
MLE Mean (bias corrected)	11.83	MLE Sd (bias corrected)	2.153
		Approximate Chi Square Value (0.05)	1713
Adjusted Level of Significance	0.041	Adjusted Chi Square Value	1708

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	12.5	95% Adjusted Gamma UCL (use when n<50)	12.54

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.984	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.927	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0849	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.162	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.116	Mean of logged Data	2.455
Maximum of Logged Data	2.896	SD of logged Data	0.174

Assuming Lognormal Distribution

95% H-UCL	12.51	90% Chebyshev (MVUE) UCL	12.96
95% Chebyshev (MVUE) UCL	13.47	97.5% Chebyshev (MVUE) UCL	14.18
99% Chebyshev (MVUE) UCL	15.58		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	12.47	95% Jackknife UCL	12.49
95% Standard Bootstrap UCL	12.45	95% Bootstrap-t UCL	12.6
95% Hall's Bootstrap UCL	12.64	95% Percentile Bootstrap UCL	12.47
95% BCA Bootstrap UCL	12.55		
90% Chebyshev(Mean, Sd) UCL	13	95% Chebyshev(Mean, Sd) UCL	13.53
97.5% Chebyshev(Mean, Sd) UCL	14.27	99% Chebyshev(Mean, Sd) UCL	15.72

Suggested UCL to Use

95% Student's-t UCL	12.49

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)

and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Cobalt (MG/KG)

General Statistics

Total Number of Observations	30	Number of Distinct Observations	27
Number of Detects	29	Number of Non-Detects	1
Number of Distinct Detects	26	Number of Distinct Non-Detects	1
Minimum Detect	7.4	Minimum Non-Detect	5.6
Maximum Detect	15.8	Maximum Non-Detect	5.6
Variance Detects	4.325	Percent Non-Detects	3.333%
Mean Detects	9.941	SD Detects	2.08
Median Detects	9.5	CV Detects	0.209
Skewness Detects	1.249	Kurtosis Detects	1.617
Mean of Logged Detects	2.278	SD of Logged Detects	0.194

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.892	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.926	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.148	Lilliefors GOF Test
5% Lilliefors Critical Value	0.165	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	9.797	Standard Error of Mean	0.4
SD	2.155	95% KM (BCA) UCL	10.51
95% KM (t) UCL	10.48	95% KM (Percentile Bootstrap) UCL	10.48
95% KM (z) UCL	10.46	95% KM Bootstrap t UCL	10.59
90% KM Chebyshev UCL	11	95% KM Chebyshev UCL	11.54
97.5% KM Chebyshev UCL	12.3	99% KM Chebyshev UCL	13.78

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.578	Anderson-Darling GOF Test
5% A-D Critical Value	0.744	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.124	Kolmogrov-Smirnoff GOF
5% K-S Critical Value	0.162	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	26.36	k star (bias corrected MLE)	23.66
Theta hat (MLE)	0.377	Theta star (bias corrected MLE)	0.42
nu hat (MLE)	1529	nu star (bias corrected)	1372
MLE Mean (bias corrected)	9.941	MLE Sd (bias corrected)	2.044

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	20.66	nu hat (KM)	1240
Approximate Chi Square Value (N/A, α)	1159	Adjusted Chi Square Value (N/A, β)	1155
95% Gamma Approximate KM-UCL (use when n>=50)	10.48	95% Gamma Adjusted KM-UCL (use when n<50)	10.52

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	5.464	Mean	9.792
Maximum	15.8	Median	9.4
SD	2.201	CV	0.225
k hat (MLE)	21.65	k star (bias corrected MLE)	19.51
Theta hat (MLE)	0.452	Theta star (bias corrected MLE)	0.502
nu hat (MLE)	1299	nu star (bias corrected)	1170
MLE Mean (bias corrected)	9.792	MLE Sd (bias corrected)	2.217
		Adjusted Level of Significance (β)	0.041
Approximate Chi Square Value (N/A, α)	1092	Adjusted Chi Square Value (N/A, β)	1088
95% Gamma Approximate UCL (use when n>=50)	10.5	95% Gamma Adjusted UCL (use when n<50)	10.54

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.942	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.926	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.111	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.165	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	9.81	Mean in Log Scale	2.261
SD in Original Scale	2.166	SD in Log Scale	0.211
95% t UCL (assumes normality of ROS data)	10.48	95% Percentile Bootstrap UCL	10.49
95% BCA Bootstrap UCL	10.54	95% Bootstrap t UCL	10.58
95% H-UCL (Log ROS)	10.51		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	2.259	95% H-UCL (KM -Log)	10.5
KM SD (logged)	0.213	95% Critical H Value (KM-Log)	1.76
KM Standard Error of Mean (logged)	0.0395		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	9.703	Mean in Log Scale	2.236
SD in Original Scale	2.424	SD in Log Scale	0.297
95% t UCL (Assumes normality)	10.46	95% H-Stat UCL	10.8

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Approximate Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	10.48	95% KM (Percentile Bootstrap) UCL	10.48

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Cyanide (MG/KG)

General Statistics

Total Number of Observations	30	Number of Distinct Observations	8
Number of Detects	4	Number of Non-Detects	26
Number of Distinct Detects	4	Number of Distinct Non-Detects	4
Minimum Detect	0.21	Minimum Non-Detect	1.3
Maximum Detect	0.72	Maximum Non-Detect	1.45
Variance Detects	0.0615	Percent Non-Detects	86.67%
Mean Detects	0.425	SD Detects	0.248
Median Detects	0.385	CV Detects	0.584
Skewness Detects	0.43	Kurtosis Detects	-3.514
Mean of Logged Detects	-0.994	SD of Logged Detects	0.615

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.878	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.284	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.443	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.425	Standard Error of Mean	0.124
SD	0.215	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.636	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.629	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.797	95% KM Chebyshev UCL	0.965
97.5% KM Chebyshev UCL	1.199	99% KM Chebyshev UCL	1.659

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.435	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.659	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.317	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.396	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	3.779	k star (bias corrected MLE)	1.112
Theta hat (MLE)	0.112	Theta star (bias corrected MLE)	0.382
nu hat (MLE)	30.24	nu star (bias corrected)	8.892
MLE Mean (bias corrected)	0.425	MLE Sd (bias corrected)	0.403

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	3.916	nu hat (KM)	235
Approximate Chi Square Value (234.96, α)	200.5	Adjusted Chi Square Value (234.96, β)	198.6
95% Gamma Approximate KM-UCL (use when n>=50)	0.498	95% Gamma Adjusted KM-UCL (use when n<50)	0.503

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0435	Mean	0.433
Maximum	1	Median	0.403
SD	0.249	CV	0.575
k hat (MLE)	2.588	k star (bias corrected MLE)	2.351
Theta hat (MLE)	0.167	Theta star (bias corrected MLE)	0.184
nu hat (MLE)	155.3	nu star (bias corrected)	141.1
MLE Mean (bias corrected)	0.433	MLE Sd (bias corrected)	0.283
		Adjusted Level of Significance (β)	0.041
Approximate Chi Square Value (141.08, α)	114.6	Adjusted Chi Square Value (141.08, β)	113.3
95% Gamma Approximate UCL (use when n>=50)	0.533	95% Gamma Adjusted UCL (use when n<50)	N/A

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.865	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.281	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.443	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.439	Mean in Log Scale	-0.994
SD in Original Scale	0.264	SD in Log Scale	0.602
95% t UCL (assumes normality of ROS data)	0.521	95% Percentile Bootstrap UCL	0.524
95% BCA Bootstrap UCL	0.53	95% Bootstrap t UCL	0.538
95% H-UCL (Log ROS)	0.558		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-0.994	95% H-UCL (KM -Log)	0.519
KM SD (logged)	0.532	95% Critical H Value (KM-Log)	1.978
KM Standard Error of Mean (logged)	0.307		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.645	Mean in Log Scale	-0.469
SD in Original Scale	0.12	SD in Log Scale	0.29
95% t UCL (Assumes normality)	0.682	95% H-Stat UCL	0.719

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.636	95% KM (Percentile Bootstrap) UCL	N/A

Warning: One or more Recommended UCL(s) not available!

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Iron (MG/KG)

General Statistics

Total Number of Observations	30	Number of Distinct Observations	26
		Number of Missing Observations	0
Minimum	13600	Mean	17750
Maximum	30000	Median	17200
SD	3391	Std. Error of Mean	619.1
Coefficient of Variation	0.191	Skewness	1.869

Normal GOF Test

Shapiro Wilk Test Statistic	0.851	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.927	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.156	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.162	Data appear Normal at 5% Significance Level

Data appear Approximate Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	18802	95% Adjusted-CLT UCL (Chen-1995)	18994
		95% Modified-t UCL (Johnson-1978)	18837

Gamma GOF Test

A-D Test Statistic	0.641	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.744	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.126	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.16	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	33.02	k star (bias corrected MLE)	29.74
Theta hat (MLE)	537.6	Theta star (bias corrected MLE)	596.9
nu hat (MLE)	1981	nu star (bias corrected)	1784
MLE Mean (bias corrected)	17750	MLE Sd (bias corrected)	3255
		Approximate Chi Square Value (0.05)	1687
Adjusted Level of Significance	0.041	Adjusted Chi Square Value	1682

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	18772	95% Adjusted Gamma UCL (use when n<50)	18832

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.926	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.927	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.114	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.162	Data appear Lognormal at 5% Significance Level

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	9.518	Mean of logged Data	9.769
Maximum of Logged Data	10.31	SD of logged Data	0.172

Assuming Lognormal Distribution

95% H-UCL	18755	90% Chebyshev (MVUE) UCL	19411
95% Chebyshev (MVUE) UCL	20172	97.5% Chebyshev (MVUE) UCL	21227

99% Chebyshev (MVUE) UCL	23299

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	18768	95% Jackknife UCL	18802
95% Standard Bootstrap UCL	18747	95% Bootstrap-t UCL	19170
95% Hall's Bootstrap UCL	19673	95% Percentile Bootstrap UCL	18833
95% BCA Bootstrap UCL	19017		
90% Chebyshev(Mean, Sd) UCL	19607	95% Chebyshev(Mean, Sd) UCL	20449
97.5% Chebyshev(Mean, Sd) UCL	21616	99% Chebyshev(Mean, Sd) UCL	23910

Suggested UCL to Use

95% Student's-t UCL	18802

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Manganese (MG/KG)

General Statistics

Total Number of Observations	30	Number of Distinct Observations	30
		Number of Missing Observations	0
Minimum	265	Mean	495.8
Maximum	968	Median	500
SD	148	Std. Error of Mean	27.03
Coefficient of Variation	0.299	Skewness	1.082

Normal GOF Test

Shapiro Wilk Test Statistic	0.938	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.927	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.101	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.162	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	541.7	95% Adjusted-CLT UCL (Chen-1995)	545.9
		95% Modified-t UCL (Johnson-1978)	542.6

Gamma GOF Test

A-D Test Statistic	0.185	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.745	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.08	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.16	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	12.52	k star (bias corrected MLE)	11.29
Theta hat (MLE)	39.59	Theta star (bias corrected MLE)	43.9
nu hat (MLE)	751.4	nu star (bias corrected)	677.6
MLE Mean (bias corrected)	495.8	MLE Sd (bias corrected)	147.5
		Approximate Chi Square Value (0.05)	618.2
Adjusted Level of Significance	0.041	Adjusted Chi Square Value	614.9

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	543.4	95% Adjusted Gamma UCL (use when n<50)	546.3

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.988	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.927	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0982	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.162	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	5.58	Mean of logged Data	6.166
Maximum of Logged Data	6.875	SD of logged Data	0.288

Assuming Lognormal Distribution

95% H-UCL	546.3	90% Chebyshev (MVUE) UCL	574.8
95% Chebyshev (MVUE) UCL	610.7	97.5% Chebyshev (MVUE) UCL	660.5
99% Chebyshev (MVUE) UCL	758.4		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	540.2	95% Jackknife UCL	541.7
95% Standard Bootstrap UCL	540.3	95% Bootstrap-t UCL	548.1
95% Hall's Bootstrap UCL	554.6	95% Percentile Bootstrap UCL	541.1
95% BCA Bootstrap UCL	543.9		
90% Chebyshev(Mean, Sd) UCL	576.8	95% Chebyshev(Mean, Sd) UCL	613.6
97.5% Chebyshev(Mean, Sd) UCL	664.5	99% Chebyshev(Mean, Sd) UCL	764.7

Suggested UCL to Use

95% Student's-t UCL	541.7

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Vanadium (MG/KG)

General Statistics

Total Number of Observations	30	Number of Distinct Observations	30
		Number of Missing Observations	0
Minimum	37.9	Mean	65.77

Maximum	113	Median	62.5
SD	14.86	Std. Error of Mean	2.714
Coefficient of Variation	0.226	Skewness	1.324

Normal GOF Test

Shapiro Wilk Test Statistic	0.906	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.927	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.138	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.162	Data appear Normal at 5% Significance Level

Data appear Approximate Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	70.38	95% Adjusted-CLT UCL (Chen-1995)	70.94
		95% Modified-t UCL (Johnson-1978)	70.49

Gamma GOF Test

A-D Test Statistic	0.577	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.744	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.11	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.16	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	22.36	k star (bias corrected MLE)	20.15
Theta hat (MLE)	2.942	Theta star (bias corrected MLE)	3.265
nu hat (MLE)	1342	nu star (bias corrected)	1209
MLE Mean (bias corrected)	65.77	MLE Sd (bias corrected)	14.65
		Approximate Chi Square Value (0.05)	1129
Adjusted Level of Significance	0.041	Adjusted Chi Square Value	1125

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	70.42	95% Adjusted Gamma UCL (use when n<50)	70.69

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.965	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.927	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0961	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.162	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	3.635	Mean of logged Data	4.164
Maximum of Logged Data	4.727	SD of logged Data	0.213

Assuming Lognormal Distribution

95% H-UCL	70.52	90% Chebyshev (MVUE) UCL	73.46
95% Chebyshev (MVUE) UCL	76.96	97.5% Chebyshev (MVUE) UCL	81.82
99% Chebyshev (MVUE) UCL	91.36		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	70.24	95% Jackknife UCL	70.38
95% Standard Bootstrap UCL	70.29	95% Bootstrap-t UCL	71.3
95% Hall's Bootstrap UCL	71.93	95% Percentile Bootstrap UCL	70.39
95% BCA Bootstrap UCL	70.8		
90% Chebyshev(Mean, Sd) UCL	73.91	95% Chebyshev(Mean, Sd) UCL	77.6
97.5% Chebyshev(Mean, Sd) UCL	82.72	99% Chebyshev(Mean, Sd) UCL	92.77

Suggested UCL to Use

95% Student's-t UCL	70.38

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Attachment K-6

ProUCL Output - Groundwater (Plume Core)

SWMU 20

Former Vieques Naval Training Range, Vieques, Puerto Rico

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	3/3/2015 10:14:51 AM
From File	ProUCL_gw-plume.xls
Full Precision	OFF
Confidence Coefficient	95%
mber of Bootstrap Operations	2000

Trichloroethene

General Statistics

Total Number of Observations	13	Number of Distinct Observations	13
		Number of Missing Observations	0
Minimum	47.6	Mean	133.8
Maximum	334	Median	112
SD	79.98	Std. Error of Mean	22.18
Coefficient of Variation	0.598	Skewness	1.527

Normal GOF Test

Shapiro Wilk Test Statistic	0.854	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.213	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.246	Data appear Normal at 5% Significance Level

Data appear Approximate Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	173.3	95% Adjusted-CLT UCL (Chen-1995)	180.3
		95% Modified-t UCL (Johnson-1978)	174.9

Gamma GOF Test

A-D Test Statistic	0.323	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.738	etected data appear Gamma Distributed at 5% Significance Lev
K-S Test Statistic	0.163	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.238	etected data appear Gamma Distributed at 5% Significance Lev

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.635	k star (bias corrected MLE)	2.848
Theta hat (MLE)	36.81	Theta star (bias corrected MLE)	46.99
nu hat (MLE)	94.52	nu star (bias corrected)	74.04
MLE Mean (bias corrected)	133.8	MLE Sd (bias corrected)	79.3
		Approximate Chi Square Value (0.05)	55.23
Adjusted Level of Significance	0.0301	Adjusted Chi Square Value	52.91

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	179.4	95% Adjusted Gamma UCL (use when n<50)	187.2

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.971	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.15	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.246	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	3.863	Mean of logged Data	4.753
Maximum of Logged Data	5.811	SD of logged Data	0.55

Assuming Lognormal Distribution

95% H-UCL	190.4	90% Chebyshev (MVUE) UCL	195.9
95% Chebyshev (MVUE) UCL	224.4	97.5% Chebyshev (MVUE) UCL	263.9
99% Chebyshev (MVUE) UCL	341.5		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	170.3	95% Jackknife UCL	173.3
95% Standard Bootstrap UCL	169.3	95% Bootstrap-t UCL	199.7
95% Hall's Bootstrap UCL	377.3	95% Percentile Bootstrap UCL	169.5
95% BCA Bootstrap UCL	178.3		
90% Chebyshev(Mean, Sd) UCL	200.4	95% Chebyshev(Mean, Sd) UCL	230.5
97.5% Chebyshev(Mean, Sd) UCL	272.3	99% Chebyshev(Mean, Sd) UCL	354.5

Suggested UCL to Use

95% Student's-t UCL	173.3

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Tetrachloroethene

General Statistics

Total Number of Observations	13	Number of Distinct Observations	13
		Number of Missing Observations	0
Minimum	1.01	Mean	2.542
Maximum	5.87	Median	2.35
SD	1.52	Std. Error of Mean	0.422
Coefficient of Variation	0.598	Skewness	1.199

Normal GOF Test

Shapiro Wilk Test Statistic	0.865	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.191	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.246	Data appear Normal at 5% Significance Level	

Data appear Approximate Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	3.293	95% Adjusted-CLT UCL (Chen-1995)	3.385
		95% Modified-t UCL (Johnson-1978)	3.316

Gamma GOF Test

A-D Test Statistic	0.349	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.738	etected data appear Gamma Distributed at 5% Significance Lev
K-S Test Statistic	0.139	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.238	etected data appear Gamma Distributed at 5% Significance Lev

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.422	k star (bias corrected MLE)	2.683
Theta hat (MLE)	0.743	Theta star (bias corrected MLE)	0.947
nu hat (MLE)	88.96	nu star (bias corrected)	69.77
MLE Mean (bias corrected)	2.542	MLE Sd (bias corrected)	1.552
		Approximate Chi Square Value (0.05)	51.54
Adjusted Level of Significance	0.0301	Adjusted Chi Square Value	49.31

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	3.44	95% Adjusted Gamma UCL (use when n<50)	3.596

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.942	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.866	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.124	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.246	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.00995	Mean of logged Data	0.78
Maximum of Logged Data	1.77	SD of logged Data	0.573

Assuming Lognormal Distribution

95% H-UCL	3.697	90% Chebyshev (MVUE) UCL	3.781
95% Chebyshev (MVUE) UCL	4.346	97.5% Chebyshev (MVUE) UCL	5.13
99% Chebyshev (MVUE) UCL	6.67		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	3.235	95% Jackknife UCL	3.293
95% Standard Bootstrap UCL	3.234	95% Bootstrap-t UCL	3.714
95% Hall's Bootstrap UCL	4.286	95% Percentile Bootstrap UCL	3.261
95% BCA Bootstrap UCL	3.368		
90% Chebyshev(Mean, Sd) UCL	3.806	95% Chebyshev(Mean, Sd) UCL	4.379
97.5% Chebyshev(Mean, Sd) UCL	5.174	99% Chebyshev(Mean, Sd) UCL	6.736

Suggested UCL to Use

95% Student's-t UCL	3.293

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Attachment K-7
Evaluation of Reporting Limits for 100% Non-Detected Chemicals

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-MW01	MW	14-May-13	N	VEP4-GW01-0513	SVOA	123-91-1	1,4-Dioxane	UG_L	0.245	0.98	U	0.78	Yes
EPI04-MW01	MW	14-May-13	N	VEP4-GW01-0513	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW02	MW	16-May-13	N	VEP4-GW02-0513	SVOA	123-91-1	1,4-Dioxane	UG_L	0.24	0.962	U	0.78	Yes
EPI04-MW02	MW	16-May-13	N	VEP4-GW02-0513	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW03	MW	16-May-13	N	VEP4-GW03-0513	SVOA	123-91-1	1,4-Dioxane	UG_L	0.24	0.962	U	0.78	Yes
EPI04-MW03	MW	16-May-13	N	VEP4-GW03-0513	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW04	MW	20-May-13	N	VEP4-GW04-0513	SVOA	123-91-1	1,4-Dioxane	UG_L	0.236	0.943	U	0.78	Yes
EPI04-MW04	MW	20-May-13	N	VEP4-GW04-0513	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW05	MW	15-May-13	N	VEP4-GW05-0513	SVOA	123-91-1	1,4-Dioxane	UG_L		0.926	U	0.78	Yes
EPI04-MW05	MW	15-May-13	N	VEP4-GW05-0513	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW05	MW	15-May-13	FD	VEP4-GW05P-0513	SVOA	123-91-1	1,4-Dioxane	UG_L	0.245	0.98	U	0.78	Yes
EPI04-MW05	MW	15-May-13	FD	VEP4-GW05P-0513	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW06	MW	15-May-13	N	VEP4-GW06-0513	SVOA	123-91-1	1,4-Dioxane	UG_L	0.25	1	U	0.78	Yes
EPI04-MW06	MW	15-May-13	N	VEP4-GW06-0513	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW07	MW	17-May-13	N	VEP4-GW07-0513	SVOA	123-91-1	1,4-Dioxane	UG_L	0.25	1	U	0.78	Yes
EPI04-MW07	MW	17-May-13	N	VEP4-GW07-0513	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW08	MW	20-May-13	N	VEP4-GW08-0513	SVOA	123-91-1	1,4-Dioxane	UG_L	0.248	0.99	U	0.78	Yes
EPI04-MW08	MW	20-May-13	N	VEP4-GW08-0513	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW08	MW	20-May-13	FD	VEP4-GW08P-0513	SVOA	123-91-1	1,4-Dioxane	UG_L	0.24	0.962	U	0.78	Yes
EPI04-MW08	MW	20-May-13	FD	VEP4-GW08P-0513	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW09	MW	22-May-13	N	VEP4-GW09-0513	SVOA	123-91-1	1,4-Dioxane	UG_L	0.24	0.962	U	0.78	Yes
EPI04-MW09	MW	22-May-13	N	VEP4-GW09-0513	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW10	MW	21-May-13	N	VEP4-GW10-0513	SVOA	123-91-1	1,4-Dioxane	UG_L	0.25	1	U	0.78	Yes
EPI04-MW10	MW	21-May-13	N	VEP4-GW10-0513	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW10	MW	16-Sep-14	N	VEP4-GW10-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW11	MW	23-May-13	N	VEP4-GW11-0513	SVOA	123-91-1	1,4-Dioxane	UG_L	0.25	1	U	0.78	Yes
EPI04-MW11	MW	23-May-13	N	VEP4-GW11-0513	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW12	MW	23-May-13	N	VEP4-GW12-0513	SVOA	123-91-1	1,4-Dioxane	UG_L	0.263	1.05	U	0.78	Yes
EPI04-MW12	MW	23-May-13	N	VEP4-GW12-0513	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW13	MW	22-May-13	N	VEP4-GW13-0513	SVOA	123-91-1	1,4-Dioxane	UG_L	0.24	0.962	U	0.78	Yes
EPI04-MW13	MW	22-May-13	N	VEP4-GW13-0513	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW13	MW	16-Sep-14	N	VEP4-GW13-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW13D	MW	26-Jun-13	N	VEP4-GW13D-062613	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW13D	MW	02-Jul-13	N	VEP4-GW13D-0713	SVOA	123-91-1	1,4-Dioxane	UG_L	0.24	0.962	U	0.78	Yes
EPI04-MW13D	MW	02-Jul-13	N	VEP4-GW13D-0713	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW13D	MW	16-Sep-14	N	VEP4-GW13D-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW13	MW	22-May-13	FD	VEP4-GW13P-0513	SVOA	123-91-1	1,4-Dioxane	UG_L	0.24	0.962	U	0.78	Yes
EPI04-MW13	MW	22-May-13	FD	VEP4-GW13P-0513	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW13	MW	16-Sep-14	FD	VEP4-GW13P-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW14	MW	24-May-13	N	VEP4-GW14-0513	SVOA	123-91-1	1,4-Dioxane	UG_L	0.24	0.962	U	0.78	Yes
EPI04-MW14	MW	24-May-13	N	VEP4-GW14-0513	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW14	MW	15-Sep-14	N	VEP4-GW14-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW15	MW	23-May-13	N	VEP4-GW15-052313	SVOA	123-91-1	1,4-Dioxane	UG_L	0.24	0.962	U	0.78	Yes
EPI04-MW15	MW	23-May-13	N	VEP4-GW15-052313	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW15	MW	05-Jun-13	N	VEP4-GW15-0613	SVOA	123-91-1	1,4-Dioxane	UG_L	0.236	0.943	U	0.78	Yes
EPI04-MW15	MW	05-Jun-13	N	VEP4-GW15-0613	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW16	MW	16-May-13	N	VEP4-GW16-051613	SVOA	123-91-1	1,4-Dioxane	UG_L	0.231	0.926	U	0.78	Yes
EPI04-MW16	MW	16-May-13	N	VEP4-GW16-051613	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW16	MW	10-Jun-13	N	VEP4-GW16-0613	SVOA	123-91-1	1,4-Dioxane	UG_L	0.231	0.926	U	0.78	Yes
EPI04-MW16	MW	10-Jun-13	N	VEP4-GW16-0613	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW16	MW	11-Sep-14	N	VEP4-GW16-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW17	MW	29-May-13	N	VEP4-GW17-052913	SVOA	123-91-1	1,4-Dioxane	UG_L	0.25	1	U	0.78	Yes
EPI04-MW17	MW	29-May-13	N	VEP4-GW17-052913	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW17	MW	10-Jun-13	N	VEP4-GW17-0613	SVOA	123-91-1	1,4-Dioxane	UG_L	0.231	0.926	U	0.78	Yes
EPI04-MW17	MW	10-Jun-13	N	VEP4-GW17-0613	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW17	MW	17-Sep-14	N	VEP4-GW17-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW17D	MW	26-Jun-13	N	VEP4-GW17D-062613	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW17D	MW	01-Jul-13	N	VEP4-GW17D-0713	SVOA	123-91-1	1,4-Dioxane	UG_L	0.245	0.98	U	0.78	Yes
EPI04-MW17D	MW	01-Jul-13	N	VEP4-GW17D-0713	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW17D	MW	17-Sep-14	N	VEP4-GW17D-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW17	MW	10-Jun-13	FD	VEP4-GW17P-0613	SVOA	123-91-1	1,4-Dioxane	UG_L	0.231	0.926	U	0.78	Yes
EPI04-MW17	MW	10-Jun-13	FD	VEP4-GW17P-0613	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW18	MW	21-May-13	N	VEP4-GW18-052113	SVOA	123-91-1	1,4-Dioxane	UG_L	0.234	0.935	U	0.78	Yes
EPI04-MW18	MW	21-May-13	N	VEP4-GW18-052113	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW18	MW	07-Jun-13	N	VEP4-GW18-0613	SVOA	123-91-1	1,4-Dioxane	UG_L	0.245	0.98	U	0.78	Yes
EPI04-MW18	MW	07-Jun-13	N	VEP4-GW18-0613	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW18	MW	15-Sep-14	N	VEP4-GW18-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW19	MW	14-May-13	N	VEP4-GW19-051413	SVOA	123-91-1	1,4-Dioxane	UG_L	0.231	0.926	U	0.78	Yes
EPI04-MW19	MW	14-May-13	N	VEP4-GW19-051413	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW19	MW	06-Jun-13	N	VEP4-GW19-0613	SVOA	123-91-1	1,4-Dioxane	UG_L	0.231	0.926	U	0.78	Yes
EPI04-MW19	MW	06-Jun-13	N	VEP4-GW19-0613	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW19	MW	15-Sep-14	N	VEP4-GW19-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW20	MW	10-Jun-13	N	VEP4-GW20-061013	SVOA	123-91-1	1,4-Dioxane	UG_L	0.236	0.943	QU	0.78	Yes
EPI04-MW20	MW	10-Jun-13	N	VEP4-GW20-061013	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW20	MW	17-Jun-13	N	VEP4-GW20-0613	SVOA	123-91-1	1,4-Dioxane	UG_L	0.234	0.935	U	0.78	Yes
EPI04-MW20	MW	17-Jun-13	N	VEP4-GW20-0613	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW20	MW	12-Sep-14	N	VEP4-GW20-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW21	MW	21-Jun-13	N	VEP4-GW21-062113	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW21	MW	16-Jul-13	N	VEP4-GW21-0713	SVOA	123-91-1	1,4-Dioxane	UG_L	0.248	0.99	U	0.78	Yes
EPI04-MW21	MW	16-Jul-13	N	VEP4-GW21-0713	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW21	MW	11-Sep-14	N	VEP4-GW21-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW22	MW	19-Jun-13	N	VEP4-GW22-061913	SVOA	123-91-1	1,4-Dioxane	UG_L	0.238	0.952	U	0.78	Yes
EPI04-MW22	MW	19-Jun-13	N	VEP4-GW22-061913	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW22	MW	17-Jul-13	N	VEP4-GW22-0713	SVOA	123-91-1	1,4-Dioxane	UG_L	0.236	0.943	U	0.78	Yes
EPI04-MW22	MW	17-Jul-13	N	VEP4-GW22-0713	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW22	MW	11-Sep-14	N	VEP4-GW22-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW22	MW	11-Sep-14	FD	VEP4-GW22P-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW23	MW	19-Jun-13	N	VEP4-GW23-061913	SVOA	123-91-1	1,4-Dioxane	UG_L	0.24	0.962	U	0.78	Yes
EPI04-MW23	MW	19-Jun-13	N	VEP4-GW23-061913	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW23	MW	23-Jul-13	N	VEP4-GW23-0713	SVOA	123-91-1	1,4-Dioxane	UG_L	0.245	0.98	U	0.78	Yes
EPI04-MW23	MW	23-Jul-13	N	VEP4-GW23-0713	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW23	MW	17-Sep-14	N	VEP4-GW23-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW24	MW	20-Jun-13	N	VEP4-GW24-062013	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW24	MW	24-Jul-13	N	VEP4-GW24-0713	SVOA	123-91-1	1,4-Dioxane	UG_L	0.24	0.962	U	0.78	Yes
EPI04-MW24	MW	24-Jul-13	N	VEP4-GW24-0713	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW24	MW	23-Sep-14	N	VEP4-GW24-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW24D	MW	26-Sep-14	N	VEP4-GW24D-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-MW24	MW	23-Sep-14	FD	VEP4-GW24P-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW25	MW	26-Sep-13	N	VEP4-GW25-0913	SVOA	123-91-1	1,4-Dioxane	UG_L	0.231	0.926	UJ	0.78	Yes
EPI04-MW25	MW	26-Sep-13	N	VEP4-GW25-0913	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW25	MW	18-Sep-14	N	VEP4-GW25-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW25D	MW	23-Sep-14	N	VEP4-GW25D-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW26	MW	24-Sep-13	N	VEP4-GW26-0913	SVOA	123-91-1	1,4-Dioxane	UG_L	0.231	0.926	U	0.78	Yes
EPI04-MW26	MW	24-Sep-13	N	VEP4-GW26-0913	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW26	MW	12-Sep-14	N	VEP4-GW26-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW27	MW	26-Sep-13	N	VEP4-GW27-0913	SVOA	123-91-1	1,4-Dioxane	UG_L	0.231	0.926	UJ	0.78	Yes
EPI04-MW27	MW	26-Sep-13	N	VEP4-GW27-0913	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW27	MW	10-Sep-14	N	VEP4-GW27-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW28	MW	09-Sep-14	N	VEP4-GW28-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW28	MW	02-Oct-13	N	VEP4-GW28-1013	SVOA	123-91-1	1,4-Dioxane	UG_L	0.231	0.926	U	0.78	Yes
EPI04-MW28	MW	02-Oct-13	N	VEP4-GW28-1013	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW28D	MW	26-Sep-14	N	VEP4-GW28D-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW29	MW	10-Sep-14	N	VEP4-GW29-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW29	MW	02-Oct-13	N	VEP4-GW29-1013	SVOA	123-91-1	1,4-Dioxane	UG_L	0.24	0.962	U	0.78	Yes
EPI04-MW29	MW	02-Oct-13	N	VEP4-GW29-1013	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW30	MW	24-Sep-13	N	VEP4-GW30-0913	SVOA	123-91-1	1,4-Dioxane	UG_L	0.231	0.926	U	0.78	Yes
EPI04-MW30	MW	24-Sep-13	N	VEP4-GW30-0913	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.25	1	U	36	No
EPI04-MW30	MW	10-Sep-14	N	VEP4-GW30-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW31	MW	26-Sep-14	N	VEP4-GW31-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW32	MW	23-Sep-14	N	VEP4-GW32-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW33	MW	26-Sep-14	N	VEP4-GW33-0914	VOA	156-60-5	trans-1,2-Dichloroethene	UG_L	0.5	2	U	36	No
EPI04-MW13D	MW	30-May-13	N	VEP4-SB16-0406	SVOA	123-91-1	1,4-Dioxane	UG_KG	17.5	69.8	U	5300	No
EPI04-MW13D	MW	30-May-13	N	VEP4-SB16-0406	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG	1.12	4.47	U	160000	No
EPI04-MW17D	MW	05-Jun-13	N	VEP4-SB17-0406	SVOA	123-91-1	1,4-Dioxane	UG_KG	16.7	66.9	U	5300	No
EPI04-MW17D	MW	05-Jun-13	N	VEP4-SB17-0406	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG	2.04	8.17	U	160000	No
EPI04-MW13D	MW	30-May-13	N	VEP4-SS16-0001	SVOA	123-91-1	1,4-Dioxane	UG_KG	17.5	69.8	U	5300	No
EPI04-MW13D	MW	30-May-13	N	VEP4-SS16-0001	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG	1.29	5.15	U	160000	No
EPI04-MW17D	MW	05-Jun-13	N	VEP4-SS17-0001	SVOA	123-91-1	1,4-Dioxane	UG_KG	190	758	U	5300	No
EPI04-MW17D	MW	05-Jun-13	N	VEP4-SS17-0001	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG	1.64	6.57	U	160000	No
EPI04-MW17D	MW	05-Jun-13	FD	VEP4-SS17P-0001	SVOA	123-91-1	1,4-Dioxane	UG_KG	177	706	U	5300	No
EPI04-MW17D	MW	05-Jun-13	FD	VEP4-SS17P-0001	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG	1.13	4.54	U	160000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	METAL	7439-97-6	Mercury	MG_KG		0.11	U	0.94	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	METAL	7440-22-4	Silver	MG_KG		1.1	U	39	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	METAL	7440-28-0	Thallium	MG_KG		0.53	U	0.078	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	309-00-2	Aldrin	UG_KG		1.8	U	31	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	319-84-6	alpha-BHC	UG_KG		1.8	U	85	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		1.8	U	1800	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	319-85-7	beta-BHC	UG_KG		1.8	U	300	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	60-57-1	Dieldrin	UG_KG		3.5	U	33	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		3.5	U	37000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		3.5	U	37000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	72-20-8	Endrin	UG_KG		3.5	U	1800	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		3.5	U	1800	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		1.8	U	560	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	76-44-8	Heptachlor	UG_KG		1.8	U	120	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		1.8	U	59	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	72-43-5	Methoxychlor	UG_KG		18	U	31000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	PEST/PCB	8001-35-2	Toxaphene	UG_KG		180	U	480	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	92-52-4	1,1-Biphenyl	UG_KG		350	U	4700	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		350	U	4900	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		880	U	620000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		350	U	6200	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		350	U	18000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		350	U	120000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		350	U	1700	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		350	U	360	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		350	U	630000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	95-57-8	2-Chlorophenol	UG_KG		350	U	39000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		350	U	23000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	95-48-7	2-Methylphenol	UG_KG		350	U	310000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	88-74-4	2-Nitroaniline	UG_KG		880	U	61000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	88-75-5	2-Nitrophenol	UG_KG		350	U	NA	NA
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		350	U	1200	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	99-09-2	3-Nitroaniline	UG_KG		880	U	NA	NA
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		880	U	490	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		350	U	NA	NA
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		350	U	620000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	106-47-8	4-Chloroaniline	UG_KG		350	U	2700	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		350	U	NA	NA
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	106-44-5	4-Methylphenol	UG_KG		350	U	620000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	100-01-6	4-Nitroaniline	UG_KG		880	U	25000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	100-02-7	4-Nitrophenol	UG_KG		880	UJ	NA	NA
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	83-32-9	Acenaphthene	UG_KG		350	U	350000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	208-96-8	Acenaphthylene	UG_KG		350	U	350000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	98-86-2	Acetophenone	UG_KG		350	U	780000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	120-12-7	Anthracene	UG_KG		350	U	1700000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	1912-24-9	Atrazine	UG_KG		350	UJ	2300	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	100-52-7	Benzaldehyde	UG_KG		350	UJ	780000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		350	U	150	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		350	U	18000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		350	U	230	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		350	U	280000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	105-60-2	Caprolactam	UG_KG		350	U	3100000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	86-74-8	Carbazole	UG_KG		350	U	NA	NA
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	218-01-9	Chrysene	UG_KG		350	U	15000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	132-64-9	Dibenzofuran	UG_KG		350	U	7200	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	84-66-2	Diethylphthalate	UG_KG		350	U	4900000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	131-11-3	Dimethyl phthalate	UG_KG		350	U	NA	NA
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		350	U	620000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	206-44-0	Fluoranthene	UG_KG		350	U	230000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	86-73-7	Fluorene	UG_KG		350	U	230000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	118-74-1	Hexachlorobenzene	UG_KG		350	U	330	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		350	U	6200	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		350	U	37000	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	67-72-1	Hexachloroethane	UG_KG		350	U	4300	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	78-59-1	Isophorone	UG_KG		350	U	560000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	91-20-3	Naphthalene	UG_KG		350	U	3800	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	98-95-3	Nitrobenzene	UG_KG		350	U	5100	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		350	U	76	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		350	U	110000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	87-86-5	Pentachlorophenol	UG_KG		880	U	990	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	85-01-8	Phenanthrene	UG_KG		350	U	1700000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	108-95-2	Phenol	UG_KG		350	U	1800000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	SVOA	129-00-0	Pyrene	UG_KG		350	U	170000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		10	U	810000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		10	U	600	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		10	U	4000000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		10	U	150	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	75-34-3	1,1-Dichloroethane	UG_KG		10	U	3600	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	75-35-4	1,1-Dichloroethene	UG_KG		10	U	23000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		10	U	5800	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		10	U	5.3	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	106-93-4	1,2-Dibromoethane	UG_KG		10	U	36	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		10	U	180000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	107-06-2	1,2-Dichloroethane	UG_KG		10	U	460	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	78-87-5	1,2-Dichloropropane	UG_KG		10	U	1000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	78-93-3	2-Butanone	UG_KG		10	U	2700000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	591-78-6	2-Hexanone	UG_KG		10	UJ	20000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		10	U	530000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	71-43-2	Benzene	UG_KG		10	U	1200	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	75-27-4	Bromodichloromethane	UG_KG		10	U	290	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	75-25-2	Bromoform	UG_KG		10	U	67000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	74-83-9	Bromomethane	UG_KG		10	U	680	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	56-23-5	Carbon tetrachloride	UG_KG		10	U	650	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	108-90-7	Chlorobenzene	UG_KG		10	U	28000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	75-00-3	Chloroethane	UG_KG		10	U	1400000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	67-66-3	Chloroform	UG_KG		10	U	320	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	74-87-3	Chloromethane	UG_KG		10	U	11000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		10	U	16000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	110-82-7	Cyclohexane	UG_KG		10	U	650000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	124-48-1	Dibromochloromethane	UG_KG		10	U	730	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		10	U	8700	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	100-41-4	Ethylbenzene	UG_KG		10	U	5800	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	98-82-8	Isopropylbenzene	UG_KG		10	U	190000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	79-20-9	Methyl acetate	UG_KG		10	U	7800000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	108-87-2	Methylcyclohexane	UG_KG		10	U	650000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	75-09-2	Methylene chloride	UG_KG		10	U	35000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		10	U	47000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	100-42-5	Styrene	UG_KG		10	U	600000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	127-18-4	Tetrachloroethene	UG_KG		10	U	8100	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	108-88-3	Toluene	UG_KG		10	U	490000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		10	UJ	160000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	79-01-6	Trichloroethene	UG_KG		10	U	410	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		10	U	73000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	75-01-4	Vinyl chloride	UG_KG		10	U	59	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SB01-0406	VOA	1330-20-7	Xylene, total	UG_KG		10	U	58000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	METAL	7439-97-6	Mercury	MG_KG		0.1	U	0.94	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	METAL	7440-22-4	Silver	MG_KG		1	U	39	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	METAL	7440-28-0	Thallium	MG_KG		0.52	U	0.078	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	309-00-2	Aldrin	UG_KG		1.8	U	31	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	319-84-6	alpha-BHC	UG_KG		1.8	U	85	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		1.8	U	1800	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	319-85-7	beta-BHC	UG_KG		1.8	U	300	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	60-57-1	Dieldrin	UG_KG		3.4	U	33	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		3.4	U	37000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		3.4	U	37000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	72-20-8	Endrin	UG_KG		3.4	U	1800	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		3.4	U	1800	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		1.8	U	560	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	76-44-8	Heptachlor	UG_KG		1.8	U	120	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		1.8	U	59	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	72-43-5	Methoxychlor	UG_KG		18	U	31000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	PEST/PCB	8001-35-2	Toxaphene	UG_KG		180	U	480	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	92-52-4	1,1-Biphenyl	UG_KG		340	U	4700	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		340	U	4900	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		860	U	620000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		340	U	6200	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		340	U	18000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		340	U	120000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		340	U	1700	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		340	U	360	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		340	U	630000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	95-57-8	2-Chlorophenol	UG_KG		340	U	39000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		340	U	23000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	95-48-7	2-Methylphenol	UG_KG		340	U	310000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	88-74-4	2-Nitroaniline	UG_KG		860	U	61000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	88-75-5	2-Nitrophenol	UG_KG		340	U	NA	NA
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		340	U	1200	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	99-09-2	3-Nitroaniline	UG_KG		860	U	NA	NA
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		860	U	490	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		340	U	NA	NA
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		340	U	620000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	106-47-8	4-Chloroaniline	UG_KG		340	U	2700	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		340	U	NA	NA
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	106-44-5	4-Methylphenol	UG_KG		340	U	620000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	100-01-6	4-Nitroaniline	UG_KG		860	U	25000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	100-02-7	4-Nitrophenol	UG_KG		860	UJ	NA	NA

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	83-32-9	Acenaphthene	UG_KG		340	U	350000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	208-96-8	Acenaphthylene	UG_KG		340	U	350000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	98-86-2	Acetophenone	UG_KG		340	U	780000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	120-12-7	Anthracene	UG_KG		340	U	1700000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	1912-24-9	Atrazine	UG_KG		340	UJ	2300	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	100-52-7	Benzaldehyde	UG_KG		340	UJ	780000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		340	U	150	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		340	U	18000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		340	U	230	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		340	U	280000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	105-60-2	Caprolactam	UG_KG		340	U	3100000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	86-74-8	Carbazole	UG_KG		340	U	NA	NA
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	218-01-9	Chrysene	UG_KG		340	U	15000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	132-64-9	Dibenzofuran	UG_KG		340	U	7200	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	84-66-2	Diethylphthalate	UG_KG		340	U	4900000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	131-11-3	Dimethyl phthalate	UG_KG		340	U	NA	NA
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		340	U	620000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	206-44-0	Fluoranthene	UG_KG		340	U	230000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	86-73-7	Fluorene	UG_KG		340	U	230000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	118-74-1	Hexachlorobenzene	UG_KG		340	U	330	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		340	U	6200	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		340	U	37000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	67-72-1	Hexachloroethane	UG_KG		340	U	4300	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	78-59-1	Isophorone	UG_KG		340	U	560000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	91-20-3	Naphthalene	UG_KG		340	U	3800	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	98-95-3	Nitrobenzene	UG_KG		340	U	5100	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		340	U	76	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		340	U	110000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	87-86-5	Pentachlorophenol	UG_KG		860	U	990	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	85-01-8	Phenanthrene	UG_KG		340	U	1700000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	108-95-2	Phenol	UG_KG		340	U	1800000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	SVOA	129-00-0	Pyrene	UG_KG		340	U	170000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		10	U	810000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		10	U	600	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		10	U	4000000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		10	U	150	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	75-34-3	1,1-Dichloroethane	UG_KG		10	U	3600	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	75-35-4	1,1-Dichloroethene	UG_KG		10	U	23000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		10	U	5800	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		10	U	5.3	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	106-93-4	1,2-Dibromoethane	UG_KG		10	U	36	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		10	U	180000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	107-06-2	1,2-Dichloroethane	UG_KG		10	U	460	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	78-87-5	1,2-Dichloropropane	UG_KG		10	U	1000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	78-93-3	2-Butanone	UG_KG		10	U	2700000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	591-78-6	2-Hexanone	UG_KG		10	UJ	20000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		10	U	530000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	71-43-2	Benzene	UG_KG		10	U	1200	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	75-27-4	Bromodichloromethane	UG_KG		10	U	290	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	75-25-2	Bromoform	UG_KG		10	U	67000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	74-83-9	Bromomethane	UG_KG		10	U	680	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	56-23-5	Carbon tetrachloride	UG_KG		10	U	650	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	108-90-7	Chlorobenzene	UG_KG		10	U	28000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	75-00-3	Chloroethane	UG_KG		10	U	1400000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	67-66-3	Chloroform	UG_KG		10	U	320	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	74-87-3	Chloromethane	UG_KG		10	U	11000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		10	U	16000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	110-82-7	Cyclohexane	UG_KG		10	U	650000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	124-48-1	Dibromochloromethane	UG_KG		10	U	730	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		10	U	8700	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	100-41-4	Ethylbenzene	UG_KG		10	U	5800	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	98-82-8	Isopropylbenzene	UG_KG		10	U	190000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	79-20-9	Methyl acetate	UG_KG		10	U	7800000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	108-87-2	Methylcyclohexane	UG_KG		10	U	650000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	75-09-2	Methylene chloride	UG_KG		10	U	35000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		10	U	47000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	100-42-5	Styrene	UG_KG		10	U	600000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	127-18-4	Tetrachloroethene	UG_KG		10	U	8100	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	108-88-3	Toluene	UG_KG		10	U	490000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		10	UJ	160000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	79-01-6	Trichloroethene	UG_KG		10	U	410	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		10	U	73000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	75-01-4	Vinyl chloride	UG_KG		10	U	59	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SB02-0406	VOA	1330-20-7	Xylene, total	UG_KG		10	U	58000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	METAL	7439-97-6	Mercury	MG_KG		0.1	U	0.94	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	METAL	7440-22-4	Silver	MG_KG		1.1	U	39	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	METAL	7440-28-0	Thallium	MG_KG		0.53	U	0.078	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	309-00-2	Aldrin	UG_KG		1.8	U	31	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	319-84-6	alpha-BHC	UG_KG		1.8	U	85	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		1.8	U	1800	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	319-85-7	beta-BHC	UG_KG		1.8	U	300	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	60-57-1	Dieldrin	UG_KG		3.5	U	33	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		3.5	U	37000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		3.5	U	37000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	72-20-8	Endrin	UG_KG		3.5	U	1800	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		3.5	U	1800	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		1.8	U	560	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	76-44-8	Heptachlor	UG_KG		1.8	U	120	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		1.8	U	59	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	72-43-5	Methoxychlor	UG_KG		18	U	31000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	PEST/PCB	8001-35-2	Toxaphene	UG_KG		180	U	480	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	92-52-4	1,1-Biphenyl	UG_KG		350	U	4700	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		350	U	4900	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		870	U	620000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		350	U	6200	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		350	U	18000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		350	U	120000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		350	U	1700	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		350	U	360	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		350	U	630000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	95-57-8	2-Chlorophenol	UG_KG		350	U	39000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		350	U	23000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	95-48-7	2-Methylphenol	UG_KG		350	U	310000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	88-74-4	2-Nitroaniline	UG_KG		870	U	61000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	88-75-5	2-Nitrophenol	UG_KG		350	U	NA	NA
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		350	U	1200	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	99-09-2	3-Nitroaniline	UG_KG		870	U	NA	NA
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		870	U	490	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		350	U	NA	NA
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		350	U	620000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	106-47-8	4-Chloroaniline	UG_KG		350	U	2700	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		350	U	NA	NA
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	106-44-5	4-Methylphenol	UG_KG		350	U	620000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	100-01-6	4-Nitroaniline	UG_KG		870	U	25000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	100-02-7	4-Nitrophenol	UG_KG		870	UJ	NA	NA
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	83-32-9	Acenaphthene	UG_KG		350	U	350000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	208-96-8	Acenaphthylene	UG_KG		350	U	350000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	98-86-2	Acetophenone	UG_KG		350	U	780000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	120-12-7	Anthracene	UG_KG		350	U	1700000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	1912-24-9	Atrazine	UG_KG		350	UJ	2300	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	100-52-7	Benzaldehyde	UG_KG		350	UJ	780000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		350	U	150	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		350	U	18000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		350	U	230	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		350	U	280000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	105-60-2	Caprolactam	UG_KG		350	U	3100000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	86-74-8	Carbazole	UG_KG		350	U	NA	NA
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	218-01-9	Chrysene	UG_KG		350	U	15000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	132-64-9	Dibenzofuran	UG_KG		350	U	7200	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	84-66-2	Diethylphthalate	UG_KG		350	U	4900000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	131-11-3	Dimethyl phthalate	UG_KG		350	U	NA	NA
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		350	U	620000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	206-44-0	Fluoranthene	UG_KG		350	U	230000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	86-73-7	Fluorene	UG_KG		350	U	230000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	118-74-1	Hexachlorobenzene	UG_KG		350	U	330	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		350	U	6200	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		350	U	37000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	67-72-1	Hexachloroethane	UG_KG		350	U	4300	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	78-59-1	Isophorone	UG_KG		350	U	560000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	91-20-3	Naphthalene	UG_KG		350	U	3800	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	98-95-3	Nitrobenzene	UG_KG		350	U	5100	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		350	U	76	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		350	U	110000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	87-86-5	Pentachlorophenol	UG_KG		870	U	990	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	85-01-8	Phenanthrene	UG_KG		350	U	1700000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	108-95-2	Phenol	UG_KG		350	U	1800000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	SVOA	129-00-0	Pyrene	UG_KG		350	U	170000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		10	U	810000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		10	U	600	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		10	U	4000000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		10	U	150	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	75-34-3	1,1-Dichloroethane	UG_KG		10	U	3600	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	75-35-4	1,1-Dichloroethene	UG_KG		10	U	23000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		10	U	5800	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		10	U	5.3	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	106-93-4	1,2-Dibromoethane	UG_KG		10	U	36	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		10	U	180000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	107-06-2	1,2-Dichloroethane	UG_KG		10	U	460	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	78-87-5	1,2-Dichloropropane	UG_KG		10	U	1000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	78-93-3	2-Butanone	UG_KG		10	U	2700000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	591-78-6	2-Hexanone	UG_KG		10	U	20000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		10	U	530000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	71-43-2	Benzene	UG_KG		10	U	1200	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	75-27-4	Bromodichloromethane	UG_KG		10	U	290	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	75-25-2	Bromoform	UG_KG		10	U	67000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	74-83-9	Bromomethane	UG_KG		10	U	680	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	56-23-5	Carbon tetrachloride	UG_KG		10	U	650	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	108-90-7	Chlorobenzene	UG_KG		10	U	28000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	75-00-3	Chloroethane	UG_KG		10	U	1400000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	67-66-3	Chloroform	UG_KG		10	U	320	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	74-87-3	Chloromethane	UG_KG		10	U	11000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		10	U	16000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	110-82-7	Cyclohexane	UG_KG		10	U	650000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	124-48-1	Dibromochloromethane	UG_KG		10	U	730	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		10	U	8700	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	100-41-4	Ethylbenzene	UG_KG		10	U	5800	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	98-82-8	Isopropylbenzene	UG_KG		10	U	190000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	79-20-9	Methyl acetate	UG_KG		10	UJ	7800000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	108-87-2	Methylcyclohexane	UG_KG		10	U	650000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	75-09-2	Methylene chloride	UG_KG		10	UJ	35000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		10	U	47000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	100-42-5	Styrene	UG_KG		10	U	600000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	127-18-4	Tetrachloroethene	UG_KG		10	U	8100	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	108-88-3	Toluene	UG_KG		10	U	490000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		10	U	160000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	79-01-6	Trichloroethene	UG_KG		10	U	410	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		10	U	73000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	75-01-4	Vinyl chloride	UG_KG		10	U	59	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SB03-0406	VOA	1330-20-7	Xylene, total	UG_KG		10	U	58000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	METAL	7439-97-6	Mercury	MG_KG		0.12	U	0.94	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	METAL	7440-22-4	Silver	MG_KG		1.2	U	39	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	METAL	7440-28-0	Thallium	MG_KG		0.58	U	0.078	Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	309-00-2	Aldrin	UG_KG		2	U	31	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	319-84-6	alpha-BHC	UG_KG		2	U	85	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		2	U	1800	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	12674-11-2	Aroclor-1016	UG_KG		38	U	400	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	11104-28-2	Aroclor-1221	UG_KG		77	U	150	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	11141-16-5	Aroclor-1232	UG_KG		38	U	150	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	53469-21-9	Aroclor-1242	UG_KG		38	U	240	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	12672-29-6	Aroclor-1248	UG_KG		38	U	240	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	11097-69-1	Aroclor-1254	UG_KG		38	U	110	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	319-85-7	beta-BHC	UG_KG		2	U	300	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	60-57-1	Dieldrin	UG_KG		3.8	U	33	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		3.8	U	37000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		3.8	U	37000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	72-20-8	Endrin	UG_KG		3.8	U	1800	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		3.8	U	1800	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		2	U	560	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	76-44-8	Heptachlor	UG_KG		2	U	120	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		2	U	59	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	72-43-5	Methoxychlor	UG_KG		20	U	31000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	PEST/PCB	8001-35-2	Toxaphene	UG_KG		200	U	480	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	92-52-4	1,1-Biphenyl	UG_KG		380	U	4700	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		380	U	4900	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		950	U	620000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		380	U	6200	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		380	U	18000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		380	U	120000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		380	U	1700	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		380	U	360	Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		380	U	630000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	95-57-8	2-Chlorophenol	UG_KG		380	U	39000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		380	U	23000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	95-48-7	2-Methylphenol	UG_KG		380	U	310000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	88-74-4	2-Nitroaniline	UG_KG		950	U	61000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	88-75-5	2-Nitrophenol	UG_KG		380	U	NA	NA
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		380	U	1200	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	99-09-2	3-Nitroaniline	UG_KG		950	U	NA	NA
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		950	UJ	490	Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		380	U	NA	NA
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		380	U	620000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	106-47-8	4-Chloroaniline	UG_KG		380	U	2700	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		380	U	NA	NA
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	106-44-5	4-Methylphenol	UG_KG		380	U	620000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	100-01-6	4-Nitroaniline	UG_KG		950	U	25000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	100-02-7	4-Nitrophenol	UG_KG		950	U	NA	NA
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	83-32-9	Acenaphthene	UG_KG		380	U	350000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	208-96-8	Acenaphthylene	UG_KG		380	U	350000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	98-86-2	Acetophenone	UG_KG		380	U	780000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	120-12-7	Anthracene	UG_KG		380	U	1700000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	1912-24-9	Atrazine	UG_KG		380	U	2300	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	100-52-7	Benzaldehyde	UG_KG		380	U	780000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		380	U	150	Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		380	U	18000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		380	U	230	Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		380	U	280000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	105-60-2	Caprolactam	UG_KG		380	U	3100000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	86-74-8	Carbazole	UG_KG		380	U	NA	NA
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	218-01-9	Chrysene	UG_KG		380	U	15000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	132-64-9	Dibenzofuran	UG_KG		380	U	7200	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	84-66-2	Diethylphthalate	UG_KG		380	U	4900000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	131-11-3	Dimethyl phthalate	UG_KG		380	U	NA	NA
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		380	U	620000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	206-44-0	Fluoranthene	UG_KG		380	U	230000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	86-73-7	Fluorene	UG_KG		380	U	230000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	118-74-1	Hexachlorobenzene	UG_KG		380	U	330	Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		380	U	6200	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		380	U	37000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	67-72-1	Hexachloroethane	UG_KG		380	U	4300	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	78-59-1	Isophorone	UG_KG		380	U	560000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	91-20-3	Naphthalene	UG_KG		380	U	3800	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	98-95-3	Nitrobenzene	UG_KG		380	U	5100	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		380	U	76	Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		380	U	110000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	87-86-5	Pentachlorophenol	UG_KG		950	U	990	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	85-01-8	Phenanthrene	UG_KG		380	U	1700000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	108-95-2	Phenol	UG_KG		380	U	1800000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	SVOA	129-00-0	Pyrene	UG_KG		380	U	170000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		11	U	810000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		11	U	600	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		11	U	4000000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		11	U	150	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	75-34-3	1,1-Dichloroethane	UG_KG		11	U	3600	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	75-35-4	1,1-Dichloroethene	UG_KG		11	U	23000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		11	U	5800	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		11	U	5.3	Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	106-93-4	1,2-Dibromoethane	UG_KG		11	U	36	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		11	U	180000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	107-06-2	1,2-Dichloroethane	UG_KG		11	U	460	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	78-87-5	1,2-Dichloropropane	UG_KG		11	U	1000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		11	U	2600	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		11	U	2600	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	78-93-3	2-Butanone	UG_KG		11	U	2700000	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	591-78-6	2-Hexanone	UG_KG		11	U	20000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		11	U	530000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	71-43-2	Benzene	UG_KG		11	U	1200	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	75-27-4	Bromodichloromethane	UG_KG		11	U	290	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	75-25-2	Bromoform	UG_KG		11	U	67000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	74-83-9	Bromomethane	UG_KG		11	U	680	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	56-23-5	Carbon tetrachloride	UG_KG		11	U	650	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	108-90-7	Chlorobenzene	UG_KG		11	U	28000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	75-00-3	Chloroethane	UG_KG		11	U	1400000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	67-66-3	Chloroform	UG_KG		11	U	320	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	74-87-3	Chloromethane	UG_KG		11	U	11000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		11	U	16000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		11	U	160000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	110-82-7	Cyclohexane	UG_KG		11	U	650000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	124-48-1	Dibromochloromethane	UG_KG		11	U	730	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		11	U	8700	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	100-41-4	Ethylbenzene	UG_KG		11	U	5800	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	98-82-8	Isopropylbenzene	UG_KG		11	U	190000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	79-20-9	Methyl acetate	UG_KG		11	UJ	7800000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	108-87-2	Methylcyclohexane	UG_KG		11	U	650000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	75-09-2	Methylene chloride	UG_KG		11	UJ	35000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		11	U	47000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	100-42-5	Styrene	UG_KG		11	U	600000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	127-18-4	Tetrachloroethene	UG_KG		11	U	8100	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	108-88-3	Toluene	UG_KG		11	U	490000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		11	U	160000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		11	U	160000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	79-01-6	Trichloroethene	UG_KG		11	U	410	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		11	U	73000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	75-01-4	Vinyl chloride	UG_KG		11	U	59	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SB04-0406	VOA	1330-20-7	Xylene, total	UG_KG		11	U	58000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	METAL	7439-97-6	Mercury	MG_KG		0.1	U	0.94	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	METAL	7440-22-4	Silver	MG_KG		1.1	U	39	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	METAL	7440-28-0	Thallium	MG_KG		0.53	U	0.078	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	309-00-2	Aldrin	UG_KG		1.8	U	31	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	319-84-6	alpha-BHC	UG_KG		1.8	U	85	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		1.8	U	1800	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	319-85-7	beta-BHC	UG_KG		1.8	U	300	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	60-57-1	Dieldrin	UG_KG		3.5	U	33	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		3.5	U	37000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		3.5	U	37000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	72-20-8	Endrin	UG_KG		3.5	U	1800	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		3.5	U	1800	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		1.8	U	560	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	76-44-8	Heptachlor	UG_KG		1.8	U	120	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		1.8	U	59	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	72-43-5	Methoxychlor	UG_KG		18	U	31000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	PEST/PCB	8001-35-2	Toxaphene	UG_KG		180	U	480	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	92-52-4	1,1-Biphenyl	UG_KG		350	U	4700	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		350	U	4900	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		870	U	620000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		350	U	6200	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		350	U	18000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		350	U	120000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		350	U	1700	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		350	U	360	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		350	U	630000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	95-57-8	2-Chlorophenol	UG_KG		350	U	39000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		350	U	23000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	95-48-7	2-Methylphenol	UG_KG		350	U	310000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	88-74-4	2-Nitroaniline	UG_KG		870	U	61000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	88-75-5	2-Nitrophenol	UG_KG		350	U	NA	NA
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		350	U	1200	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	99-09-2	3-Nitroaniline	UG_KG		870	U	NA	NA
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		870	U	490	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		350	U	NA	NA
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		350	U	620000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	106-47-8	4-Chloroaniline	UG_KG		350	U	2700	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		350	U	NA	NA
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	106-44-5	4-Methylphenol	UG_KG		350	U	620000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	100-01-6	4-Nitroaniline	UG_KG		870	U	25000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	100-02-7	4-Nitrophenol	UG_KG		870	UJ	NA	NA
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	83-32-9	Acenaphthene	UG_KG		350	U	350000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	208-96-8	Acenaphthylene	UG_KG		350	U	350000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	98-86-2	Acetophenone	UG_KG		350	U	780000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	120-12-7	Anthracene	UG_KG		350	U	1700000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	1912-24-9	Atrazine	UG_KG		350	UJ	2300	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	100-52-7	Benzaldehyde	UG_KG		350	UJ	780000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		350	U	150	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		350	U	18000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		350	U	230	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		350	U	280000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	105-60-2	Caprolactam	UG_KG		350	U	3100000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	86-74-8	Carbazole	UG_KG		350	U	NA	NA
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	218-01-9	Chrysene	UG_KG		350	U	15000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	132-64-9	Dibenzofuran	UG_KG		350	U	7200	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	84-66-2	Diethylphthalate	UG_KG		350	U	4900000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	131-11-3	Dimethyl phthalate	UG_KG		350	U	NA	NA
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		350	U	620000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	206-44-0	Fluoranthene	UG_KG		350	U	230000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	86-73-7	Fluorene	UG_KG		350	U	230000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	118-74-1	Hexachlorobenzene	UG_KG		350	U	330	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		350	U	6200	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		350	U	37000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	67-72-1	Hexachloroethane	UG_KG		350	U	4300	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	78-59-1	Isophorone	UG_KG		350	U	560000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	91-20-3	Naphthalene	UG_KG		350	U	3800	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	98-95-3	Nitrobenzene	UG_KG		350	U	5100	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		350	U	76	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		350	U	110000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	87-86-5	Pentachlorophenol	UG_KG		870	U	990	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	85-01-8	Phenanthrene	UG_KG		350	U	1700000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	108-95-2	Phenol	UG_KG		350	U	1800000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	SVOA	129-00-0	Pyrene	UG_KG		350	U	170000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		11	U	810000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		11	U	600	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		11	U	4000000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		11	U	150	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	75-34-3	1,1-Dichloroethane	UG_KG		11	U	3600	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	75-35-4	1,1-Dichloroethene	UG_KG		11	U	23000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		11	U	5800	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		11	U	5.3	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	106-93-4	1,2-Dibromoethane	UG_KG		11	U	36	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		11	U	180000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	107-06-2	1,2-Dichloroethane	UG_KG		11	U	460	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	78-87-5	1,2-Dichloropropane	UG_KG		11	U	1000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		11	U	2600	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		11	U	2600	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	78-93-3	2-Butanone	UG_KG		11	U	2700000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	591-78-6	2-Hexanone	UG_KG		11	U	20000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		11	U	530000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	71-43-2	Benzene	UG_KG		11	U	1200	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	75-27-4	Bromodichloromethane	UG_KG		11	U	290	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	75-25-2	Bromoform	UG_KG		11	U	67000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	74-83-9	Bromomethane	UG_KG		11	U	680	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	56-23-5	Carbon tetrachloride	UG_KG		11	U	650	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	108-90-7	Chlorobenzene	UG_KG		11	U	28000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	75-00-3	Chloroethane	UG_KG		11	U	1400000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	67-66-3	Chloroform	UG_KG		11	U	320	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	74-87-3	Chloromethane	UG_KG		11	U	11000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		11	U	16000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		11	U	160000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	110-82-7	Cyclohexane	UG_KG		11	U	650000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	124-48-1	Dibromochloromethane	UG_KG		11	U	730	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		11	U	8700	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	100-41-4	Ethylbenzene	UG_KG		11	U	5800	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	98-82-8	Isopropylbenzene	UG_KG		11	U	190000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	79-20-9	Methyl acetate	UG_KG		11	UJ	7800000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	108-87-2	Methylcyclohexane	UG_KG		11	U	650000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	75-09-2	Methylene chloride	UG_KG		11	UJ	35000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		11	U	47000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	100-42-5	Styrene	UG_KG		11	U	600000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	127-18-4	Tetrachloroethene	UG_KG		11	U	8100	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	108-88-3	Toluene	UG_KG		11	U	490000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		11	U	160000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		11	U	160000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	79-01-6	Trichloroethene	UG_KG		11	U	410	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		11	U	73000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	75-01-4	Vinyl chloride	UG_KG		11	U	59	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SB05-0406	VOA	1330-20-7	Xylene, total	UG_KG		11	U	58000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	METAL	7439-97-6	Mercury	MG_KG		0.11	U	0.94	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	METAL	7440-22-4	Silver	MG_KG		1.1	U	39	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	METAL	7440-28-0	Thallium	MG_KG		0.56	U	0.078	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	309-00-2	Aldrin	UG_KG		1.9	U	31	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	319-84-6	alpha-BHC	UG_KG		1.9	U	85	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		1.9	U	1800	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	319-85-7	beta-BHC	UG_KG		1.9	U	300	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	60-57-1	Dieldrin	UG_KG		3.7	U	33	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		3.7	U	37000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		3.7	U	37000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	72-20-8	Endrin	UG_KG		3.7	U	1800	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		3.7	U	1800	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		1.9	U	560	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	76-44-8	Heptachlor	UG_KG		1.9	U	120	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		1.9	U	59	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	72-43-5	Methoxychlor	UG_KG		19	U	31000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	PEST/PCB	8001-35-2	Toxaphene	UG_KG		190	U	480	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	92-52-4	1,1-Biphenyl	UG_KG		370	U	4700	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		370	U	4900	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		920	U	620000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		370	U	6200	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		370	U	18000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		370	U	120000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		370	U	1700	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		370	U	360	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		370	U	630000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	95-57-8	2-Chlorophenol	UG_KG		370	U	39000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		370	U	23000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	95-48-7	2-Methylphenol	UG_KG		370	U	310000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	88-74-4	2-Nitroaniline	UG_KG		920	U	61000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	88-75-5	2-Nitrophenol	UG_KG		370	U	NA	NA
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		370	U	1200	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	99-09-2	3-Nitroaniline	UG_KG		920	U	NA	NA
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		920	U	490	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		370	U	NA	NA
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		370	U	620000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	106-47-8	4-Chloroaniline	UG_KG		370	U	2700	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		370	U	NA	NA
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	106-44-5	4-Methylphenol	UG_KG		370	U	620000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	100-01-6	4-Nitroaniline	UG_KG		920	U	25000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	100-02-7	4-Nitrophenol	UG_KG		920	UJ	NA	NA
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	83-32-9	Acenaphthene	UG_KG		370	U	350000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	208-96-8	Acenaphthylene	UG_KG		370	U	350000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	98-86-2	Acetophenone	UG_KG		370	U	780000	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	120-12-7	Anthracene	UG_KG		370	U	1700000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	1912-24-9	Atrazine	UG_KG		370	UJ	2300	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	100-52-7	Benzaldehyde	UG_KG		370	UJ	780000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		370	U	150	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		370	U	18000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		370	U	230	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		370	U	280000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	105-60-2	Caprolactam	UG_KG		370	U	3100000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	86-74-8	Carbazole	UG_KG		370	U	NA	NA
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	218-01-9	Chrysene	UG_KG		370	U	15000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	132-64-9	Dibenzofuran	UG_KG		370	U	7200	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	84-66-2	Diethylphthalate	UG_KG		370	U	4900000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	131-11-3	Dimethyl phthalate	UG_KG		370	U	NA	NA
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		370	U	620000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	206-44-0	Fluoranthene	UG_KG		370	U	230000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	86-73-7	Fluorene	UG_KG		370	U	230000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	118-74-1	Hexachlorobenzene	UG_KG		370	U	330	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		370	U	6200	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		370	U	37000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	67-72-1	Hexachloroethane	UG_KG		370	U	4300	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	78-59-1	Isophorone	UG_KG		370	U	560000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	91-20-3	Naphthalene	UG_KG		370	U	3800	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	98-95-3	Nitrobenzene	UG_KG		370	U	5100	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		370	U	76	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		370	U	110000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	87-86-5	Pentachlorophenol	UG_KG		920	U	990	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	85-01-8	Phenanthrene	UG_KG		370	U	1700000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	108-95-2	Phenol	UG_KG		370	U	1800000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	SVOA	129-00-0	Pyrene	UG_KG		370	U	170000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		11	U	810000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		11	U	600	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		11	U	4000000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		11	U	150	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	75-34-3	1,1-Dichloroethane	UG_KG		11	U	3600	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	75-35-4	1,1-Dichloroethene	UG_KG		11	U	23000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		11	U	5800	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		11	U	5.3	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	106-93-4	1,2-Dibromoethane	UG_KG		11	U	36	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		11	U	180000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	107-06-2	1,2-Dichloroethane	UG_KG		11	U	460	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	78-87-5	1,2-Dichloropropane	UG_KG		11	U	1000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		11	U	2600	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		11	U	2600	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	78-93-3	2-Butanone	UG_KG		11	U	2700000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	591-78-6	2-Hexanone	UG_KG		11	U	20000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		11	U	530000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	71-43-2	Benzene	UG_KG		11	U	1200	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	75-27-4	Bromodichloromethane	UG_KG		11	U	290	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	75-25-2	Bromoform	UG_KG		11	U	67000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	74-83-9	Bromomethane	UG_KG		11	U	680	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	56-23-5	Carbon tetrachloride	UG_KG		11	U	650	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	108-90-7	Chlorobenzene	UG_KG		11	U	28000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	75-00-3	Chloroethane	UG_KG		11	U	1400000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	67-66-3	Chloroform	UG_KG		11	U	320	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	74-87-3	Chloromethane	UG_KG		11	U	11000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		11	U	16000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		11	U	160000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	110-82-7	Cyclohexane	UG_KG		11	U	650000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	124-48-1	Dibromochloromethane	UG_KG		11	U	730	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		11	U	8700	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	100-41-4	Ethylbenzene	UG_KG		11	U	5800	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	98-82-8	Isopropylbenzene	UG_KG		11	U	190000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	79-20-9	Methyl acetate	UG_KG		11	UJ	7800000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	108-87-2	Methylcyclohexane	UG_KG		11	U	650000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	75-09-2	Methylene chloride	UG_KG		11	UJ	35000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		11	U	47000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	100-42-5	Styrene	UG_KG		11	U	600000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	127-18-4	Tetrachloroethene	UG_KG		11	U	8100	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	108-88-3	Toluene	UG_KG		11	U	490000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		11	U	160000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		11	U	160000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	79-01-6	Trichloroethene	UG_KG		11	U	410	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		11	U	73000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	75-01-4	Vinyl chloride	UG_KG		11	U	59	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SB06-0406	VOA	1330-20-7	Xylene, total	UG_KG		11	U	58000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	METAL	7439-97-6	Mercury	MG_KG		0.11	U	0.94	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	METAL	7440-22-4	Silver	MG_KG		1.1	U	39	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	METAL	7440-28-0	Thallium	MG_KG		0.56	U	0.078	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	309-00-2	Aldrin	UG_KG		1.9	U	31	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	319-84-6	alpha-BHC	UG_KG		1.9	U	85	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		1.9	U	1800	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	319-85-7	beta-BHC	UG_KG		1.9	U	300	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	60-57-1	Dieldrin	UG_KG		3.7	U	33	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		3.7	U	37000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		3.7	U	37000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	72-20-8	Endrin	UG_KG		3.7	U	1800	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		3.7	U	1800	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		1.9	U	560	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	76-44-8	Heptachlor	UG_KG		1.9	U	120	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		1.9	U	59	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	72-43-5	Methoxychlor	UG_KG		19	U	31000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	PEST/PCB	8001-35-2	Toxaphene	UG_KG		190	U	480	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	92-52-4	1,1-Biphenyl	UG_KG		370	U	4700	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		370	U	4900	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		920	U	620000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		370	U	6200	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		370	U	18000	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		370	U	120000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		370	U	1700	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		370	U	360	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		370	U	630000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	95-57-8	2-Chlorophenol	UG_KG		370	U	39000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		370	U	23000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	95-48-7	2-Methylphenol	UG_KG		370	U	310000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	88-74-4	2-Nitroaniline	UG_KG		920	U	61000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	88-75-5	2-Nitrophenol	UG_KG		370	U	NA	NA
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		370	U	1200	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	99-09-2	3-Nitroaniline	UG_KG		920	U	NA	NA
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		920	U	490	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		370	U	NA	NA
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		370	U	620000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	106-47-8	4-Chloroaniline	UG_KG		370	U	2700	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		370	U	NA	NA
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	106-44-5	4-Methylphenol	UG_KG		370	U	620000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	100-01-6	4-Nitroaniline	UG_KG		920	U	25000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	100-02-7	4-Nitrophenol	UG_KG		920	UJ	NA	NA
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	83-32-9	Acenaphthene	UG_KG		370	U	350000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	208-96-8	Acenaphthylene	UG_KG		370	U	350000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	98-86-2	Acetophenone	UG_KG		370	U	780000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	120-12-7	Anthracene	UG_KG		370	U	1700000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	1912-24-9	Atrazine	UG_KG		370	UJ	2300	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	100-52-7	Benzaldehyde	UG_KG		370	UJ	780000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		370	U	150	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		370	U	18000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		370	U	230	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		370	U	280000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	105-60-2	Caprolactam	UG_KG		370	U	3100000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	86-74-8	Carbazole	UG_KG		370	U	NA	NA
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	218-01-9	Chrysene	UG_KG		370	U	15000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	132-64-9	Dibenzofuran	UG_KG		370	U	7200	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	84-66-2	Diethylphthalate	UG_KG		370	U	4900000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	131-11-3	Dimethyl phthalate	UG_KG		370	U	NA	NA
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		370	U	620000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	206-44-0	Fluoranthene	UG_KG		370	U	230000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	86-73-7	Fluorene	UG_KG		370	U	230000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	118-74-1	Hexachlorobenzene	UG_KG		370	U	330	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		370	U	6200	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		370	U	37000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	67-72-1	Hexachloroethane	UG_KG		370	U	4300	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	78-59-1	Isophorone	UG_KG		370	U	560000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	91-20-3	Naphthalene	UG_KG		370	U	3800	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	98-95-3	Nitrobenzene	UG_KG		370	U	5100	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		370	U	76	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		370	U	110000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	87-86-5	Pentachlorophenol	UG_KG		920	U	990	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	85-01-8	Phenanthrene	UG_KG		370	U	1700000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	108-95-2	Phenol	UG_KG		370	U	1800000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	SVOA	129-00-0	Pyrene	UG_KG		370	U	170000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		10	U	810000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		10	U	600	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		10	U	4000000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		10	U	150	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	75-34-3	1,1-Dichloroethane	UG_KG		10	U	3600	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	75-35-4	1,1-Dichloroethene	UG_KG		10	U	23000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		10	U	5800	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		10	U	5.3	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	106-93-4	1,2-Dibromoethane	UG_KG		10	U	36	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		10	U	180000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	107-06-2	1,2-Dichloroethane	UG_KG		10	U	460	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	78-87-5	1,2-Dichloropropane	UG_KG		10	U	1000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	78-93-3	2-Butanone	UG_KG		10	U	2700000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	591-78-6	2-Hexanone	UG_KG		10	U	20000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		10	U	530000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	71-43-2	Benzene	UG_KG		10	U	1200	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	75-27-4	Bromodichloromethane	UG_KG		10	U	290	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	75-25-2	Bromoform	UG_KG		10	U	67000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	74-83-9	Bromomethane	UG_KG		10	U	680	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	56-23-5	Carbon tetrachloride	UG_KG		10	U	650	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	108-90-7	Chlorobenzene	UG_KG		10	U	28000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	75-00-3	Chloroethane	UG_KG		10	U	1400000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	67-66-3	Chloroform	UG_KG		10	U	320	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	74-87-3	Chloromethane	UG_KG		10	U	11000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		10	U	16000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	110-82-7	Cyclohexane	UG_KG		10	U	650000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	124-48-1	Dibromochloromethane	UG_KG		10	U	730	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		10	U	8700	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	100-41-4	Ethylbenzene	UG_KG		10	U	5800	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	98-82-8	Isopropylbenzene	UG_KG		10	U	190000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	79-20-9	Methyl acetate	UG_KG		10	U	7800000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	108-87-2	Methylcyclohexane	UG_KG		10	U	650000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	75-09-2	Methylene chloride	UG_KG		10	U	35000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		10	U	47000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	100-42-5	Styrene	UG_KG		10	U	600000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	127-18-4	Tetrachloroethene	UG_KG		10	U	8100	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	108-88-3	Toluene	UG_KG		10	U	490000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		10	U	160000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	79-01-6	Trichloroethene	UG_KG		10	U	410	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		10	U	73000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	75-01-4	Vinyl chloride	UG_KG		10	U	59	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SB07-0406	VOA	1330-20-7	Xylene, total	UG_KG		10	U	58000	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	METAL	7439-97-6	Mercury	MG_KG		0.11	U	0.94	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	METAL	7440-22-4	Silver	MG_KG		1.1	U	39	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	METAL	7440-28-0	Thallium	MG_KG		0.53	U	0.078	Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	309-00-2	Aldrin	UG_KG		1.8	U	31	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	319-84-6	alpha-BHC	UG_KG		1.8	U	85	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		1.8	U	1800	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	12674-11-2	Aroclor-1016	UG_KG		35	U	400	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	11104-28-2	Aroclor-1221	UG_KG		71	U	150	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	11141-16-5	Aroclor-1232	UG_KG		35	U	150	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	53469-21-9	Aroclor-1242	UG_KG		35	U	240	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	12672-29-6	Aroclor-1248	UG_KG		35	U	240	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	11097-69-1	Aroclor-1254	UG_KG		35	U	110	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	319-85-7	beta-BHC	UG_KG		1.8	U	300	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	60-57-1	Dieldrin	UG_KG		3.5	U	33	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		3.5	U	37000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		3.5	U	37000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	72-20-8	Endrin	UG_KG		3.5	U	1800	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		3.5	U	1800	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		1.8	U	560	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	76-44-8	Heptachlor	UG_KG		1.8	U	120	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		1.8	U	59	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	72-43-5	Methoxychlor	UG_KG		18	U	31000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	PEST/PCB	8001-35-2	Toxaphene	UG_KG		180	U	480	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	92-52-4	1,1-Biphenyl	UG_KG		350	U	4700	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		350	U	4900	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		870	U	620000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		350	U	6200	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		350	U	18000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		350	U	120000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		350	U	1700	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		350	U	360	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		350	U	630000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	95-57-8	2-Chlorophenol	UG_KG		350	U	39000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		350	U	23000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	95-48-7	2-Methylphenol	UG_KG		350	U	310000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	88-74-4	2-Nitroaniline	UG_KG		870	U	61000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	88-75-5	2-Nitrophenol	UG_KG		350	U	NA	NA
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		350	U	1200	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	99-09-2	3-Nitroaniline	UG_KG		870	U	NA	NA
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		870	U	490	Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		350	U	NA	NA
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		350	U	620000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	106-47-8	4-Chloroaniline	UG_KG		350	U	2700	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		350	U	NA	NA
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	106-44-5	4-Methylphenol	UG_KG		350	U	620000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	100-01-6	4-Nitroaniline	UG_KG		870	U	25000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	100-02-7	4-Nitrophenol	UG_KG		870	U	NA	NA
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	83-32-9	Acenaphthene	UG_KG		350	U	350000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	208-96-8	Acenaphthylene	UG_KG		350	U	350000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	98-86-2	Acetophenone	UG_KG		350	U	780000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	120-12-7	Anthracene	UG_KG		350	U	1700000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	1912-24-9	Atrazine	UG_KG		350	UJ	2300	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	100-52-7	Benzaldehyde	UG_KG		350	UJ	780000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		350	U	150	Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		350	U	18000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		350	U	230	Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		350	U	280000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	105-60-2	Caprolactam	UG_KG		350	U	3100000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	86-74-8	Carbazole	UG_KG		350	U	NA	NA
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	218-01-9	Chrysene	UG_KG		350	U	15000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	132-64-9	Dibenzofuran	UG_KG		350	U	7200	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	84-66-2	Diethylphthalate	UG_KG		350	U	4900000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	131-11-3	Dimethyl phthalate	UG_KG		350	U	NA	NA
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		350	U	620000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	206-44-0	Fluoranthene	UG_KG		350	U	230000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	86-73-7	Fluorene	UG_KG		350	U	230000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	118-74-1	Hexachlorobenzene	UG_KG		350	U	330	Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		350	U	6200	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		350	U	37000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	67-72-1	Hexachloroethane	UG_KG		350	U	4300	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	78-59-1	Isophorone	UG_KG		350	U	560000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	91-20-3	Naphthalene	UG_KG		350	U	3800	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	98-95-3	Nitrobenzene	UG_KG		350	U	5100	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		350	U	76	Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		350	U	110000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	87-86-5	Pentachlorophenol	UG_KG		870	U	990	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	85-01-8	Phenanthrene	UG_KG		350	U	1700000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	108-95-2	Phenol	UG_KG		350	U	1800000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	SVOA	129-00-0	Pyrene	UG_KG		350	U	170000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		11	U	810000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		11	U	600	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		11	U	4000000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		11	U	150	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	75-34-3	1,1-Dichloroethane	UG_KG		11	U	3600	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	75-35-4	1,1-Dichloroethene	UG_KG		11	U	23000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		11	U	5800	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		11	U	5.3	Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	106-93-4	1,2-Dibromoethane	UG_KG		11	U	36	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		11	U	180000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	107-06-2	1,2-Dichloroethane	UG_KG		11	U	460	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	78-87-5	1,2-Dichloropropane	UG_KG		11	U	1000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		11	U	2600	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		11	U	2600	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	78-93-3	2-Butanone	UG_KG		11	U	2700000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	591-78-6	2-Hexanone	UG_KG		11	U	20000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		11	U	530000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	71-43-2	Benzene	UG_KG		11	U	1200	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	75-27-4	Bromodichloromethane	UG_KG		11	U	290	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	75-25-2	Bromoform	UG_KG		11	U	67000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	74-83-9	Bromomethane	UG_KG		11	U	680	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	56-23-5	Carbon tetrachloride	UG_KG		11	U	650	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	108-90-7	Chlorobenzene	UG_KG		11	U	28000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	75-00-3	Chloroethane	UG_KG		11	U	1400000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	67-66-3	Chloroform	UG_KG		11	U	320	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	74-87-3	Chloromethane	UG_KG		11	U	11000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		11	U	16000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		11	U	160000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	110-82-7	Cyclohexane	UG_KG		11	U	650000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	124-48-1	Dibromochloromethane	UG_KG		11	U	730	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		11	U	8700	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	100-41-4	Ethylbenzene	UG_KG		11	U	5800	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	98-82-8	Isopropylbenzene	UG_KG		11	U	190000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	79-20-9	Methyl acetate	UG_KG		11	U	7800000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	108-87-2	Methylcyclohexane	UG_KG		11	U	650000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	75-09-2	Methylene chloride	UG_KG		11	U	35000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		11	U	47000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	100-42-5	Styrene	UG_KG		11	U	600000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	127-18-4	Tetrachloroethene	UG_KG		11	U	8100	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	108-88-3	Toluene	UG_KG		11	U	490000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		11	U	160000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		11	U	160000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	79-01-6	Trichloroethene	UG_KG		11	U	410	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		11	U	73000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	75-01-4	Vinyl chloride	UG_KG		11	U	59	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SB08-0406	VOA	1330-20-7	Xylene, total	UG_KG		11	U	58000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	METAL	7439-97-6	Mercury	MG_KG		0.11	U	0.94	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	METAL	7440-22-4	Silver	MG_KG		1.1	U	39	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	METAL	7440-28-0	Thallium	MG_KG		0.53	U	0.078	Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	309-00-2	Aldrin	UG_KG		1.8	U	31	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	319-84-6	alpha-BHC	UG_KG		1.8	U	85	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		1.8	U	1800	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	12674-11-2	Aroclor-1016	UG_KG		35	U	400	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	11104-28-2	Aroclor-1221	UG_KG		71	U	150	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	11141-16-5	Aroclor-1232	UG_KG		35	U	150	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	53469-21-9	Aroclor-1242	UG_KG		35	U	240	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	12672-29-6	Aroclor-1248	UG_KG		35	U	240	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	11097-69-1	Aroclor-1254	UG_KG		35	U	110	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	319-85-7	beta-BHC	UG_KG		1.8	U	300	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	60-57-1	Dieldrin	UG_KG		3.5	U	33	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		3.5	U	37000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		3.5	U	37000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	72-20-8	Endrin	UG_KG		3.5	U	1800	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		3.5	U	1800	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		1.8	U	560	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	76-44-8	Heptachlor	UG_KG		1.8	U	120	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		1.8	U	59	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	72-43-5	Methoxychlor	UG_KG		18	U	31000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	PEST/PCB	8001-35-2	Toxaphene	UG_KG		180	U	480	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	92-52-4	1,1-Biphenyl	UG_KG		350	U	4700	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		350	U	4900	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		880	U	620000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		350	U	6200	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		350	U	18000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		350	U	120000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		350	U	1700	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		350	U	360	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		350	U	630000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	95-57-8	2-Chlorophenol	UG_KG		350	U	39000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		350	U	23000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	95-48-7	2-Methylphenol	UG_KG		350	U	310000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	88-74-4	2-Nitroaniline	UG_KG		880	U	61000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	88-75-5	2-Nitrophenol	UG_KG		350	U	NA	NA
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		350	U	1200	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	99-09-2	3-Nitroaniline	UG_KG		880	U	NA	NA
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		880	U	490	Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		350	U	NA	NA
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		350	U	620000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	106-47-8	4-Chloroaniline	UG_KG		350	U	2700	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		350	U	NA	NA
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	106-44-5	4-Methylphenol	UG_KG		350	U	620000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	100-01-6	4-Nitroaniline	UG_KG		880	U	25000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	100-02-7	4-Nitrophenol	UG_KG		880	U	NA	NA
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	83-32-9	Acenaphthene	UG_KG		350	U	350000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	208-96-8	Acenaphthylene	UG_KG		350	U	350000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	98-86-2	Acetophenone	UG_KG		350	U	780000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	120-12-7	Anthracene	UG_KG		350	U	1700000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	1912-24-9	Atrazine	UG_KG		350	UJ	2300	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	100-52-7	Benzaldehyde	UG_KG		350	UJ	780000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		350	U	150	Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		350	U	18000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		350	U	230	Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		350	U	280000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	105-60-2	Caprolactam	UG_KG		350	U	3100000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	86-74-8	Carbazole	UG_KG		350	U	NA	NA
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	218-01-9	Chrysene	UG_KG		350	U	15000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	132-64-9	Dibenzofuran	UG_KG		350	U	7200	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	84-66-2	Diethylphthalate	UG_KG		350	U	4900000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	131-11-3	Dimethyl phthalate	UG_KG		350	U	NA	NA
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		350	U	620000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	206-44-0	Fluoranthene	UG_KG		350	U	230000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	86-73-7	Fluorene	UG_KG		350	U	230000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	118-74-1	Hexachlorobenzene	UG_KG		350	U	330	Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		350	U	6200	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		350	U	37000	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	67-72-1	Hexachloroethane	UG_KG		350	U	4300	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	78-59-1	Isophorone	UG_KG		350	U	560000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	91-20-3	Naphthalene	UG_KG		350	U	3800	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	98-95-3	Nitrobenzene	UG_KG		350	U	5100	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		350	U	76	Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		350	U	110000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	87-86-5	Pentachlorophenol	UG_KG		880	U	990	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	85-01-8	Phenanthrene	UG_KG		350	U	1700000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	108-95-2	Phenol	UG_KG		350	U	1800000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	SVOA	129-00-0	Pyrene	UG_KG		350	U	170000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		11	U	810000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		11	U	600	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		11	U	4000000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		11	U	150	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	75-34-3	1,1-Dichloroethane	UG_KG		11	U	3600	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	75-35-4	1,1-Dichloroethene	UG_KG		11	U	23000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		11	U	5800	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		11	U	5.3	Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	106-93-4	1,2-Dibromoethane	UG_KG		11	U	36	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		11	U	180000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	107-06-2	1,2-Dichloroethane	UG_KG		11	U	460	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	78-87-5	1,2-Dichloropropane	UG_KG		11	U	1000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		11	U	2600	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		11	U	2600	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	78-93-3	2-Butanone	UG_KG		11	U	2700000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	591-78-6	2-Hexanone	UG_KG		11	U	20000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		11	U	530000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	71-43-2	Benzene	UG_KG		11	U	1200	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	75-27-4	Bromodichloromethane	UG_KG		11	U	290	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	75-25-2	Bromoform	UG_KG		11	U	67000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	74-83-9	Bromomethane	UG_KG		11	U	680	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	56-23-5	Carbon tetrachloride	UG_KG		11	U	650	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	108-90-7	Chlorobenzene	UG_KG		11	U	28000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	75-00-3	Chloroethane	UG_KG		11	U	1400000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	67-66-3	Chloroform	UG_KG		11	U	320	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	74-87-3	Chloromethane	UG_KG		11	U	11000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		11	U	16000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		11	U	160000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	110-82-7	Cyclohexane	UG_KG		11	U	650000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	124-48-1	Dibromochloromethane	UG_KG		11	U	730	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		11	U	8700	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	100-41-4	Ethylbenzene	UG_KG		11	U	5800	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	98-82-8	Isopropylbenzene	UG_KG		11	U	190000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	79-20-9	Methyl acetate	UG_KG		11	U	7800000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	108-87-2	Methylcyclohexane	UG_KG		11	U	650000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	75-09-2	Methylene chloride	UG_KG		11	U	35000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		11	U	47000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	100-42-5	Styrene	UG_KG		11	U	600000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	127-18-4	Tetrachloroethene	UG_KG		11	U	8100	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	108-88-3	Toluene	UG_KG		11	U	490000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		11	U	160000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		11	U	160000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	79-01-6	Trichloroethene	UG_KG		11	U	410	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		11	U	73000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	75-01-4	Vinyl chloride	UG_KG		11	U	59	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SB08P-0406	VOA	1330-20-7	Xylene, total	UG_KG		11	U	58000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	METAL	7439-97-6	Mercury	MG_KG		0.11	U	0.94	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	METAL	7440-22-4	Silver	MG_KG		1.1	U	39	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	METAL	7440-28-0	Thallium	MG_KG		0.54	U	0.078	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	309-00-2	Aldrin	UG_KG		1.8	U	31	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	319-84-6	alpha-BHC	UG_KG		1.8	U	85	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		1.8	U	1800	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	12674-11-2	Aroclor-1016	UG_KG		35	U	400	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	11104-28-2	Aroclor-1221	UG_KG		72	U	150	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	11141-16-5	Aroclor-1232	UG_KG		35	U	150	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	53469-21-9	Aroclor-1242	UG_KG		35	U	240	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	12672-29-6	Aroclor-1248	UG_KG		35	U	240	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	11097-69-1	Aroclor-1254	UG_KG		35	U	110	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	319-85-7	beta-BHC	UG_KG		1.8	U	300	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	60-57-1	Dieldrin	UG_KG		3.5	U	33	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		3.5	U	37000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		3.5	U	37000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	72-20-8	Endrin	UG_KG		3.5	U	1800	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		3.5	U	1800	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		1.8	U	560	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	76-44-8	Heptachlor	UG_KG		1.8	U	120	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		1.8	U	59	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	72-43-5	Methoxychlor	UG_KG		18	U	31000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	PEST/PCB	8001-35-2	Toxaphene	UG_KG		180	U	480	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	92-52-4	1,1-Biphenyl	UG_KG		350	U	4700	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		350	U	4900	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		890	U	620000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		350	U	6200	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		350	U	18000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		350	U	120000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		350	U	1700	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		350	U	360	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		350	U	630000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	95-57-8	2-Chlorophenol	UG_KG		350	U	39000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		350	U	23000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	95-48-7	2-Methylphenol	UG_KG		350	U	310000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	88-74-4	2-Nitroaniline	UG_KG		890	U	61000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	88-75-5	2-Nitrophenol	UG_KG		350	U	NA	NA
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		350	U	1200	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	99-09-2	3-Nitroaniline	UG_KG		890	U	NA	NA
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		890	U	490	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		350	U	NA	NA

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		350	U	620000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	106-47-8	4-Chloroaniline	UG_KG		350	U	2700	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		350	U	NA	NA
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	106-44-5	4-Methylphenol	UG_KG		350	U	620000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	100-01-6	4-Nitroaniline	UG_KG		890	U	25000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	100-02-7	4-Nitrophenol	UG_KG		890	U	NA	NA
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	83-32-9	Acenaphthene	UG_KG		350	U	350000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	208-96-8	Acenaphthylene	UG_KG		350	U	350000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	98-86-2	Acetophenone	UG_KG		350	U	780000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	120-12-7	Anthracene	UG_KG		350	U	1700000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	1912-24-9	Atrazine	UG_KG		350	UJ	2300	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	100-52-7	Benzaldehyde	UG_KG		350	UJ	780000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		350	U	150	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		350	U	18000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		350	U	230	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		350	U	280000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	105-60-2	Caprolactam	UG_KG		350	U	3100000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	86-74-8	Carbazole	UG_KG		350	U	NA	NA
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	218-01-9	Chrysene	UG_KG		350	U	15000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	132-64-9	Dibenzofuran	UG_KG		350	U	7200	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	84-66-2	Diethylphthalate	UG_KG		350	U	4900000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	131-11-3	Dimethyl phthalate	UG_KG		350	U	NA	NA
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		350	U	620000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	206-44-0	Fluoranthene	UG_KG		350	U	230000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	86-73-7	Fluorene	UG_KG		350	U	230000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	118-74-1	Hexachlorobenzene	UG_KG		350	U	330	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		350	U	6200	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		350	U	37000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	67-72-1	Hexachloroethane	UG_KG		350	U	4300	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	78-59-1	Isophorone	UG_KG		350	U	560000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	91-20-3	Naphthalene	UG_KG		350	U	3800	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	98-95-3	Nitrobenzene	UG_KG		350	U	5100	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		350	U	76	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		350	U	110000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	87-86-5	Pentachlorophenol	UG_KG		890	U	990	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	85-01-8	Phenanthrene	UG_KG		350	U	1700000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	108-95-2	Phenol	UG_KG		350	U	1800000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	SVOA	129-00-0	Pyrene	UG_KG		350	U	170000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		10	U	810000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		10	U	600	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		10	U	4000000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		10	U	150	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	75-34-3	1,1-Dichloroethane	UG_KG		10	U	3600	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	75-35-4	1,1-Dichloroethene	UG_KG		10	U	23000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		10	U	5800	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		10	U	5.3	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	106-93-4	1,2-Dibromoethane	UG_KG		10	U	36	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		10	U	180000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	107-06-2	1,2-Dichloroethane	UG_KG		10	U	460	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	78-87-5	1,2-Dichloropropane	UG_KG		10	U	1000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	78-93-3	2-Butanone	UG_KG		10	U	2700000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	591-78-6	2-Hexanone	UG_KG		10	U	20000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		10	U	530000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	71-43-2	Benzene	UG_KG		10	U	1200	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	75-27-4	Bromodichloromethane	UG_KG		10	U	290	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	75-25-2	Bromoform	UG_KG		10	U	67000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	74-83-9	Bromomethane	UG_KG		10	U	680	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	56-23-5	Carbon tetrachloride	UG_KG		10	U	650	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	108-90-7	Chlorobenzene	UG_KG		10	U	28000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	75-00-3	Chloroethane	UG_KG		10	U	1400000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	67-66-3	Chloroform	UG_KG		10	U	320	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	74-87-3	Chloromethane	UG_KG		10	U	11000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		10	U	16000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	110-82-7	Cyclohexane	UG_KG		10	U	650000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	124-48-1	Dibromochloromethane	UG_KG		10	U	730	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		10	U	8700	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	100-41-4	Ethylbenzene	UG_KG		10	U	5800	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	98-82-8	Isopropylbenzene	UG_KG		10	U	190000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	79-20-9	Methyl acetate	UG_KG		10	U	7800000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	108-87-2	Methylcyclohexane	UG_KG		10	U	650000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	75-09-2	Methylene chloride	UG_KG		10	U	35000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		10	U	47000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	100-42-5	Styrene	UG_KG		10	U	600000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	127-18-4	Tetrachloroethene	UG_KG		10	U	8100	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	108-88-3	Toluene	UG_KG		10	U	490000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		10	U	160000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	79-01-6	Trichloroethene	UG_KG		10	U	410	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		10	U	73000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	75-01-4	Vinyl chloride	UG_KG		10	U	59	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SB09-0406	VOA	1330-20-7	Xylene, total	UG_KG		10	U	58000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	METAL	7439-97-6	Mercury	MG_KG		0.11	U	0.94	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	METAL	7440-22-4	Silver	MG_KG		1.1	U	39	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	METAL	7440-28-0	Thallium	MG_KG		0.54	U	0.078	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	309-00-2	Aldrin	UG_KG		1.8	U	31	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	319-84-6	alpha-BHC	UG_KG		1.8	U	85	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		1.8	U	1800	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	12674-11-2	Aroclor-1016	UG_KG		36	U	400	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	11104-28-2	Aroclor-1221	UG_KG		73	U	150	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	11141-16-5	Aroclor-1232	UG_KG		36	U	150	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	53469-21-9	Aroclor-1242	UG_KG		36	U	240	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	12672-29-6	Aroclor-1248	UG_KG		36	U	240	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	11097-69-1	Aroclor-1254	UG_KG		36	U	110	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	319-85-7	beta-BHC	UG_KG		1.8	U	300	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	60-57-1	Dieldrin	UG_KG		3.6	U	33	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		3.6	U	37000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		3.6	U	37000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	72-20-8	Endrin	UG_KG		3.6	U	1800	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		3.6	U	1800	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		1.8	U	560	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	76-44-8	Heptachlor	UG_KG		1.8	U	120	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		1.8	U	59	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	72-43-5	Methoxychlor	UG_KG		18	U	31000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	PEST/PCB	8001-35-2	Toxaphene	UG_KG		180	U	480	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	92-52-4	1,1-Biphenyl	UG_KG		360	U	4700	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		360	U	4900	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		900	U	620000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		360	U	6200	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		360	U	18000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		360	U	120000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		360	U	1700	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		360	U	360	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		360	U	630000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	95-57-8	2-Chlorophenol	UG_KG		360	U	39000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		360	U	23000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	95-48-7	2-Methylphenol	UG_KG		360	U	310000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	88-74-4	2-Nitroaniline	UG_KG		900	U	61000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	88-75-5	2-Nitrophenol	UG_KG		360	U	NA	NA
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		360	U	1200	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	99-09-2	3-Nitroaniline	UG_KG		900	U	NA	NA
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		900	U	490	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		360	U	NA	NA
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		360	U	620000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	106-47-8	4-Chloroaniline	UG_KG		360	U	2700	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		360	U	NA	NA
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	106-44-5	4-Methylphenol	UG_KG		360	U	620000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	100-01-6	4-Nitroaniline	UG_KG		900	U	25000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	100-02-7	4-Nitrophenol	UG_KG		900	UJ	NA	NA
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	83-32-9	Acenaphthene	UG_KG		360	U	350000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	208-96-8	Acenaphthylene	UG_KG		360	U	350000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	98-86-2	Acetophenone	UG_KG		360	U	780000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	120-12-7	Anthracene	UG_KG		360	U	1700000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	1912-24-9	Atrazine	UG_KG		360	UJ	2300	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	100-52-7	Benzaldehyde	UG_KG		360	UJ	780000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		360	U	150	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		360	U	18000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		360	U	230	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		360	U	280000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	105-60-2	Caprolactam	UG_KG		360	U	3100000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	86-74-8	Carbazole	UG_KG		360	U	NA	NA
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	218-01-9	Chrysene	UG_KG		360	U	15000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	132-64-9	Dibenzofuran	UG_KG		360	U	7200	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	84-66-2	Diethylphthalate	UG_KG		360	U	4900000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	131-11-3	Dimethyl phthalate	UG_KG		360	U	NA	NA
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		360	U	620000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	206-44-0	Fluoranthene	UG_KG		360	U	230000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	86-73-7	Fluorene	UG_KG		360	U	230000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	118-74-1	Hexachlorobenzene	UG_KG		360	U	330	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		360	U	6200	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		360	U	37000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	67-72-1	Hexachloroethane	UG_KG		360	U	4300	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	78-59-1	Isophorone	UG_KG		360	U	560000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	91-20-3	Naphthalene	UG_KG		360	U	3800	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	98-95-3	Nitrobenzene	UG_KG		360	U	5100	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		360	U	76	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		360	U	110000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	87-86-5	Pentachlorophenol	UG_KG		900	U	990	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	85-01-8	Phenanthrene	UG_KG		360	U	1700000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	108-95-2	Phenol	UG_KG		360	U	1800000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	SVOA	129-00-0	Pyrene	UG_KG		360	U	170000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		10	U	810000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		10	U	600	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		10	U	4000000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		10	U	150	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	75-34-3	1,1-Dichloroethane	UG_KG		10	U	3600	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	75-35-4	1,1-Dichloroethene	UG_KG		10	U	23000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		10	U	5800	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		10	U	5.3	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	106-93-4	1,2-Dibromoethane	UG_KG		10	U	36	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		10	U	180000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	107-06-2	1,2-Dichloroethane	UG_KG		10	U	460	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	78-87-5	1,2-Dichloropropane	UG_KG		10	U	1000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	78-93-3	2-Butanone	UG_KG		10	U	2700000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	591-78-6	2-Hexanone	UG_KG		10	U	20000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		10	U	530000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	71-43-2	Benzene	UG_KG		10	U	1200	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	75-27-4	Bromodichloromethane	UG_KG		10	U	290	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	75-25-2	Bromoform	UG_KG		10	U	67000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	74-83-9	Bromomethane	UG_KG		10	U	680	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	56-23-5	Carbon tetrachloride	UG_KG		10	U	650	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	108-90-7	Chlorobenzene	UG_KG		10	U	28000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	75-00-3	Chloroethane	UG_KG		10	U	1400000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	67-66-3	Chloroform	UG_KG		10	U	320	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	74-87-3	Chloromethane	UG_KG		10	U	11000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		10	U	16000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	110-82-7	Cyclohexane	UG_KG		10	U	650000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	124-48-1	Dibromochloromethane	UG_KG		10	U	730	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		10	U	8700	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	100-41-4	Ethylbenzene	UG_KG		10	U	5800	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	98-82-8	Isopropylbenzene	UG_KG		10	U	190000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	79-20-9	Methyl acetate	UG_KG		10	U	7800000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	108-87-2	Methylcyclohexane	UG_KG		10	U	650000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	75-09-2	Methylene chloride	UG_KG		10	U	35000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		10	U	47000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	100-42-5	Styrene	UG_KG		10	U	600000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	127-18-4	Tetrachloroethene	UG_KG		10	U	8100	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	108-88-3	Toluene	UG_KG		10	U	490000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		10	U	160000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	79-01-6	Trichloroethene	UG_KG		10	U	410	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		10	U	73000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	75-01-4	Vinyl chloride	UG_KG		10	U	59	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SB10-0406	VOA	1330-20-7	Xylene, total	UG_KG		10	U	58000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	METAL	7439-97-6	Mercury	MG_KG		0.11	U	0.94	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	METAL	7440-22-4	Silver	MG_KG		1.1	U	39	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	METAL	7440-28-0	Thallium	MG_KG		0.56	U	0.078	Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	309-00-2	Aldrin	UG_KG		1.9	U	31	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	319-84-6	alpha-BHC	UG_KG		1.9	U	85	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		1.9	U	1800	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	12674-11-2	Aroclor-1016	UG_KG		38	U	400	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	11104-28-2	Aroclor-1221	UG_KG		76	U	150	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	11141-16-5	Aroclor-1232	UG_KG		38	U	150	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	53469-21-9	Aroclor-1242	UG_KG		38	U	240	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	12672-29-6	Aroclor-1248	UG_KG		38	U	240	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	11097-69-1	Aroclor-1254	UG_KG		38	U	110	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	319-85-7	beta-BHC	UG_KG		1.9	U	300	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	60-57-1	Dieldrin	UG_KG		3.8	U	33	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		3.8	U	37000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		3.8	U	37000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	72-20-8	Endrin	UG_KG		3.8	U	1800	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		3.8	U	1800	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		1.9	U	560	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	76-44-8	Heptachlor	UG_KG		1.9	U	120	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		1.9	U	59	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	72-43-5	Methoxychlor	UG_KG		19	U	31000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	PEST/PCB	8001-35-2	Toxaphene	UG_KG		190	U	480	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	92-52-4	1,1-Biphenyl	UG_KG		380	U	4700	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		380	U	4900	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		940	U	620000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		380	U	6200	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		380	U	18000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		380	U	120000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		380	U	1700	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		380	U	360	Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		380	U	630000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	95-57-8	2-Chlorophenol	UG_KG		380	U	39000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		380	U	23000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	95-48-7	2-Methylphenol	UG_KG		380	U	310000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	88-74-4	2-Nitroaniline	UG_KG		940	U	61000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	88-75-5	2-Nitrophenol	UG_KG		380	U	NA	NA
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		380	U	1200	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	99-09-2	3-Nitroaniline	UG_KG		940	U	NA	NA
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		940	U	490	Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		380	U	NA	NA
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		380	U	620000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	106-47-8	4-Chloroaniline	UG_KG		380	U	2700	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		380	U	NA	NA
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	106-44-5	4-Methylphenol	UG_KG		380	U	620000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	100-01-6	4-Nitroaniline	UG_KG		940	U	25000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	100-02-7	4-Nitrophenol	UG_KG		940	U	NA	NA
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	83-32-9	Acenaphthene	UG_KG		380	U	350000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	208-96-8	Acenaphthylene	UG_KG		380	U	350000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	98-86-2	Acetophenone	UG_KG		380	U	780000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	120-12-7	Anthracene	UG_KG		380	U	1700000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	1912-24-9	Atrazine	UG_KG		380	UJ	2300	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	100-52-7	Benzaldehyde	UG_KG		380	UJ	780000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		380	U	150	Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		380	U	18000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		380	U	230	Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		380	U	280000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	105-60-2	Caprolactam	UG_KG		380	U	3100000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	86-74-8	Carbazole	UG_KG		380	U	NA	NA
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	218-01-9	Chrysene	UG_KG		380	U	15000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	132-64-9	Dibenzofuran	UG_KG		380	U	7200	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	84-66-2	Diethylphthalate	UG_KG		380	U	4900000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	131-11-3	Dimethyl phthalate	UG_KG		380	U	NA	NA
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		380	U	620000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	206-44-0	Fluoranthene	UG_KG		380	U	230000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	86-73-7	Fluorene	UG_KG		380	U	230000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	118-74-1	Hexachlorobenzene	UG_KG		380	U	330	Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		380	U	6200	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		380	U	37000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	67-72-1	Hexachloroethane	UG_KG		380	U	4300	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	78-59-1	Isophorone	UG_KG		380	U	560000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	91-20-3	Naphthalene	UG_KG		380	U	3800	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	98-95-3	Nitrobenzene	UG_KG		380	U	5100	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		380	U	76	Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		380	U	110000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	87-86-5	Pentachlorophenol	UG_KG		940	U	990	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	85-01-8	Phenanthrene	UG_KG		380	U	1700000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	108-95-2	Phenol	UG_KG		380	U	1800000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	SVOA	129-00-0	Pyrene	UG_KG		380	U	170000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		10	U	810000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		10	U	600	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		10	U	4000000	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		10	U	150	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	75-34-3	1,1-Dichloroethane	UG_KG		10	U	3600	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	75-35-4	1,1-Dichloroethene	UG_KG		10	U	23000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		10	U	5800	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		10	U	5.3	Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	106-93-4	1,2-Dibromoethane	UG_KG		10	U	36	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		10	U	180000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	107-06-2	1,2-Dichloroethane	UG_KG		10	U	460	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	78-87-5	1,2-Dichloropropane	UG_KG		10	U	1000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	78-93-3	2-Butanone	UG_KG		10	U	2700000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	591-78-6	2-Hexanone	UG_KG		10	U	20000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		10	U	530000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	71-43-2	Benzene	UG_KG		10	U	1200	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	75-27-4	Bromodichloromethane	UG_KG		10	U	290	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	75-25-2	Bromoform	UG_KG		10	U	67000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	74-83-9	Bromomethane	UG_KG		10	U	680	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	56-23-5	Carbon tetrachloride	UG_KG		10	U	650	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	108-90-7	Chlorobenzene	UG_KG		10	U	28000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	75-00-3	Chloroethane	UG_KG		10	U	1400000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	67-66-3	Chloroform	UG_KG		10	U	320	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	74-87-3	Chloromethane	UG_KG		10	U	11000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		10	U	16000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	110-82-7	Cyclohexane	UG_KG		10	U	650000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	124-48-1	Dibromochloromethane	UG_KG		10	U	730	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		10	U	8700	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	100-41-4	Ethylbenzene	UG_KG		10	U	5800	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	98-82-8	Isopropylbenzene	UG_KG		10	U	190000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	79-20-9	Methyl acetate	UG_KG		10	U	7800000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	108-87-2	Methylcyclohexane	UG_KG		10	U	650000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	75-09-2	Methylene chloride	UG_KG		10	U	35000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		10	U	47000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	100-42-5	Styrene	UG_KG		10	U	600000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	127-18-4	Tetrachloroethene	UG_KG		10	U	8100	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	108-88-3	Toluene	UG_KG		10	U	490000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		10	U	160000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	79-01-6	Trichloroethene	UG_KG		10	U	410	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		10	U	73000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	75-01-4	Vinyl chloride	UG_KG		10	U	59	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SB11-0406	VOA	1330-20-7	Xylene, total	UG_KG		10	U	58000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	METAL	7439-97-6	Mercury	MG_KG		0.11	U	0.94	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	METAL	7440-22-4	Silver	MG_KG		1.1	U	39	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	METAL	7440-28-0	Thallium	MG_KG		0.54	U	0.078	Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	309-00-2	Aldrin	UG_KG		1.8	U	31	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	319-84-6	alpha-BHC	UG_KG		1.8	U	85	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		1.8	U	1800	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	12674-11-2	Aroclor-1016	UG_KG		35	U	400	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	11104-28-2	Aroclor-1221	UG_KG		72	U	150	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	11141-16-5	Aroclor-1232	UG_KG		35	U	150	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	53469-21-9	Aroclor-1242	UG_KG		35	U	240	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	12672-29-6	Aroclor-1248	UG_KG		35	U	240	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	11097-69-1	Aroclor-1254	UG_KG		35	U	110	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	319-85-7	beta-BHC	UG_KG		1.8	U	300	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	60-57-1	Dieldrin	UG_KG		3.5	U	33	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		3.5	U	37000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		3.5	U	37000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	72-20-8	Endrin	UG_KG		3.5	U	1800	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		3.5	U	1800	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		1.8	U	560	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	76-44-8	Heptachlor	UG_KG		1.8	U	120	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		1.8	U	59	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	72-43-5	Methoxychlor	UG_KG		18	U	31000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	PEST/PCB	8001-35-2	Toxaphene	UG_KG		180	U	480	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	92-52-4	1,1-Biphenyl	UG_KG		350	U	4700	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		350	U	4900	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		890	U	620000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		350	U	6200	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		350	U	18000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		350	U	120000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		350	U	1700	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		350	U	360	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		350	U	630000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	95-57-8	2-Chlorophenol	UG_KG		350	U	39000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		350	U	23000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	95-48-7	2-Methylphenol	UG_KG		350	U	310000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	88-74-4	2-Nitroaniline	UG_KG		890	U	61000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	88-75-5	2-Nitrophenol	UG_KG		350	U	NA	NA
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		350	U	1200	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	99-09-2	3-Nitroaniline	UG_KG		890	U	NA	NA
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		890	U	490	Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		350	U	NA	NA
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		350	U	620000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	106-47-8	4-Chloroaniline	UG_KG		350	U	2700	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		350	U	NA	NA
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	106-44-5	4-Methylphenol	UG_KG		350	U	620000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	100-01-6	4-Nitroaniline	UG_KG		890	U	25000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	100-02-7	4-Nitrophenol	UG_KG		890	U	NA	NA
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	83-32-9	Acenaphthene	UG_KG		350	U	350000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	208-96-8	Acenaphthylene	UG_KG		350	U	350000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	98-86-2	Acetophenone	UG_KG		350	U	780000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	120-12-7	Anthracene	UG_KG		350	U	1700000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	1912-24-9	Atrazine	UG_KG		350	UJ	2300	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	100-52-7	Benzaldehyde	UG_KG		350	UJ	780000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		350	U	150	Yes

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		350	U	18000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		350	U	230	Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		350	U	280000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	105-60-2	Caprolactam	UG_KG		350	U	3100000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	86-74-8	Carbazole	UG_KG		350	U	NA	NA
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	218-01-9	Chrysene	UG_KG		350	U	15000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	132-64-9	Dibenzofuran	UG_KG		350	U	7200	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	84-66-2	Diethylphthalate	UG_KG		350	U	4900000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	131-11-3	Dimethyl phthalate	UG_KG		350	U	NA	NA
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		350	U	620000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	206-44-0	Fluoranthene	UG_KG		350	U	230000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	86-73-7	Fluorene	UG_KG		350	U	230000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	118-74-1	Hexachlorobenzene	UG_KG		350	U	330	Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		350	U	6200	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		350	U	37000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	67-72-1	Hexachloroethane	UG_KG		350	U	4300	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	78-59-1	Isophorone	UG_KG		350	U	560000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	91-20-3	Naphthalene	UG_KG		350	U	3800	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	98-95-3	Nitrobenzene	UG_KG		350	U	5100	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		350	U	76	Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		350	U	110000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	87-86-5	Pentachlorophenol	UG_KG		890	U	990	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	85-01-8	Phenanthrene	UG_KG		350	U	1700000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	108-95-2	Phenol	UG_KG		350	U	1800000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	SVOA	129-00-0	Pyrene	UG_KG		350	U	170000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		10	U	810000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		10	U	600	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		10	U	4000000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		10	U	150	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	75-34-3	1,1-Dichloroethane	UG_KG		10	U	3600	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	75-35-4	1,1-Dichloroethene	UG_KG		10	U	23000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		10	U	5800	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		10	U	5.3	Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	106-93-4	1,2-Dibromoethane	UG_KG		10	U	36	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		10	U	180000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	107-06-2	1,2-Dichloroethane	UG_KG		10	U	460	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	78-87-5	1,2-Dichloropropane	UG_KG		10	U	1000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	78-93-3	2-Butanone	UG_KG		10	U	2700000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	591-78-6	2-Hexanone	UG_KG		10	U	20000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		10	U	530000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	71-43-2	Benzene	UG_KG		10	U	1200	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	75-27-4	Bromodichloromethane	UG_KG		10	U	290	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	75-25-2	Bromoform	UG_KG		10	U	67000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	74-83-9	Bromomethane	UG_KG		10	U	680	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	56-23-5	Carbon tetrachloride	UG_KG		10	U	650	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	108-90-7	Chlorobenzene	UG_KG		10	U	28000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	75-00-3	Chloroethane	UG_KG		10	U	1400000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	67-66-3	Chloroform	UG_KG		10	U	320	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	74-87-3	Chloromethane	UG_KG		10	U	11000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		10	U	16000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	110-82-7	Cyclohexane	UG_KG		10	U	650000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	124-48-1	Dibromochloromethane	UG_KG		10	U	730	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		10	U	8700	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	100-41-4	Ethylbenzene	UG_KG		10	U	5800	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	98-82-8	Isopropylbenzene	UG_KG		10	U	190000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	79-20-9	Methyl acetate	UG_KG		10	U	7800000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	108-87-2	Methylcyclohexane	UG_KG		10	U	650000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	75-09-2	Methylene chloride	UG_KG		10	U	35000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		10	U	47000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	100-42-5	Styrene	UG_KG		10	U	600000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	127-18-4	Tetrachloroethene	UG_KG		10	U	8100	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	108-88-3	Toluene	UG_KG		10	U	490000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		10	U	160000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	79-01-6	Trichloroethene	UG_KG		10	U	410	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		10	U	73000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	75-01-4	Vinyl chloride	UG_KG		10	U	59	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SB12-0406	VOA	1330-20-7	Xylene, total	UG_KG		10	U	58000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	METAL	7439-97-6	Mercury	MG_KG		0.12	U	0.94	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	METAL	7440-22-4	Silver	MG_KG		1.2	U	39	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	METAL	7440-28-0	Thallium	MG_KG		0.58	U	0.078	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	309-00-2	Aldrin	UG_KG		2	U	31	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	319-84-6	alpha-BHC	UG_KG		2	U	85	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		2	U	1800	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	12674-11-2	Aroclor-1016	UG_KG		38	U	400	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	11104-28-2	Aroclor-1221	UG_KG		77	U	150	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	11141-16-5	Aroclor-1232	UG_KG		38	U	150	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	53469-21-9	Aroclor-1242	UG_KG		38	U	240	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	12672-29-6	Aroclor-1248	UG_KG		38	U	240	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	11097-69-1	Aroclor-1254	UG_KG		38	U	110	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	319-85-7	beta-BHC	UG_KG		2	U	300	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	60-57-1	Dieldrin	UG_KG		3.8	U	33	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		3.8	U	37000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		3.8	U	37000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	72-20-8	Endrin	UG_KG		3.8	U	1800	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		3.8	U	1800	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		2	U	560	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	76-44-8	Heptachlor	UG_KG		2	U	120	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		2	U	59	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	72-43-5	Methoxychlor	UG_KG		20	U	31000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	PEST/PCB	8001-35-2	Toxaphene	UG_KG		200	U	480	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	92-52-4	1,1-Biphenyl	UG_KG		380	U	4700	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		380	U	4900	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		950	U	620000	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		380	U	6200	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		380	U	18000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		380	U	120000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		380	U	1700	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		380	U	360	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		380	U	630000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	95-57-8	2-Chlorophenol	UG_KG		380	U	39000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		380	U	23000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	95-48-7	2-Methylphenol	UG_KG		380	U	310000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	88-74-4	2-Nitroaniline	UG_KG		950	U	61000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	88-75-5	2-Nitrophenol	UG_KG		380	U	NA	NA
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		380	U	1200	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	99-09-2	3-Nitroaniline	UG_KG		950	U	NA	NA
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		950	U	490	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		380	U	NA	NA
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		380	U	620000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	106-47-8	4-Chloroaniline	UG_KG		380	U	2700	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		380	U	NA	NA
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	106-44-5	4-Methylphenol	UG_KG		380	U	620000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	100-01-6	4-Nitroaniline	UG_KG		950	U	25000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	100-02-7	4-Nitrophenol	UG_KG		950	UJ	NA	NA
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	83-32-9	Acenaphthene	UG_KG		380	U	350000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	208-96-8	Acenaphthylene	UG_KG		380	U	350000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	98-86-2	Acetophenone	UG_KG		380	U	780000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	120-12-7	Anthracene	UG_KG		380	U	1700000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	1912-24-9	Atrazine	UG_KG		380	UJ	2300	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	100-52-7	Benzaldehyde	UG_KG		380	UJ	780000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		380	U	150	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		380	U	18000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		380	U	230	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		380	U	280000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	105-60-2	Caprolactam	UG_KG		380	U	3100000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	86-74-8	Carbazole	UG_KG		380	U	NA	NA
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	218-01-9	Chrysene	UG_KG		380	U	15000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	132-64-9	Dibenzofuran	UG_KG		380	U	7200	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	84-66-2	Diethylphthalate	UG_KG		380	U	4900000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	131-11-3	Dimethyl phthalate	UG_KG		380	U	NA	NA
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		380	U	620000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	206-44-0	Fluoranthene	UG_KG		380	U	230000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	86-73-7	Fluorene	UG_KG		380	U	230000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	118-74-1	Hexachlorobenzene	UG_KG		380	U	330	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		380	U	6200	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		380	U	37000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	67-72-1	Hexachloroethane	UG_KG		380	U	4300	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	78-59-1	Isophorone	UG_KG		380	U	560000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	91-20-3	Naphthalene	UG_KG		380	U	3800	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	98-95-3	Nitrobenzene	UG_KG		380	U	5100	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		380	U	76	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		380	U	110000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	87-86-5	Pentachlorophenol	UG_KG		950	U	990	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	85-01-8	Phenanthrene	UG_KG		380	U	1700000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	108-95-2	Phenol	UG_KG		380	U	1800000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	SVOA	129-00-0	Pyrene	UG_KG		380	U	170000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		10	U	810000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		10	U	600	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		10	U	4000000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		10	U	150	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	75-34-3	1,1-Dichloroethane	UG_KG		10	U	3600	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	75-35-4	1,1-Dichloroethene	UG_KG		10	U	23000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		10	U	5800	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		10	U	5.3	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	106-93-4	1,2-Dibromoethane	UG_KG		10	U	36	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		10	U	180000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	107-06-2	1,2-Dichloroethane	UG_KG		10	U	460	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	78-87-5	1,2-Dichloropropane	UG_KG		10	U	1000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	78-93-3	2-Butanone	UG_KG		10	U	2700000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	591-78-6	2-Hexanone	UG_KG		10	U	20000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		10	U	530000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	71-43-2	Benzene	UG_KG		10	U	1200	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	75-27-4	Bromodichloromethane	UG_KG		10	U	290	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	75-25-2	Bromoform	UG_KG		10	U	67000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	74-83-9	Bromomethane	UG_KG		10	U	680	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	56-23-5	Carbon tetrachloride	UG_KG		10	U	650	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	108-90-7	Chlorobenzene	UG_KG		10	U	28000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	75-00-3	Chloroethane	UG_KG		10	U	1400000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	67-66-3	Chloroform	UG_KG		10	U	320	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	74-87-3	Chloromethane	UG_KG		10	U	11000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		10	U	16000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	110-82-7	Cyclohexane	UG_KG		10	U	650000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	124-48-1	Dibromochloromethane	UG_KG		10	U	730	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		10	U	8700	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	100-41-4	Ethylbenzene	UG_KG		10	U	5800	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	98-82-8	Isopropylbenzene	UG_KG		10	U	190000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	79-20-9	Methyl acetate	UG_KG		10	U	7800000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	108-87-2	Methylcyclohexane	UG_KG		10	U	650000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	75-09-2	Methylene chloride	UG_KG		10	U	35000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		10	U	47000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	100-42-5	Styrene	UG_KG		10	U	600000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	127-18-4	Tetrachloroethene	UG_KG		10	U	8100	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	108-88-3	Toluene	UG_KG		10	U	490000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		10	U	160000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	79-01-6	Trichloroethene	UG_KG		10	U	410	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		10	U	73000	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	75-01-4	Vinyl chloride	UG_KG		10	U	59	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SB13-0406	VOA	1330-20-7	Xylene, total	UG_KG		10	U	58000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	METAL	7439-97-6	Mercury	MG_KG		0.1	U	0.94	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	METAL	7440-22-4	Silver	MG_KG		1	U	39	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	METAL	7440-28-0	Thallium	MG_KG		0.52	U	0.078	Yes
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	92-52-4	1,1-Biphenyl	UG_KG		340	U	4700	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		340	U	4900	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		860	U	620000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		340	U	6200	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		340	U	18000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		340	U	120000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		340	U	1700	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		340	U	360	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		340	U	630000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	95-57-8	2-Chlorophenol	UG_KG		340	U	39000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		340	U	23000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	95-48-7	2-Methylphenol	UG_KG		340	U	310000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	88-74-4	2-Nitroaniline	UG_KG		860	UJ	61000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	88-75-5	2-Nitrophenol	UG_KG		340	U	NA	NA
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		340	U	1200	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	99-09-2	3-Nitroaniline	UG_KG		860	U	NA	NA
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		860	UJ	490	Yes
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		340	U	NA	NA
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		340	U	620000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	106-47-8	4-Chloroaniline	UG_KG		340	U	2700	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		340	U	NA	NA
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	106-44-5	4-Methylphenol	UG_KG		340	U	620000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	100-01-6	4-Nitroaniline	UG_KG		860	UJ	25000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	100-02-7	4-Nitrophenol	UG_KG		860	UJ	NA	NA
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	83-32-9	Acenaphthene	UG_KG		340	U	350000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	208-96-8	Acenaphthylene	UG_KG		340	U	350000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	98-86-2	Acetophenone	UG_KG		340	U	780000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	120-12-7	Anthracene	UG_KG		340	U	1700000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	1912-24-9	Atrazine	UG_KG		340	U	2300	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	100-52-7	Benzaldehyde	UG_KG		340	U	780000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		340	U	150	Yes
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		340	U	18000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		340	U	230	Yes
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		340	U	280000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	105-60-2	Caprolactam	UG_KG		340	U	3100000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	86-74-8	Carbazole	UG_KG		340	U	NA	NA
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	218-01-9	Chrysene	UG_KG		340	U	15000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	132-64-9	Dibenzofuran	UG_KG		340	U	7200	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	84-66-2	Diethylphthalate	UG_KG		340	U	4900000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	131-11-3	Dimethyl phthalate	UG_KG		340	U	NA	NA
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		340	U	620000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	206-44-0	Fluoranthene	UG_KG		340	U	230000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	86-73-7	Fluorene	UG_KG		340	U	230000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	118-74-1	Hexachlorobenzene	UG_KG		340	U	330	Yes
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		340	U	6200	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		340	U	37000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	67-72-1	Hexachloroethane	UG_KG		340	U	4300	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	78-59-1	Isophorone	UG_KG		340	U	560000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	91-20-3	Naphthalene	UG_KG		340	U	3800	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	98-95-3	Nitrobenzene	UG_KG		340	U	5100	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		340	U	76	Yes
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		340	U	110000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	87-86-5	Pentachlorophenol	UG_KG		860	U	990	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	85-01-8	Phenanthrene	UG_KG		340	U	1700000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	108-95-2	Phenol	UG_KG		340	U	1800000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	SVOA	129-00-0	Pyrene	UG_KG		340	U	170000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		10	U	810000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		10	U	600	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		10	U	4000000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		10	U	150	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	75-34-3	1,1-Dichloroethane	UG_KG		10	U	3600	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	75-35-4	1,1-Dichloroethene	UG_KG		10	U	23000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		10	U	5800	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		10	U	5.3	Yes
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	106-93-4	1,2-Dibromoethane	UG_KG		10	U	36	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		10	U	180000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	107-06-2	1,2-Dichloroethane	UG_KG		10	U	460	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	78-87-5	1,2-Dichloropropane	UG_KG		10	U	1000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	78-93-3	2-Butanone	UG_KG		10	U	2700000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	591-78-6	2-Hexanone	UG_KG		10	U	20000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		10	U	530000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	71-43-2	Benzene	UG_KG		10	U	1200	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	75-27-4	Bromodichloromethane	UG_KG		10	U	290	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	75-25-2	Bromoform	UG_KG		10	U	67000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	74-83-9	Bromomethane	UG_KG		10	U	680	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	56-23-5	Carbon tetrachloride	UG_KG		10	U	650	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	108-90-7	Chlorobenzene	UG_KG		10	U	28000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	75-00-3	Chloroethane	UG_KG		10	U	1400000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	67-66-3	Chloroform	UG_KG		10	U	320	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	74-87-3	Chloromethane	UG_KG		10	U	11000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		10	U	16000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	110-82-7	Cyclohexane	UG_KG		10	U	650000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	124-48-1	Dibromochloromethane	UG_KG		10	U	730	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		10	U	8700	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	100-41-4	Ethylbenzene	UG_KG		10	U	5800	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	98-82-8	Isopropylbenzene	UG_KG		10	U	190000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	79-20-9	Methyl acetate	UG_KG		10	U	7800000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	108-87-2	Methylcyclohexane	UG_KG		10	U	650000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	75-09-2	Methylene chloride	UG_KG		10	U	35000	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		10	U	47000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	100-42-5	Styrene	UG_KG		10	U	600000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	127-18-4	Tetrachloroethene	UG_KG		10	U	8100	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	108-88-3	Toluene	UG_KG		10	U	490000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		10	U	160000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	79-01-6	Trichloroethene	UG_KG		10	U	410	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		10	U	73000	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	75-01-4	Vinyl chloride	UG_KG		10	U	59	No
EPI04-SO14	SO	14-Feb-06	N	EPI04-SB14-0406	VOA	1330-20-7	Xylene, total	UG_KG		10	U	58000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	METAL	7439-97-6	Mercury	MG_KG		0.1	U	0.94	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	METAL	7440-22-4	Silver	MG_KG		1	U	39	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	METAL	7440-28-0	Thallium	MG_KG		0.52	U	0.078	Yes
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	92-52-4	1,1-Biphenyl	UG_KG		340	U	4700	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		340	U	4900	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		860	U	620000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		340	U	6200	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		340	U	18000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		340	U	120000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		340	U	1700	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		340	U	360	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		340	U	630000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	95-57-8	2-Chlorophenol	UG_KG		340	U	39000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		340	U	23000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	95-48-7	2-Methylphenol	UG_KG		340	U	310000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	88-74-4	2-Nitroaniline	UG_KG		860	UJ	61000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	88-75-5	2-Nitrophenol	UG_KG		340	U	NA	NA
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		340	U	1200	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	99-09-2	3-Nitroaniline	UG_KG		860	U	NA	NA
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		860	UJ	490	Yes
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		340	U	NA	NA
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		340	U	620000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	106-47-8	4-Chloroaniline	UG_KG		340	U	2700	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		340	U	NA	NA
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	106-44-5	4-Methylphenol	UG_KG		340	U	620000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	100-01-6	4-Nitroaniline	UG_KG		860	UJ	25000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	100-02-7	4-Nitrophenol	UG_KG		860	UJ	NA	NA
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	83-32-9	Acenaphthene	UG_KG		340	U	350000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	208-96-8	Acenaphthylene	UG_KG		340	U	350000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	98-86-2	Acetophenone	UG_KG		340	U	780000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	120-12-7	Anthracene	UG_KG		340	U	1700000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	1912-24-9	Atrazine	UG_KG		340	U	2300	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	100-52-7	Benzaldehyde	UG_KG		340	U	780000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		340	U	150	Yes
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		340	U	18000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		340	U	230	Yes
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		340	U	280000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	105-60-2	Caprolactam	UG_KG		340	U	3100000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	86-74-8	Carbazole	UG_KG		340	U	NA	NA
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	218-01-9	Chrysene	UG_KG		340	U	15000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	132-64-9	Dibenzofuran	UG_KG		340	U	7200	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	84-66-2	Diethylphthalate	UG_KG		340	U	4900000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	131-11-3	Dimethyl phthalate	UG_KG		340	U	NA	NA
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		340	U	620000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	206-44-0	Fluoranthene	UG_KG		340	U	230000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	86-73-7	Fluorene	UG_KG		340	U	230000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	118-74-1	Hexachlorobenzene	UG_KG		340	U	330	Yes
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		340	U	6200	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		340	U	37000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	67-72-1	Hexachloroethane	UG_KG		340	U	4300	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	78-59-1	Isophorone	UG_KG		340	U	560000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	91-20-3	Naphthalene	UG_KG		340	U	3800	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	98-95-3	Nitrobenzene	UG_KG		340	U	5100	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		340	U	76	Yes
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		340	U	110000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	87-86-5	Pentachlorophenol	UG_KG		860	U	990	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	85-01-8	Phenanthrene	UG_KG		340	U	1700000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	108-95-2	Phenol	UG_KG		340	U	1800000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	SVOA	129-00-0	Pyrene	UG_KG		340	U	170000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		10	U	810000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		10	U	600	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		10	U	4000000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		10	U	150	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	75-34-3	1,1-Dichloroethane	UG_KG		10	U	3600	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	75-35-4	1,1-Dichloroethene	UG_KG		10	U	23000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		10	U	5800	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		10	U	5.3	Yes
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	106-93-4	1,2-Dibromoethane	UG_KG		10	U	36	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		10	U	180000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	107-06-2	1,2-Dichloroethane	UG_KG		10	U	460	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	78-87-5	1,2-Dichloropropane	UG_KG		10	U	1000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	78-93-3	2-Butanone	UG_KG		10	U	2700000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	591-78-6	2-Hexanone	UG_KG		10	U	20000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		10	U	530000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	71-43-2	Benzene	UG_KG		10	U	1200	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	75-27-4	Bromodichloromethane	UG_KG		10	U	290	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	75-25-2	Bromoform	UG_KG		10	U	67000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	74-83-9	Bromomethane	UG_KG		10	U	680	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	56-23-5	Carbon tetrachloride	UG_KG		10	U	650	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	108-90-7	Chlorobenzene	UG_KG		10	U	28000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	75-00-3	Chloroethane	UG_KG		10	U	1400000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	67-66-3	Chloroform	UG_KG		10	U	320	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	74-87-3	Chloromethane	UG_KG		10	U	11000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		10	U	16000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		10	U	160000	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	110-82-7	Cyclohexane	UG_KG		10	U	650000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	124-48-1	Dibromochloromethane	UG_KG		10	U	730	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		10	U	8700	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	100-41-4	Ethylbenzene	UG_KG		10	U	5800	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	98-82-8	Isopropylbenzene	UG_KG		10	U	190000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	79-20-9	Methyl acetate	UG_KG		10	U	7800000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	108-87-2	Methylcyclohexane	UG_KG		10	U	650000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	75-09-2	Methylene chloride	UG_KG		10	U	35000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		10	U	47000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	100-42-5	Styrene	UG_KG		10	U	600000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	127-18-4	Tetrachloroethene	UG_KG		10	U	8100	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	108-88-3	Toluene	UG_KG		10	U	490000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		10	U	160000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	79-01-6	Trichloroethene	UG_KG		10	U	410	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		10	U	73000	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	75-01-4	Vinyl chloride	UG_KG		10	U	59	No
EPI04-SO14	SO	14-Feb-06	FD	EPI04-SB14P-0406	VOA	1330-20-7	Xylene, total	UG_KG		10	U	58000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	METAL	7439-97-6	Mercury	MG_KG		0.11	U	0.94	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	METAL	7440-22-4	Silver	MG_KG		1.1	U	39	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	METAL	7440-28-0	Thallium	MG_KG		0.54	U	0.078	Yes
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	92-52-4	1,1-Biphenyl	UG_KG		350	U	4700	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		350	U	4900	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		890	U	620000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		350	U	6200	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		350	U	18000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		350	U	120000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		350	U	1700	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		350	U	360	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		350	U	630000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	95-57-8	2-Chlorophenol	UG_KG		350	U	39000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		350	U	23000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	95-48-7	2-Methylphenol	UG_KG		350	U	310000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	88-74-4	2-Nitroaniline	UG_KG		890	UJ	61000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	88-75-5	2-Nitrophenol	UG_KG		350	U	NA	NA
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		350	U	1200	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	99-09-2	3-Nitroaniline	UG_KG		890	U	NA	NA
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		890	UJ	490	Yes
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		350	U	NA	NA
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		350	U	620000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	106-47-8	4-Chloroaniline	UG_KG		350	U	2700	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		350	U	NA	NA
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	106-44-5	4-Methylphenol	UG_KG		350	U	620000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	100-01-6	4-Nitroaniline	UG_KG		890	UJ	25000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	100-02-7	4-Nitrophenol	UG_KG		890	UJ	NA	NA
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	83-32-9	Acenaphthene	UG_KG		350	U	350000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	208-96-8	Acenaphthylene	UG_KG		350	U	350000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	98-86-2	Acetophenone	UG_KG		350	U	780000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	120-12-7	Anthracene	UG_KG		350	U	1700000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	1912-24-9	Atrazine	UG_KG		350	U	2300	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	100-52-7	Benzaldehyde	UG_KG		350	U	780000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		350	U	150	Yes
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		350	U	18000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		350	U	230	Yes
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		350	U	280000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	105-60-2	Caprolactam	UG_KG		350	U	3100000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	86-74-8	Carbazole	UG_KG		350	U	NA	NA
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	218-01-9	Chrysene	UG_KG		350	U	15000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	132-64-9	Dibenzofuran	UG_KG		350	U	7200	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	84-66-2	Diethylphthalate	UG_KG		350	U	4900000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	131-11-3	Dimethyl phthalate	UG_KG		350	U	NA	NA
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		350	U	620000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	206-44-0	Fluoranthene	UG_KG		350	U	230000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	86-73-7	Fluorene	UG_KG		350	U	230000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	118-74-1	Hexachlorobenzene	UG_KG		350	U	330	Yes
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		350	U	6200	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		350	U	37000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	67-72-1	Hexachloroethane	UG_KG		350	U	4300	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	78-59-1	Isophorone	UG_KG		350	U	560000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	91-20-3	Naphthalene	UG_KG		350	U	3800	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	98-95-3	Nitrobenzene	UG_KG		350	U	5100	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		350	U	76	Yes
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		350	U	110000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	87-86-5	Pentachlorophenol	UG_KG		890	U	990	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	85-01-8	Phenanthrene	UG_KG		350	U	1700000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	108-95-2	Phenol	UG_KG		350	U	1800000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	SVOA	129-00-0	Pyrene	UG_KG		350	U	170000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		12	U	810000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		12	U	600	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		12	U	4000000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		12	U	150	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	75-34-3	1,1-Dichloroethane	UG_KG		12	U	3600	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	75-35-4	1,1-Dichloroethene	UG_KG		12	U	23000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		12	U	5800	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		12	U	5.3	Yes
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	106-93-4	1,2-Dibromoethane	UG_KG		12	U	36	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		12	U	180000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	107-06-2	1,2-Dichloroethane	UG_KG		12	U	460	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	78-87-5	1,2-Dichloropropane	UG_KG		12	U	1000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		12	U	2600	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		12	U	2600	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	78-93-3	2-Butanone	UG_KG		12	U	2700000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	591-78-6	2-Hexanone	UG_KG		12	U	20000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		12	U	530000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	71-43-2	Benzene	UG_KG		12	U	1200	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	75-27-4	Bromodichloromethane	UG_KG		12	U	290	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	75-25-2	Bromoform	UG_KG		12	U	67000	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	74-83-9	Bromomethane	UG_KG		12	U	680	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	56-23-5	Carbon tetrachloride	UG_KG		12	U	650	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	108-90-7	Chlorobenzene	UG_KG		12	U	28000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	75-00-3	Chloroethane	UG_KG		12	U	1400000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	67-66-3	Chloroform	UG_KG		12	U	320	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	74-87-3	Chloromethane	UG_KG		12	U	11000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		12	U	16000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		12	U	160000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	110-82-7	Cyclohexane	UG_KG		12	U	650000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	124-48-1	Dibromochloromethane	UG_KG		12	U	730	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		12	U	8700	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	100-41-4	Ethylbenzene	UG_KG		12	U	5800	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	98-82-8	Isopropylbenzene	UG_KG		12	U	190000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	79-20-9	Methyl acetate	UG_KG		12	U	7800000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	108-87-2	Methylcyclohexane	UG_KG		12	U	650000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	75-09-2	Methylene chloride	UG_KG		12	U	35000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		12	U	47000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	100-42-5	Styrene	UG_KG		12	U	600000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	127-18-4	Tetrachloroethene	UG_KG		12	U	8100	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	108-88-3	Toluene	UG_KG		12	U	490000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		12	U	160000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		12	U	160000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	79-01-6	Trichloroethene	UG_KG		12	U	410	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		12	U	73000	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	75-01-4	Vinyl chloride	UG_KG		12	U	59	No
EPI04-SO15	SO	14-Feb-06	N	EPI04-SB15-0406	VOA	1330-20-7	Xylene, total	UG_KG		12	U	58000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	METAL	7439-97-6	Mercury	MG_KG		0.11	U	0.94	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	METAL	7440-22-4	Silver	MG_KG		2.2	U	39	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	METAL	7440-28-0	Thallium	MG_KG		0.56	U	0.078	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	309-00-2	Aldrin	UG_KG		1.9	U	31	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	319-84-6	alpha-BHC	UG_KG		1.9	U	85	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		1.9	U	1800	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	319-85-7	beta-BHC	UG_KG		1.9	U	300	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	60-57-1	Dieldrin	UG_KG		3.7	U	33	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		3.7	U	37000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		3.7	U	37000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	72-20-8	Endrin	UG_KG		3.7	U	1800	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		3.7	U	1800	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		1.9	U	560	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	76-44-8	Heptachlor	UG_KG		1.9	U	120	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		1.9	U	59	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	72-43-5	Methoxychlor	UG_KG		19	U	31000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	PEST/PCB	8001-35-2	Toxaphene	UG_KG		190	U	480	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	92-52-4	1,1-Biphenyl	UG_KG		370	U	4700	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		370	U	4900	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		920	U	620000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		370	U	6200	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		370	U	18000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		370	U	120000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		370	U	1700	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		370	U	360	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		370	U	630000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	95-57-8	2-Chlorophenol	UG_KG		370	U	39000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		370	U	23000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	95-48-7	2-Methylphenol	UG_KG		370	U	310000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	88-74-4	2-Nitroaniline	UG_KG		920	U	61000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	88-75-5	2-Nitrophenol	UG_KG		370	U	NA	NA
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		370	UJ	1200	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	99-09-2	3-Nitroaniline	UG_KG		920	U	NA	NA
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		920	UJ	490	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		370	U	NA	NA
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		370	U	620000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	106-47-8	4-Chloroaniline	UG_KG		370	U	2700	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		370	U	NA	NA
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	106-44-5	4-Methylphenol	UG_KG		370	U	620000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	100-01-6	4-Nitroaniline	UG_KG		920	U	25000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	100-02-7	4-Nitrophenol	UG_KG		920	U	NA	NA
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	83-32-9	Acenaphthene	UG_KG		370	U	350000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	208-96-8	Acenaphthylene	UG_KG		370	U	350000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	98-86-2	Acetophenone	UG_KG		370	U	780000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	120-12-7	Anthracene	UG_KG		370	U	1700000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	1912-24-9	Atrazine	UG_KG		370	U	2300	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	100-52-7	Benzaldehyde	UG_KG		370	U	780000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		370	UJ	150	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		370	U	18000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		370	U	230	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		370	UJ	280000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	105-60-2	Caprolactam	UG_KG		370	U	3100000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	86-74-8	Carbazole	UG_KG		370	U	NA	NA
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	218-01-9	Chrysene	UG_KG		370	UJ	15000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	132-64-9	Dibenzofuran	UG_KG		370	U	7200	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	84-66-2	Diethylphthalate	UG_KG		370	U	4900000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	131-11-3	Dimethyl phthalate	UG_KG		370	U	NA	NA
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		370	U	620000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	206-44-0	Fluoranthene	UG_KG		370	U	230000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	86-73-7	Fluorene	UG_KG		370	U	230000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	118-74-1	Hexachlorobenzene	UG_KG		370	U	330	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		370	U	6200	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		370	U	37000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	67-72-1	Hexachloroethane	UG_KG		370	U	4300	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	78-59-1	Isophorone	UG_KG		370	U	560000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	91-20-3	Naphthalene	UG_KG		370	U	3800	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	98-95-3	Nitrobenzene	UG_KG		370	U	5100	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		370	UJ	76	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		370	U	110000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	87-86-5	Pentachlorophenol	UG_KG		920	UJ	990	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	85-01-8	Phenanthrene	UG_KG		370	U	1700000	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	108-95-2	Phenol	UG_KG		370	U	1800000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	SVOA	129-00-0	Pyrene	UG_KG		370	UJ	170000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		13	U	810000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		13	U	600	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		13	U	4000000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		13	U	150	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	75-34-3	1,1-Dichloroethane	UG_KG		13	U	3600	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	75-35-4	1,1-Dichloroethene	UG_KG		13	U	23000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		13	U	5800	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		13	U	5.3	Yes
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	106-93-4	1,2-Dibromoethane	UG_KG		13	U	36	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		13	U	180000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	107-06-2	1,2-Dichloroethane	UG_KG		13	U	460	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	78-87-5	1,2-Dichloropropane	UG_KG		13	U	1000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		13	U	2600	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		13	U	2600	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	78-93-3	2-Butanone	UG_KG		13	U	2700000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	591-78-6	2-Hexanone	UG_KG		13	UJ	20000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		13	U	530000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	71-43-2	Benzene	UG_KG		13	U	1200	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	75-27-4	Bromodichloromethane	UG_KG		13	U	290	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	75-25-2	Bromoform	UG_KG		13	U	67000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	74-83-9	Bromomethane	UG_KG		13	U	680	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	56-23-5	Carbon tetrachloride	UG_KG		13	U	650	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	108-90-7	Chlorobenzene	UG_KG		13	U	28000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	75-00-3	Chloroethane	UG_KG		13	U	1400000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	67-66-3	Chloroform	UG_KG		13	U	320	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	74-87-3	Chloromethane	UG_KG		13	U	11000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		13	U	16000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		13	U	160000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	110-82-7	Cyclohexane	UG_KG		13	U	650000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	124-48-1	Dibromochloromethane	UG_KG		13	U	730	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		13	U	8700	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	100-41-4	Ethylbenzene	UG_KG		13	U	5800	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	98-82-8	Isopropylbenzene	UG_KG		13	U	190000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	79-20-9	Methyl acetate	UG_KG		13	U	7800000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	108-87-2	Methylcyclohexane	UG_KG		13	U	650000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	75-09-2	Methylene chloride	UG_KG		13	U	35000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		13	U	47000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	100-42-5	Styrene	UG_KG		13	U	600000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	127-18-4	Tetrachloroethene	UG_KG		13	U	8100	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	108-88-3	Toluene	UG_KG		13	U	490000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		13	UJ	160000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		13	U	160000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	79-01-6	Trichloroethene	UG_KG		13	U	410	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		13	U	73000	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	75-01-4	Vinyl chloride	UG_KG		13	U	59	No
EPI04-SO01	SO	26-Jan-06	N	EPI04-SS01-0001	VOA	1330-20-7	Xylene, total	UG_KG		13	U	58000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	METAL	7439-97-6	Mercury	MG_KG		0.11	U	0.94	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	METAL	7440-22-4	Silver	MG_KG		1.1	UJ	39	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	METAL	7440-28-0	Thallium	MG_KG		0.54	U	0.078	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	309-00-2	Aldrin	UG_KG		1.8	U	31	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	319-84-6	alpha-BHC	UG_KG		1.8	U	85	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		1.8	U	1800	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	319-85-7	beta-BHC	UG_KG		1.8	U	300	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	60-57-1	Dieldrin	UG_KG		3.6	U	33	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		3.6	U	37000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		3.6	U	37000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	72-20-8	Endrin	UG_KG		3.6	U	1800	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		3.6	U	1800	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		1.8	U	560	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	76-44-8	Heptachlor	UG_KG		1.8	U	120	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		1.8	U	59	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	72-43-5	Methoxychlor	UG_KG		18	U	31000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	PEST/PCB	8001-35-2	Toxaphene	UG_KG		180	U	480	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	92-52-4	1,1-Biphenyl	UG_KG		360	U	4700	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		360	U	4900	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		900	U	620000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		360	U	6200	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		360	U	18000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		360	U	120000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		360	U	1700	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		360	U	360	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		360	U	630000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	95-57-8	2-Chlorophenol	UG_KG		360	U	39000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		360	U	23000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	95-48-7	2-Methylphenol	UG_KG		360	U	310000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	88-74-4	2-Nitroaniline	UG_KG		900	U	61000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	88-75-5	2-Nitrophenol	UG_KG		360	U	NA	NA
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		360	U	1200	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	99-09-2	3-Nitroaniline	UG_KG		900	U	NA	NA
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		900	UJ	490	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		360	U	NA	NA
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		360	U	620000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	106-47-8	4-Chloroaniline	UG_KG		360	U	2700	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		360	U	NA	NA
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	106-44-5	4-Methylphenol	UG_KG		360	U	620000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	100-01-6	4-Nitroaniline	UG_KG		900	U	25000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	100-02-7	4-Nitrophenol	UG_KG		900	U	NA	NA
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	83-32-9	Acenaphthene	UG_KG		360	U	350000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	208-96-8	Acenaphthylene	UG_KG		360	U	350000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	98-86-2	Acetophenone	UG_KG		360	U	780000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	120-12-7	Anthracene	UG_KG		360	U	1700000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	1912-24-9	Atrazine	UG_KG		360	U	2300	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	100-52-7	Benzaldehyde	UG_KG		360	U	780000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		360	U	150	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		360	U	18000	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		360	U	230	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		360	U	280000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	105-60-2	Caprolactam	UG_KG		360	U	3100000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	86-74-8	Carbazole	UG_KG		360	U	NA	NA
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	218-01-9	Chrysene	UG_KG		360	U	15000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	132-64-9	Dibenzofuran	UG_KG		360	U	7200	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	84-66-2	Diethylphthalate	UG_KG		360	U	4900000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	131-11-3	Dimethyl phthalate	UG_KG		360	U	NA	NA
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		360	U	620000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	206-44-0	Fluoranthene	UG_KG		360	U	230000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	86-73-7	Fluorene	UG_KG		360	U	230000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	118-74-1	Hexachlorobenzene	UG_KG		360	U	330	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		360	U	6200	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		360	U	37000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	67-72-1	Hexachloroethane	UG_KG		360	U	4300	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	78-59-1	Isophorone	UG_KG		360	U	560000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	91-20-3	Naphthalene	UG_KG		360	U	3800	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	98-95-3	Nitrobenzene	UG_KG		360	U	5100	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		360	UJ	76	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		360	U	110000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	87-86-5	Pentachlorophenol	UG_KG		900	UJ	990	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	85-01-8	Phenanthrene	UG_KG		360	U	1700000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	108-95-2	Phenol	UG_KG		360	U	1800000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	SVOA	129-00-0	Pyrene	UG_KG		360	U	170000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		10	U	810000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		10	U	600	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		10	U	4000000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		10	U	150	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	75-34-3	1,1-Dichloroethane	UG_KG		10	U	3600	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	75-35-4	1,1-Dichloroethene	UG_KG		10	U	23000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		10	U	5800	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		10	U	5.3	Yes
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	106-93-4	1,2-Dibromoethane	UG_KG		10	U	36	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		10	U	180000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	107-06-2	1,2-Dichloroethane	UG_KG		10	U	460	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	78-87-5	1,2-Dichloropropane	UG_KG		10	U	1000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	78-93-3	2-Butanone	UG_KG		10	U	2700000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	591-78-6	2-Hexanone	UG_KG		10	UJ	20000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		10	U	530000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	71-43-2	Benzene	UG_KG		10	U	1200	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	75-27-4	Bromodichloromethane	UG_KG		10	U	290	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	75-25-2	Bromoform	UG_KG		10	U	67000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	74-83-9	Bromomethane	UG_KG		10	U	680	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	56-23-5	Carbon tetrachloride	UG_KG		10	U	650	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	108-90-7	Chlorobenzene	UG_KG		10	U	28000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	75-00-3	Chloroethane	UG_KG		10	U	1400000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	67-66-3	Chloroform	UG_KG		10	U	320	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	74-87-3	Chloromethane	UG_KG		10	U	11000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		10	U	16000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	110-82-7	Cyclohexane	UG_KG		10	U	650000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	124-48-1	Dibromochloromethane	UG_KG		10	U	730	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		10	U	8700	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	100-41-4	Ethylbenzene	UG_KG		10	U	5800	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	98-82-8	Isopropylbenzene	UG_KG		10	U	190000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	79-20-9	Methyl acetate	UG_KG		10	U	7800000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	108-87-2	Methylcyclohexane	UG_KG		10	U	650000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	75-09-2	Methylene chloride	UG_KG		10	UJ	35000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		10	U	47000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	100-42-5	Styrene	UG_KG		10	U	600000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	127-18-4	Tetrachloroethene	UG_KG		10	U	8100	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	108-88-3	Toluene	UG_KG		10	U	490000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		10	U	160000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	79-01-6	Trichloroethene	UG_KG		10	U	410	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		10	U	73000	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	75-01-4	Vinyl chloride	UG_KG		10	U	59	No
EPI04-SO02	SO	26-Jan-06	N	EPI04-SS02-0001	VOA	1330-20-7	Xylene, total	UG_KG		10	U	58000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	METAL	7439-97-6	Mercury	MG_KG		0.11	U	0.94	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	METAL	7440-22-4	Silver	MG_KG		1.1	U	39	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	METAL	7440-28-0	Thallium	MG_KG		0.53	U	0.078	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	309-00-2	Aldrin	UG_KG		1.8	U	31	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	319-84-6	alpha-BHC	UG_KG		1.8	U	85	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		1.8	U	1800	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	319-85-7	beta-BHC	UG_KG		1.8	U	300	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	60-57-1	Dieldrin	UG_KG		3.5	U	33	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		3.5	U	37000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		3.5	U	37000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	72-20-8	Endrin	UG_KG		3.5	U	1800	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		3.5	U	1800	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		1.8	U	560	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	76-44-8	Heptachlor	UG_KG		1.8	U	120	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		1.8	U	59	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	72-43-5	Methoxychlor	UG_KG		18	U	31000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	PEST/PCB	8001-35-2	Toxaphene	UG_KG		180	U	480	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	92-52-4	1,1-Biphenyl	UG_KG		350	U	4700	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		350	U	4900	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		880	U	620000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		350	U	6200	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		350	U	18000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		350	U	120000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		350	U	1700	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		350	U	360	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		350	U	630000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	95-57-8	2-Chlorophenol	UG_KG		350	U	39000	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		350	U	23000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	95-48-7	2-Methylphenol	UG_KG		350	U	310000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	88-74-4	2-Nitroaniline	UG_KG		880	U	61000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	88-75-5	2-Nitrophenol	UG_KG		350	U	NA	NA
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		350	U	1200	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	99-09-2	3-Nitroaniline	UG_KG		880	U	NA	NA
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		880	UJ	490	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		350	U	NA	NA
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		350	U	620000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	106-47-8	4-Chloroaniline	UG_KG		350	U	2700	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		350	U	NA	NA
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	106-44-5	4-Methylphenol	UG_KG		350	U	620000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	100-01-6	4-Nitroaniline	UG_KG		880	U	25000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	100-02-7	4-Nitrophenol	UG_KG		880	U	NA	NA
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	83-32-9	Acenaphthene	UG_KG		350	U	350000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	208-96-8	Acenaphthylene	UG_KG		350	U	350000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	98-86-2	Acetophenone	UG_KG		350	U	780000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	120-12-7	Anthracene	UG_KG		350	U	1700000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	1912-24-9	Atrazine	UG_KG		350	U	2300	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	100-52-7	Benzaldehyde	UG_KG		350	U	780000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		350	U	150	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		350	U	18000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		350	U	230	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		350	U	280000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	105-60-2	Caprolactam	UG_KG		350	U	3100000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	86-74-8	Carbazole	UG_KG		350	U	NA	NA
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	218-01-9	Chrysene	UG_KG		350	U	15000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	132-64-9	Dibenzofuran	UG_KG		350	U	7200	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	84-66-2	Diethylphthalate	UG_KG		350	U	4900000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	131-11-3	Dimethyl phthalate	UG_KG		350	U	NA	NA
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		350	U	620000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	206-44-0	Fluoranthene	UG_KG		350	U	230000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	86-73-7	Fluorene	UG_KG		350	U	230000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	118-74-1	Hexachlorobenzene	UG_KG		350	U	330	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		350	U	6200	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		350	U	37000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	67-72-1	Hexachloroethane	UG_KG		350	U	4300	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	78-59-1	Isophorone	UG_KG		350	U	560000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	91-20-3	Naphthalene	UG_KG		350	U	3800	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	98-95-3	Nitrobenzene	UG_KG		350	U	5100	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		350	UJ	76	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		350	U	110000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	87-86-5	Pentachlorophenol	UG_KG		880	UJ	990	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	85-01-8	Phenanthrene	UG_KG		350	U	1700000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	108-95-2	Phenol	UG_KG		350	U	1800000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	SVOA	129-00-0	Pyrene	UG_KG		350	U	170000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		12	U	810000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		12	U	600	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		12	U	4000000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		12	U	150	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	75-34-3	1,1-Dichloroethane	UG_KG		12	U	3600	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	75-35-4	1,1-Dichloroethene	UG_KG		12	U	23000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		12	U	5800	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		12	U	5.3	Yes
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	106-93-4	1,2-Dibromoethane	UG_KG		12	U	36	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		12	U	180000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	107-06-2	1,2-Dichloroethane	UG_KG		12	U	460	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	78-87-5	1,2-Dichloropropane	UG_KG		12	U	1000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		12	U	2600	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		12	U	2600	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	78-93-3	2-Butanone	UG_KG		12	U	2700000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	591-78-6	2-Hexanone	UG_KG		12	U	20000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		12	U	530000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	71-43-2	Benzene	UG_KG		12	U	1200	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	75-27-4	Bromodichloromethane	UG_KG		12	U	290	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	75-25-2	Bromoform	UG_KG		12	U	67000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	74-83-9	Bromomethane	UG_KG		12	U	680	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	56-23-5	Carbon tetrachloride	UG_KG		12	U	650	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	108-90-7	Chlorobenzene	UG_KG		12	U	28000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	75-00-3	Chloroethane	UG_KG		12	U	1400000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	67-66-3	Chloroform	UG_KG		12	U	320	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	74-87-3	Chloromethane	UG_KG		12	U	11000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		12	U	16000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		12	U	160000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	110-82-7	Cyclohexane	UG_KG		12	U	650000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	124-48-1	Dibromochloromethane	UG_KG		12	U	730	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		12	U	8700	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	100-41-4	Ethylbenzene	UG_KG		12	U	5800	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	98-82-8	Isopropylbenzene	UG_KG		12	U	190000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	79-20-9	Methyl acetate	UG_KG		12	UJ	7800000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	108-87-2	Methylcyclohexane	UG_KG		12	U	650000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	75-09-2	Methylene chloride	UG_KG		12	UJ	35000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		12	U	47000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	100-42-5	Styrene	UG_KG		12	U	600000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	127-18-4	Tetrachloroethene	UG_KG		12	U	8100	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	108-88-3	Toluene	UG_KG		12	U	490000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		12	U	160000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		12	U	160000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	79-01-6	Trichloroethene	UG_KG		12	U	410	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		12	U	73000	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	75-01-4	Vinyl chloride	UG_KG		12	U	59	No
EPI04-SO03	SO	26-Jan-06	N	EPI04-SS03-0001	VOA	1330-20-7	Xylene, total	UG_KG		12	U	58000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	METAL	7439-97-6	Mercury	MG_KG		0.11	U	0.94	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	METAL	7440-22-4	Silver	MG_KG		1.1	U	39	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	METAL	7440-28-0	Thallium	MG_KG		0.53	U	0.078	Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	309-00-2	Aldrin	UG_KG		1.8	U	31	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	319-84-6	alpha-BHC	UG_KG		1.8	U	85	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		1.8	U	1800	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	12674-11-2	Aroclor-1016	UG_KG		35	U	400	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	11104-28-2	Aroclor-1221	UG_KG		71	U	150	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	11141-16-5	Aroclor-1232	UG_KG		35	U	150	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	53469-21-9	Aroclor-1242	UG_KG		35	U	240	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	12672-29-6	Aroclor-1248	UG_KG		35	U	240	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	11097-69-1	Aroclor-1254	UG_KG		35	U	110	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	319-85-7	beta-BHC	UG_KG		1.8	U	300	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	60-57-1	Dieldrin	UG_KG		3.5	U	33	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		3.5	U	37000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		3.5	U	37000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	72-20-8	Endrin	UG_KG		3.5	U	1800	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		3.5	U	1800	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		1.8	U	560	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	76-44-8	Heptachlor	UG_KG		1.8	U	120	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		1.8	U	59	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	72-43-5	Methoxychlor	UG_KG		18	U	31000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	PEST/PCB	8001-35-2	Toxaphene	UG_KG		180	U	480	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	92-52-4	1,1-Biphenyl	UG_KG		350	U	4700	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		350	U	4900	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		880	U	620000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		350	U	6200	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		350	U	18000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		350	U	120000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		350	U	1700	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		350	U	360	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		350	U	630000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	95-57-8	2-Chlorophenol	UG_KG		350	U	39000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		350	U	23000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	95-48-7	2-Methylphenol	UG_KG		350	U	310000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	88-74-4	2-Nitroaniline	UG_KG		880	U	61000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	88-75-5	2-Nitrophenol	UG_KG		350	U	NA	NA
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		350	U	1200	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	99-09-2	3-Nitroaniline	UG_KG		880	U	NA	NA
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		880	UJ	490	Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		350	U	NA	NA
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		350	U	620000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	106-47-8	4-Chloroaniline	UG_KG		350	U	2700	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		350	U	NA	NA
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	106-44-5	4-Methylphenol	UG_KG		350	U	620000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	100-01-6	4-Nitroaniline	UG_KG		880	U	25000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	100-02-7	4-Nitrophenol	UG_KG		880	U	NA	NA
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	83-32-9	Acenaphthene	UG_KG		350	U	350000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	208-96-8	Acenaphthylene	UG_KG		350	U	350000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	98-86-2	Acetophenone	UG_KG		350	U	780000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	120-12-7	Anthracene	UG_KG		350	U	1700000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	1912-24-9	Atrazine	UG_KG		350	U	2300	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	100-52-7	Benzaldehyde	UG_KG		350	U	780000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		350	U	150	Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		350	U	18000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		350	U	230	Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		350	U	280000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	105-60-2	Caprolactam	UG_KG		350	U	3100000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	86-74-8	Carbazole	UG_KG		350	U	NA	NA
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	218-01-9	Chrysene	UG_KG		350	U	15000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	132-64-9	Dibenzofuran	UG_KG		350	U	7200	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	84-66-2	Diethylphthalate	UG_KG		350	U	4900000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	131-11-3	Dimethyl phthalate	UG_KG		350	U	NA	NA
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		350	U	620000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	206-44-0	Fluoranthene	UG_KG		350	U	230000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	86-73-7	Fluorene	UG_KG		350	U	230000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	118-74-1	Hexachlorobenzene	UG_KG		350	U	330	Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		350	U	6200	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		350	U	37000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	67-72-1	Hexachloroethane	UG_KG		350	U	4300	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	78-59-1	Isophorone	UG_KG		350	U	560000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	91-20-3	Naphthalene	UG_KG		350	U	3800	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	98-95-3	Nitrobenzene	UG_KG		350	U	5100	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		350	U	76	Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		350	U	110000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	87-86-5	Pentachlorophenol	UG_KG		880	U	990	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	85-01-8	Phenanthrene	UG_KG		350	U	1700000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	108-95-2	Phenol	UG_KG		350	U	1800000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	SVOA	129-00-0	Pyrene	UG_KG		350	U	170000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		12	U	810000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		12	U	600	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		12	U	4000000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		12	U	150	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	75-34-3	1,1-Dichloroethane	UG_KG		12	U	3600	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	75-35-4	1,1-Dichloroethene	UG_KG		12	U	23000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		12	U	5800	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		12	U	5.3	Yes
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	106-93-4	1,2-Dibromoethane	UG_KG		12	U	36	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		12	U	180000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	107-06-2	1,2-Dichloroethane	UG_KG		12	U	460	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	78-87-5	1,2-Dichloropropane	UG_KG		12	U	1000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		12	U	2600	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		12	U	2600	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	78-93-3	2-Butanone	UG_KG		12	U	2700000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	591-78-6	2-Hexanone	UG_KG		12	U	20000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		12	U	530000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	71-43-2	Benzene	UG_KG		12	U	1200	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	75-27-4	Bromodichloromethane	UG_KG		12	U	290	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	75-25-2	Bromoform	UG_KG		12	U	67000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	74-83-9	Bromomethane	UG_KG		12	U	680	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	56-23-5	Carbon tetrachloride	UG_KG		12	U	650	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	108-90-7	Chlorobenzene	UG_KG		12	U	28000	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	75-00-3	Chloroethane	UG_KG		12	U	1400000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	67-66-3	Chloroform	UG_KG		12	U	320	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	74-87-3	Chloromethane	UG_KG		12	U	11000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		12	U	16000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		12	U	160000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	110-82-7	Cyclohexane	UG_KG		12	U	650000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	124-48-1	Dibromochloromethane	UG_KG		12	U	730	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		12	U	8700	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	100-41-4	Ethylbenzene	UG_KG		12	U	5800	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	98-82-8	Isopropylbenzene	UG_KG		12	U	190000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	79-20-9	Methyl acetate	UG_KG		12	UJ	7800000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	108-87-2	Methylcyclohexane	UG_KG		12	U	650000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	75-09-2	Methylene chloride	UG_KG		12	UJ	35000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		12	U	47000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	100-42-5	Styrene	UG_KG		12	U	600000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	127-18-4	Tetrachloroethene	UG_KG		12	U	8100	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	108-88-3	Toluene	UG_KG		12	U	490000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		12	U	160000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		12	U	160000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	79-01-6	Trichloroethene	UG_KG		12	U	410	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		12	U	73000	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	75-01-4	Vinyl chloride	UG_KG		12	U	59	No
EPI04-SO04	SO	26-Jan-06	N	EPI04-SS04-0001	VOA	1330-20-7	Xylene, total	UG_KG		12	U	58000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	METAL	7439-97-6	Mercury	MG_KG		0.11	U	0.94	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	METAL	7440-22-4	Silver	MG_KG		1.1	U	39	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	METAL	7440-28-0	Thallium	MG_KG		0.53	U	0.078	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	309-00-2	Aldrin	UG_KG		1.8	U	31	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	319-84-6	alpha-BHC	UG_KG		1.8	U	85	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		1.8	U	1800	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	319-85-7	beta-BHC	UG_KG		1.8	U	300	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	60-57-1	Dieldrin	UG_KG		3.5	U	33	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		3.5	U	37000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		3.5	U	37000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	72-20-8	Endrin	UG_KG		3.5	U	1800	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		3.5	U	1800	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		1.8	U	560	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	76-44-8	Heptachlor	UG_KG		1.8	U	120	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		1.8	U	59	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	72-43-5	Methoxychlor	UG_KG		18	U	31000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	PEST/PCB	8001-35-2	Toxaphene	UG_KG		180	U	480	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	92-52-4	1,1-Biphenyl	UG_KG		350	U	4700	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		350	U	4900	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		880	U	620000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		350	U	6200	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		350	U	18000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		350	U	120000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		350	U	1700	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		350	U	360	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		350	U	630000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	95-57-8	2-Chlorophenol	UG_KG		350	U	39000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		350	U	23000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	95-48-7	2-Methylphenol	UG_KG		350	U	310000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	88-74-4	2-Nitroaniline	UG_KG		880	U	61000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	88-75-5	2-Nitrophenol	UG_KG		350	U	NA	NA
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		350	U	1200	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	99-09-2	3-Nitroaniline	UG_KG		880	U	NA	NA
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		880	UJ	490	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		350	U	NA	NA
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		350	U	620000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	106-47-8	4-Chloroaniline	UG_KG		350	U	2700	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		350	U	NA	NA
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	106-44-5	4-Methylphenol	UG_KG		350	UJ	620000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	100-01-6	4-Nitroaniline	UG_KG		880	U	25000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	100-02-7	4-Nitrophenol	UG_KG		880	U	NA	NA
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	83-32-9	Acenaphthene	UG_KG		350	U	350000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	208-96-8	Acenaphthylene	UG_KG		350	U	350000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	98-86-2	Acetophenone	UG_KG		350	U	780000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	120-12-7	Anthracene	UG_KG		350	U	1700000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	1912-24-9	Atrazine	UG_KG		350	U	2300	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	100-52-7	Benzaldehyde	UG_KG		350	U	780000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		350	U	150	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		350	U	18000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		350	U	230	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		350	U	280000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	105-60-2	Caprolactam	UG_KG		350	U	3100000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	86-74-8	Carbazole	UG_KG		350	U	NA	NA
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	218-01-9	Chrysene	UG_KG		350	U	15000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	132-64-9	Dibenzofuran	UG_KG		350	U	7200	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	84-66-2	Diethylphthalate	UG_KG		350	U	4900000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	131-11-3	Dimethyl phthalate	UG_KG		350	U	NA	NA
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		350	U	620000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	206-44-0	Fluoranthene	UG_KG		350	U	230000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	86-73-7	Fluorene	UG_KG		350	U	230000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	118-74-1	Hexachlorobenzene	UG_KG		350	U	330	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		350	U	6200	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		350	U	37000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	67-72-1	Hexachloroethane	UG_KG		350	U	4300	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	78-59-1	Isophorone	UG_KG		350	U	560000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	91-20-3	Naphthalene	UG_KG		350	U	3800	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	98-95-3	Nitrobenzene	UG_KG		350	U	5100	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		350	U	76	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		350	U	110000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	87-86-5	Pentachlorophenol	UG_KG		880	UJ	990	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	85-01-8	Phenanthrene	UG_KG		350	U	1700000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	108-95-2	Phenol	UG_KG		350	U	1800000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	SVOA	129-00-0	Pyrene	UG_KG		350	U	170000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		11	U	810000	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		11	U	600	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		11	U	4000000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		11	U	150	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	75-34-3	1,1-Dichloroethane	UG_KG		11	U	3600	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	75-35-4	1,1-Dichloroethene	UG_KG		11	U	23000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		11	U	5800	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		11	U	5.3	Yes
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	106-93-4	1,2-Dibromoethane	UG_KG		11	U	36	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		11	U	180000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	107-06-2	1,2-Dichloroethane	UG_KG		11	U	460	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	78-87-5	1,2-Dichloropropane	UG_KG		11	U	1000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		11	U	2600	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		11	U	2600	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	78-93-3	2-Butanone	UG_KG		11	U	2700000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	591-78-6	2-Hexanone	UG_KG		11	UJ	20000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		11	U	530000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	71-43-2	Benzene	UG_KG		11	U	1200	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	75-27-4	Bromodichloromethane	UG_KG		11	U	290	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	75-25-2	Bromoform	UG_KG		11	U	67000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	74-83-9	Bromomethane	UG_KG		11	U	680	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	56-23-5	Carbon tetrachloride	UG_KG		11	U	650	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	108-90-7	Chlorobenzene	UG_KG		11	U	28000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	75-00-3	Chloroethane	UG_KG		11	U	1400000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	67-66-3	Chloroform	UG_KG		11	U	320	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	74-87-3	Chloromethane	UG_KG		11	U	11000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		11	U	16000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		11	U	160000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	110-82-7	Cyclohexane	UG_KG		11	U	650000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	124-48-1	Dibromochloromethane	UG_KG		11	U	730	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		11	U	8700	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	100-41-4	Ethylbenzene	UG_KG		11	U	5800	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	98-82-8	Isopropylbenzene	UG_KG		11	U	190000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	79-20-9	Methyl acetate	UG_KG		11	U	7800000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	108-87-2	Methylcyclohexane	UG_KG		11	U	650000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	75-09-2	Methylene chloride	UG_KG		11	U	35000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		11	U	47000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	100-42-5	Styrene	UG_KG		11	U	600000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	127-18-4	Tetrachloroethene	UG_KG		11	U	8100	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	108-88-3	Toluene	UG_KG		11	U	490000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		11	UJ	160000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		11	U	160000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	79-01-6	Trichloroethene	UG_KG		11	U	410	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		11	U	73000	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	75-01-4	Vinyl chloride	UG_KG		11	U	59	No
EPI04-SO05	SO	26-Jan-06	N	EPI04-SS05-0001	VOA	1330-20-7	Xylene, total	UG_KG		11	U	58000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	METAL	7439-97-6	Mercury	MG_KG		0.11	U	0.94	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	METAL	7440-22-4	Silver	MG_KG		1.1	UJ	39	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	METAL	7440-28-0	Thallium	MG_KG		0.53	U	0.078	Yes
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	309-00-2	Aldrin	UG_KG		1.8	U	31	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	319-84-6	alpha-BHC	UG_KG		1.8	U	85	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		1.8	U	1800	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	319-85-7	beta-BHC	UG_KG		1.8	U	300	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	60-57-1	Dieldrin	UG_KG		3.5	U	33	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		3.5	U	37000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		3.5	U	37000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	72-20-8	Endrin	UG_KG		3.5	U	1800	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		3.5	U	1800	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		1.8	U	560	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	76-44-8	Heptachlor	UG_KG		1.8	U	120	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		1.8	U	59	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	72-43-5	Methoxychlor	UG_KG		18	U	31000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	PEST/PCB	8001-35-2	Toxaphene	UG_KG		180	U	480	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	92-52-4	1,1-Biphenyl	UG_KG		350	U	4700	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		350	U	4900	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		880	U	620000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		350	U	6200	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		350	U	18000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		350	U	120000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		350	U	1700	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		350	U	360	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		350	U	630000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	95-57-8	2-Chlorophenol	UG_KG		350	U	39000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		350	U	23000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	95-48-7	2-Methylphenol	UG_KG		350	U	310000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	88-74-4	2-Nitroaniline	UG_KG		880	U	61000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	88-75-5	2-Nitrophenol	UG_KG		350	U	NA	NA
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		350	U	1200	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	99-09-2	3-Nitroaniline	UG_KG		880	U	NA	NA
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		880	UJ	490	Yes
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		350	U	NA	NA
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		350	U	620000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	106-47-8	4-Chloroaniline	UG_KG		350	U	2700	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		350	U	NA	NA
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	106-44-5	4-Methylphenol	UG_KG		350	U	620000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	100-01-6	4-Nitroaniline	UG_KG		880	U	25000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	100-02-7	4-Nitrophenol	UG_KG		880	U	NA	NA
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	83-32-9	Acenaphthene	UG_KG		350	U	350000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	208-96-8	Acenaphthylene	UG_KG		350	U	350000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	98-86-2	Acetophenone	UG_KG		350	U	780000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	120-12-7	Anthracene	UG_KG		350	U	1700000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	1912-24-9	Atrazine	UG_KG		350	U	2300	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	100-52-7	Benzaldehyde	UG_KG		350	U	780000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		350	U	150	Yes
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		350	U	18000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		350	U	230	Yes
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		350	U	280000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	105-60-2	Caprolactam	UG_KG		350	U	3100000	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	86-74-8	Carbazole	UG_KG		350	U	NA	NA
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	218-01-9	Chrysene	UG_KG		350	U	15000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	132-64-9	Dibenzofuran	UG_KG		350	U	7200	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	84-66-2	Diethylphthalate	UG_KG		350	U	4900000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	131-11-3	Dimethyl phthalate	UG_KG		350	U	NA	NA
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		350	U	620000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	206-44-0	Fluoranthene	UG_KG		350	U	230000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	86-73-7	Fluorene	UG_KG		350	U	230000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	118-74-1	Hexachlorobenzene	UG_KG		350	U	330	Yes
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		350	U	6200	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		350	U	37000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	67-72-1	Hexachloroethane	UG_KG		350	U	4300	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	78-59-1	Isophorone	UG_KG		350	U	560000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	91-20-3	Naphthalene	UG_KG		350	U	3800	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	98-95-3	Nitrobenzene	UG_KG		350	U	5100	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		350	UJ	76	Yes
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		350	U	110000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	87-86-5	Pentachlorophenol	UG_KG		880	UJ	990	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	85-01-8	Phenanthrene	UG_KG		350	U	1700000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	108-95-2	Phenol	UG_KG		350	U	1800000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	SVOA	129-00-0	Pyrene	UG_KG		350	U	170000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		11	U	810000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		11	U	600	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		11	U	4000000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		11	U	150	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	75-34-3	1,1-Dichloroethane	UG_KG		11	U	3600	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	75-35-4	1,1-Dichloroethene	UG_KG		11	U	23000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		11	U	5800	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		11	U	5.3	Yes
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	106-93-4	1,2-Dibromoethane	UG_KG		11	U	36	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		11	U	180000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	107-06-2	1,2-Dichloroethane	UG_KG		11	U	460	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	78-87-5	1,2-Dichloropropane	UG_KG		11	U	1000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		11	U	2600	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		11	U	2600	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	78-93-3	2-Butanone	UG_KG		11	U	2700000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	591-78-6	2-Hexanone	UG_KG		11	UJ	20000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		11	U	530000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	71-43-2	Benzene	UG_KG		11	U	1200	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	75-27-4	Bromodichloromethane	UG_KG		11	U	290	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	75-25-2	Bromoform	UG_KG		11	U	67000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	74-83-9	Bromomethane	UG_KG		11	U	680	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	56-23-5	Carbon tetrachloride	UG_KG		11	U	650	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	108-90-7	Chlorobenzene	UG_KG		11	U	28000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	75-00-3	Chloroethane	UG_KG		11	U	1400000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	67-66-3	Chloroform	UG_KG		11	U	320	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	74-87-3	Chloromethane	UG_KG		11	U	11000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		11	U	16000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		11	U	160000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	110-82-7	Cyclohexane	UG_KG		11	U	650000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	124-48-1	Dibromochloromethane	UG_KG		11	U	730	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		11	U	8700	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	100-41-4	Ethylbenzene	UG_KG		11	U	5800	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	98-82-8	Isopropylbenzene	UG_KG		11	U	190000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	79-20-9	Methyl acetate	UG_KG		11	U	7800000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	108-87-2	Methylcyclohexane	UG_KG		11	U	650000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	75-09-2	Methylene chloride	UG_KG		11	U	35000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		11	U	47000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	100-42-5	Styrene	UG_KG		11	U	600000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	127-18-4	Tetrachloroethene	UG_KG		11	U	8100	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	108-88-3	Toluene	UG_KG		11	U	490000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		11	UJ	160000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		11	U	160000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	79-01-6	Trichloroethene	UG_KG		11	U	410	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		11	U	73000	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	75-01-4	Vinyl chloride	UG_KG		11	U	59	No
EPI04-SO05	SO	26-Jan-06	FD	EPI04-SS05P-0001	VOA	1330-20-7	Xylene, total	UG_KG		11	U	58000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	METAL	7439-97-6	Mercury	MG_KG		0.11	U	0.94	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	METAL	7440-22-4	Silver	MG_KG		1.1	U	39	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	METAL	7440-28-0	Thallium	MG_KG		0.55	U	0.078	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	309-00-2	Aldrin	UG_KG		3.7	U	31	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	319-84-6	alpha-BHC	UG_KG		3.7	U	85	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		3.7	U	1800	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	319-85-7	beta-BHC	UG_KG		3.7	U	300	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	60-57-1	Dieldrin	UG_KG		7.3	U	33	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		7.3	U	37000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		7.3	U	37000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	72-20-8	Endrin	UG_KG		7.3	U	1800	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		7.3	U	1800	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		3.7	U	560	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	76-44-8	Heptachlor	UG_KG		3.7	U	120	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		3.7	U	59	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	72-43-5	Methoxychlor	UG_KG		37	U	31000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	PEST/PCB	8001-35-2	Toxaphene	UG_KG		370	U	480	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	92-52-4	1,1-Biphenyl	UG_KG		360	U	4700	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		360	U	4900	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		910	U	620000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		360	U	6200	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		360	U	18000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		360	U	120000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		360	U	1700	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		360	U	360	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		360	U	630000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	95-57-8	2-Chlorophenol	UG_KG		360	U	39000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		360	U	23000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	95-48-7	2-Methylphenol	UG_KG		360	U	310000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	88-74-4	2-Nitroaniline	UG_KG		910	U	61000	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	88-75-5	2-Nitrophenol	UG_KG		360	U	NA	NA
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		360	U	1200	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	99-09-2	3-Nitroaniline	UG_KG		910	U	NA	NA
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		910	U	490	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		360	U	NA	NA
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		360	U	620000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	106-47-8	4-Chloroaniline	UG_KG		360	U	2700	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		360	U	NA	NA
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	106-44-5	4-Methylphenol	UG_KG		360	U	620000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	100-01-6	4-Nitroaniline	UG_KG		910	U	25000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	100-02-7	4-Nitrophenol	UG_KG		910	UJ	NA	NA
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	83-32-9	Acenaphthene	UG_KG		360	U	350000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	208-96-8	Acenaphthylene	UG_KG		360	U	350000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	98-86-2	Acetophenone	UG_KG		360	U	780000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	120-12-7	Anthracene	UG_KG		360	U	1700000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	1912-24-9	Atrazine	UG_KG		360	UJ	2300	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	100-52-7	Benzaldehyde	UG_KG		360	UJ	780000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		360	U	150	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		360	U	18000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		360	U	230	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		360	U	280000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	105-60-2	Caprolactam	UG_KG		360	U	3100000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	86-74-8	Carbazole	UG_KG		360	U	NA	NA
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	218-01-9	Chrysene	UG_KG		360	U	15000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	132-64-9	Dibenzofuran	UG_KG		360	U	7200	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	84-66-2	Diethylphthalate	UG_KG		360	U	4900000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	131-11-3	Dimethyl phthalate	UG_KG		360	U	NA	NA
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		360	U	620000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	206-44-0	Fluoranthene	UG_KG		360	U	230000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	86-73-7	Fluorene	UG_KG		360	U	230000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	118-74-1	Hexachlorobenzene	UG_KG		360	U	330	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		360	U	6200	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		360	U	37000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	67-72-1	Hexachloroethane	UG_KG		360	U	4300	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	78-59-1	Isophorone	UG_KG		360	U	560000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	91-20-3	Naphthalene	UG_KG		360	U	3800	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	98-95-3	Nitrobenzene	UG_KG		360	U	5100	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		360	U	76	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		360	U	110000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	87-86-5	Pentachlorophenol	UG_KG		910	U	990	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	85-01-8	Phenanthrene	UG_KG		360	U	1700000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	108-95-2	Phenol	UG_KG		360	U	1800000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	SVOA	129-00-0	Pyrene	UG_KG		360	U	170000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		10	U	810000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		10	U	600	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		10	U	4000000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		10	U	150	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	75-34-3	1,1-Dichloroethane	UG_KG		10	U	3600	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	75-35-4	1,1-Dichloroethene	UG_KG		10	U	23000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		10	U	5800	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		10	U	5.3	Yes
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	106-93-4	1,2-Dibromoethane	UG_KG		10	U	36	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		10	U	180000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	107-06-2	1,2-Dichloroethane	UG_KG		10	U	460	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	78-87-5	1,2-Dichloropropane	UG_KG		10	U	1000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	78-93-3	2-Butanone	UG_KG		10	U	2700000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	591-78-6	2-Hexanone	UG_KG		10	UJ	20000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		10	U	530000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	71-43-2	Benzene	UG_KG		10	U	1200	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	75-27-4	Bromodichloromethane	UG_KG		10	U	290	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	75-25-2	Bromoform	UG_KG		10	U	67000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	74-83-9	Bromomethane	UG_KG		10	U	680	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	56-23-5	Carbon tetrachloride	UG_KG		10	U	650	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	108-90-7	Chlorobenzene	UG_KG		10	U	28000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	75-00-3	Chloroethane	UG_KG		10	U	1400000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	67-66-3	Chloroform	UG_KG		10	U	320	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	74-87-3	Chloromethane	UG_KG		10	U	11000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		10	U	16000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	110-82-7	Cyclohexane	UG_KG		10	U	650000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	124-48-1	Dibromochloromethane	UG_KG		10	U	730	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		10	U	8700	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	100-41-4	Ethylbenzene	UG_KG		10	U	5800	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	98-82-8	Isopropylbenzene	UG_KG		10	U	190000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	79-20-9	Methyl acetate	UG_KG		10	U	7800000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	108-87-2	Methylcyclohexane	UG_KG		10	U	650000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	75-09-2	Methylene chloride	UG_KG		10	U	35000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		10	U	47000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	100-42-5	Styrene	UG_KG		10	U	600000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	127-18-4	Tetrachloroethene	UG_KG		10	U	8100	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	108-88-3	Toluene	UG_KG		10	U	490000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		10	UJ	160000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	79-01-6	Trichloroethene	UG_KG		10	U	410	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		10	U	73000	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	75-01-4	Vinyl chloride	UG_KG		10	U	59	No
EPI04-SO06	SO	26-Jan-06	N	EPI04-SS06-0001	VOA	1330-20-7	Xylene, total	UG_KG		10	U	58000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	METAL	7439-97-6	Mercury	MG_KG		0.11	U	0.94	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	METAL	7440-22-4	Silver	MG_KG		1.1	U	39	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	METAL	7440-28-0	Thallium	MG_KG		0.56	U	0.078	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	309-00-2	Aldrin	UG_KG		1.9	U	31	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	319-84-6	alpha-BHC	UG_KG		1.9	U	85	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		1.9	U	1800	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	319-85-7	beta-BHC	UG_KG		1.9	U	300	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	60-57-1	Dieldrin	UG_KG		3.7	U	33	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		3.7	U	37000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		3.7	U	37000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	72-20-8	Endrin	UG_KG		3.7	U	1800	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		3.7	U	1800	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		1.9	U	560	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	76-44-8	Heptachlor	UG_KG		1.9	U	120	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		1.9	U	59	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	72-43-5	Methoxychlor	UG_KG		19	U	31000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	PEST/PCB	8001-35-2	Toxaphene	UG_KG		190	U	480	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	92-52-4	1,1-Biphenyl	UG_KG		370	U	4700	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		370	U	4900	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		920	U	620000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		370	U	6200	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		370	U	18000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		370	U	120000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		370	U	1700	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		370	U	360	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		370	U	630000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	95-57-8	2-Chlorophenol	UG_KG		370	U	39000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		370	U	23000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	95-48-7	2-Methylphenol	UG_KG		370	U	310000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	88-74-4	2-Nitroaniline	UG_KG		920	U	61000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	88-75-5	2-Nitrophenol	UG_KG		370	U	NA	NA
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		370	U	1200	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	99-09-2	3-Nitroaniline	UG_KG		920	U	NA	NA
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		920	U	490	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		370	U	NA	NA
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		370	U	620000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	106-47-8	4-Chloroaniline	UG_KG		370	U	2700	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		370	U	NA	NA
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	106-44-5	4-Methylphenol	UG_KG		370	U	620000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	100-01-6	4-Nitroaniline	UG_KG		920	U	25000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	100-02-7	4-Nitrophenol	UG_KG		920	UJ	NA	NA
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	83-32-9	Acenaphthene	UG_KG		370	U	350000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	208-96-8	Acenaphthylene	UG_KG		370	U	350000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	98-86-2	Acetophenone	UG_KG		370	U	780000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	120-12-7	Anthracene	UG_KG		370	U	1700000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	1912-24-9	Atrazine	UG_KG		370	U	2300	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	100-52-7	Benzaldehyde	UG_KG		370	UJ	780000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		370	U	150	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		370	U	18000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		370	U	230	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		370	U	280000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	105-60-2	Caprolactam	UG_KG		370	U	3100000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	86-74-8	Carbazole	UG_KG		370	U	NA	NA
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	218-01-9	Chrysene	UG_KG		370	U	15000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	132-64-9	Dibenzofuran	UG_KG		370	U	7200	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	84-66-2	Diethylphthalate	UG_KG		370	U	4900000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	131-11-3	Dimethyl phthalate	UG_KG		370	U	NA	NA
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		370	U	620000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	206-44-0	Fluoranthene	UG_KG		370	U	230000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	86-73-7	Fluorene	UG_KG		370	U	230000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	118-74-1	Hexachlorobenzene	UG_KG		370	U	330	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		370	U	6200	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		370	U	37000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	67-72-1	Hexachloroethane	UG_KG		370	U	4300	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	78-59-1	Isophorone	UG_KG		370	U	560000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	91-20-3	Naphthalene	UG_KG		370	U	3800	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	98-95-3	Nitrobenzene	UG_KG		370	U	5100	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		370	U	76	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		370	U	110000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	87-86-5	Pentachlorophenol	UG_KG		920	U	990	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	85-01-8	Phenanthrene	UG_KG		370	U	1700000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	108-95-2	Phenol	UG_KG		370	U	1800000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	SVOA	129-00-0	Pyrene	UG_KG		370	U	170000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		10	U	810000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		10	U	600	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		10	U	4000000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		10	U	150	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	75-34-3	1,1-Dichloroethane	UG_KG		10	U	3600	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	75-35-4	1,1-Dichloroethene	UG_KG		10	U	23000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		10	U	5800	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		10	U	5.3	Yes
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	106-93-4	1,2-Dibromoethane	UG_KG		10	U	36	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		10	U	180000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	107-06-2	1,2-Dichloroethane	UG_KG		10	U	460	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	78-87-5	1,2-Dichloropropane	UG_KG		10	U	1000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	78-93-3	2-Butanone	UG_KG		10	U	2700000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	591-78-6	2-Hexanone	UG_KG		10	U	20000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		10	U	530000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	71-43-2	Benzene	UG_KG		10	U	1200	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	75-27-4	Bromodichloromethane	UG_KG		10	U	290	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	75-25-2	Bromoform	UG_KG		10	U	67000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	74-83-9	Bromomethane	UG_KG		10	U	680	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	56-23-5	Carbon tetrachloride	UG_KG		10	U	650	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	108-90-7	Chlorobenzene	UG_KG		10	U	28000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	75-00-3	Chloroethane	UG_KG		10	U	1400000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	67-66-3	Chloroform	UG_KG		10	U	320	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	74-87-3	Chloromethane	UG_KG		10	U	11000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		10	U	16000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	110-82-7	Cyclohexane	UG_KG		10	U	650000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	124-48-1	Dibromochloromethane	UG_KG		10	U	730	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		10	U	8700	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	100-41-4	Ethylbenzene	UG_KG		10	U	5800	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	98-82-8	Isopropylbenzene	UG_KG		10	U	190000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	79-20-9	Methyl acetate	UG_KG		10	U	7800000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	108-87-2	Methylcyclohexane	UG_KG		10	U	650000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	75-09-2	Methylene chloride	UG_KG		10	U	35000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		10	U	47000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	100-42-5	Styrene	UG_KG		10	U	600000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	127-18-4	Tetrachloroethene	UG_KG		10	U	8100	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	108-88-3	Toluene	UG_KG		10	U	490000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		10	U	160000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	79-01-6	Trichloroethene	UG_KG		10	U	410	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		10	U	73000	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	75-01-4	Vinyl chloride	UG_KG		10	U	59	No
EPI04-SO07	SO	25-Jan-06	N	EPI04-SS07-0001	VOA	1330-20-7	Xylene, total	UG_KG		10	U	58000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	METAL	7439-97-6	Mercury	MG_KG		0.11	U	0.94	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	METAL	7440-22-4	Silver	MG_KG		1.1	U	39	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	METAL	7440-28-0	Thallium	MG_KG		0.53	U	0.078	Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	309-00-2	Aldrin	UG_KG		1.8	U	31	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	319-84-6	alpha-BHC	UG_KG		1.8	U	85	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		1.8	U	1800	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	12674-11-2	Aroclor-1016	UG_KG		35	U	400	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	11104-28-2	Aroclor-1221	UG_KG		71	U	150	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	11141-16-5	Aroclor-1232	UG_KG		35	U	150	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	53469-21-9	Aroclor-1242	UG_KG		35	U	240	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	12672-29-6	Aroclor-1248	UG_KG		35	U	240	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	11097-69-1	Aroclor-1254	UG_KG		35	U	110	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	319-85-7	beta-BHC	UG_KG		1.8	U	300	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	60-57-1	Dieldrin	UG_KG		3.5	U	33	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		3.5	U	37000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		3.5	U	37000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	72-20-8	Endrin	UG_KG		3.5	U	1800	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		3.5	U	1800	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		1.8	U	560	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	76-44-8	Heptachlor	UG_KG		1.8	U	120	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		1.8	U	59	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	72-43-5	Methoxychlor	UG_KG		18	U	31000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	PEST/PCB	8001-35-2	Toxaphene	UG_KG		180	U	480	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	92-52-4	1,1-Biphenyl	UG_KG		350	U	4700	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		350	U	4900	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		870	U	620000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		350	U	6200	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		350	U	18000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		350	U	120000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		350	U	1700	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		350	U	360	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		350	U	630000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	95-57-8	2-Chlorophenol	UG_KG		350	U	39000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		350	U	23000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	95-48-7	2-Methylphenol	UG_KG		350	U	310000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	88-74-4	2-Nitroaniline	UG_KG		870	U	61000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	88-75-5	2-Nitrophenol	UG_KG		350	U	NA	NA
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		350	U	1200	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	99-09-2	3-Nitroaniline	UG_KG		870	U	NA	NA
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		870	U	490	Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		350	U	NA	NA
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		350	U	620000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	106-47-8	4-Chloroaniline	UG_KG		350	U	2700	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		350	U	NA	NA
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	106-44-5	4-Methylphenol	UG_KG		350	U	620000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	100-01-6	4-Nitroaniline	UG_KG		870	U	25000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	100-02-7	4-Nitrophenol	UG_KG		870	U	NA	NA
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	83-32-9	Acenaphthene	UG_KG		350	U	350000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	208-96-8	Acenaphthylene	UG_KG		350	U	350000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	98-86-2	Acetophenone	UG_KG		350	U	780000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	120-12-7	Anthracene	UG_KG		350	U	1700000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	1912-24-9	Atrazine	UG_KG		350	UJ	2300	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	100-52-7	Benzaldehyde	UG_KG		350	UJ	780000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		350	U	150	Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		350	U	18000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		350	U	230	Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		350	U	280000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	105-60-2	Caprolactam	UG_KG		350	U	3100000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	86-74-8	Carbazole	UG_KG		350	U	NA	NA
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	218-01-9	Chrysene	UG_KG		350	U	15000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	132-64-9	Dibenzofuran	UG_KG		350	U	7200	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	84-66-2	Diethylphthalate	UG_KG		350	U	4900000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	131-11-3	Dimethyl phthalate	UG_KG		350	U	NA	NA
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		350	U	620000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	206-44-0	Fluoranthene	UG_KG		350	U	230000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	86-73-7	Fluorene	UG_KG		350	U	230000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	118-74-1	Hexachlorobenzene	UG_KG		350	U	330	Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		350	U	6200	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		350	U	37000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	67-72-1	Hexachloroethane	UG_KG		350	U	4300	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	78-59-1	Isophorone	UG_KG		350	U	560000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	91-20-3	Naphthalene	UG_KG		350	U	3800	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	98-95-3	Nitrobenzene	UG_KG		350	U	5100	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		350	U	76	Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		350	U	110000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	87-86-5	Pentachlorophenol	UG_KG		870	U	990	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	85-01-8	Phenanthrene	UG_KG		350	U	1700000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	108-95-2	Phenol	UG_KG		350	U	1800000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	SVOA	129-00-0	Pyrene	UG_KG		350	U	170000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		10	U	810000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		10	U	600	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		10	U	4000000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		10	U	150	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	75-34-3	1,1-Dichloroethane	UG_KG		10	U	3600	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	75-35-4	1,1-Dichloroethene	UG_KG		10	U	23000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		10	U	5800	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		10	U	5.3	Yes
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	106-93-4	1,2-Dibromoethane	UG_KG		10	U	36	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		10	U	180000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	107-06-2	1,2-Dichloroethane	UG_KG		10	U	460	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	78-87-5	1,2-Dichloropropane	UG_KG		10	U	1000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	78-93-3	2-Butanone	UG_KG		10	U	2700000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	591-78-6	2-Hexanone	UG_KG		10	U	20000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		10	U	530000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	71-43-2	Benzene	UG_KG		10	U	1200	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	75-27-4	Bromodichloromethane	UG_KG		10	U	290	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	75-25-2	Bromoform	UG_KG		10	U	67000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	74-83-9	Bromomethane	UG_KG		10	U	680	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	56-23-5	Carbon tetrachloride	UG_KG		10	U	650	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	108-90-7	Chlorobenzene	UG_KG		10	U	28000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	75-00-3	Chloroethane	UG_KG		10	U	1400000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	67-66-3	Chloroform	UG_KG		10	U	320	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	74-87-3	Chloromethane	UG_KG		10	U	11000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		10	U	16000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	110-82-7	Cyclohexane	UG_KG		10	U	650000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	124-48-1	Dibromochloromethane	UG_KG		10	U	730	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		10	U	8700	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	100-41-4	Ethylbenzene	UG_KG		10	U	5800	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	98-82-8	Isopropylbenzene	UG_KG		10	U	190000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	79-20-9	Methyl acetate	UG_KG		10	U	7800000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	108-87-2	Methylcyclohexane	UG_KG		10	U	650000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	75-09-2	Methylene chloride	UG_KG		10	U	35000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		10	U	47000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	100-42-5	Styrene	UG_KG		10	U	600000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	127-18-4	Tetrachloroethene	UG_KG		10	U	8100	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	108-88-3	Toluene	UG_KG		10	U	490000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		10	U	160000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	79-01-6	Trichloroethene	UG_KG		10	U	410	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		10	U	73000	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	75-01-4	Vinyl chloride	UG_KG		10	U	59	No
EPI04-SO08	SO	25-Jan-06	N	EPI04-SS08-0001	VOA	1330-20-7	Xylene, total	UG_KG		10	U	58000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	METAL	7439-97-6	Mercury	MG_KG		0.11	U	0.94	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	METAL	7440-22-4	Silver	MG_KG		1.1	U	39	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	METAL	7440-28-0	Thallium	MG_KG		0.53	U	0.078	Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	309-00-2	Aldrin	UG_KG		1.8	U	31	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	319-84-6	alpha-BHC	UG_KG		1.8	U	85	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		1.8	U	1800	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	12674-11-2	Aroclor-1016	UG_KG		35	U	400	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	11104-28-2	Aroclor-1221	UG_KG		71	U	150	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	11141-16-5	Aroclor-1232	UG_KG		35	U	150	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	53469-21-9	Aroclor-1242	UG_KG		35	U	240	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	12672-29-6	Aroclor-1248	UG_KG		35	U	240	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	11097-69-1	Aroclor-1254	UG_KG		35	U	110	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	319-85-7	beta-BHC	UG_KG		1.8	U	300	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	60-57-1	Dieldrin	UG_KG		3.5	U	33	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		3.5	U	37000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		3.5	U	37000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	72-20-8	Endrin	UG_KG		3.5	U	1800	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		3.5	U	1800	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		1.8	U	560	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	76-44-8	Heptachlor	UG_KG		1.8	U	120	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		1.8	U	59	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	72-43-5	Methoxychlor	UG_KG		18	U	31000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	PEST/PCB	8001-35-2	Toxaphene	UG_KG		180	U	480	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	92-52-4	1,1-Biphenyl	UG_KG		350	U	4700	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		350	U	4900	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		880	U	620000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		350	U	6200	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		350	U	18000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		350	U	120000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		350	U	1700	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		350	U	360	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		350	U	630000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	95-57-8	2-Chlorophenol	UG_KG		350	U	39000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		350	U	23000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	95-48-7	2-Methylphenol	UG_KG		350	U	310000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	88-74-4	2-Nitroaniline	UG_KG		880	U	61000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	88-75-5	2-Nitrophenol	UG_KG		350	U	NA	NA
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		350	U	1200	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	99-09-2	3-Nitroaniline	UG_KG		880	U	NA	NA
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		880	U	490	Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		350	U	NA	NA
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		350	U	620000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	106-47-8	4-Chloroaniline	UG_KG		350	U	2700	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		350	U	NA	NA
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	106-44-5	4-Methylphenol	UG_KG		350	U	620000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	100-01-6	4-Nitroaniline	UG_KG		880	U	25000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	100-02-7	4-Nitrophenol	UG_KG		880	U	NA	NA
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	83-32-9	Acenaphthene	UG_KG		350	U	350000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	208-96-8	Acenaphthylene	UG_KG		350	U	350000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	98-86-2	Acetophenone	UG_KG		350	U	780000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	120-12-7	Anthracene	UG_KG		350	U	1700000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	1912-24-9	Atrazine	UG_KG		350	UJ	2300	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	100-52-7	Benzaldehyde	UG_KG		350	UJ	780000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		350	U	150	Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		350	U	18000	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		350	U	230	Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		350	U	280000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	105-60-2	Caprolactam	UG_KG		350	U	3100000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	86-74-8	Carbazole	UG_KG		350	U	NA	NA
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	218-01-9	Chrysene	UG_KG		350	U	15000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	132-64-9	Dibenzofuran	UG_KG		350	U	7200	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	84-66-2	Diethylphthalate	UG_KG		350	U	4900000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	131-11-3	Dimethyl phthalate	UG_KG		350	U	NA	NA
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		350	U	620000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	206-44-0	Fluoranthene	UG_KG		350	U	230000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	86-73-7	Fluorene	UG_KG		350	U	230000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	118-74-1	Hexachlorobenzene	UG_KG		350	U	330	Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		350	U	6200	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		350	U	37000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	67-72-1	Hexachloroethane	UG_KG		350	U	4300	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	78-59-1	Isophorone	UG_KG		350	U	560000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	91-20-3	Naphthalene	UG_KG		350	U	3800	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	98-95-3	Nitrobenzene	UG_KG		350	U	5100	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		350	U	76	Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		350	U	110000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	87-86-5	Pentachlorophenol	UG_KG		880	U	990	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	85-01-8	Phenanthrene	UG_KG		350	U	1700000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	108-95-2	Phenol	UG_KG		350	U	1800000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	SVOA	129-00-0	Pyrene	UG_KG		350	U	170000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		11	U	810000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		11	U	600	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		11	U	4000000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		11	U	150	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	75-34-3	1,1-Dichloroethane	UG_KG		11	U	3600	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	75-35-4	1,1-Dichloroethene	UG_KG		11	U	23000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		11	U	5800	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		11	U	5.3	Yes
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	106-93-4	1,2-Dibromoethane	UG_KG		11	U	36	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		11	U	180000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	107-06-2	1,2-Dichloroethane	UG_KG		11	U	460	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	78-87-5	1,2-Dichloropropane	UG_KG		11	U	1000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		11	U	2600	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		11	U	2600	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	78-93-3	2-Butanone	UG_KG		11	U	2700000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	591-78-6	2-Hexanone	UG_KG		11	U	20000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		11	U	530000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	71-43-2	Benzene	UG_KG		11	U	1200	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	75-27-4	Bromodichloromethane	UG_KG		11	U	290	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	75-25-2	Bromoform	UG_KG		11	U	67000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	74-83-9	Bromomethane	UG_KG		11	U	680	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	56-23-5	Carbon tetrachloride	UG_KG		11	U	650	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	108-90-7	Chlorobenzene	UG_KG		11	U	28000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	75-00-3	Chloroethane	UG_KG		11	U	1400000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	67-66-3	Chloroform	UG_KG		11	U	320	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	74-87-3	Chloromethane	UG_KG		11	U	11000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		11	U	16000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		11	U	160000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	110-82-7	Cyclohexane	UG_KG		11	U	650000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	124-48-1	Dibromochloromethane	UG_KG		11	U	730	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		11	U	8700	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	100-41-4	Ethylbenzene	UG_KG		11	U	5800	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	98-82-8	Isopropylbenzene	UG_KG		11	U	190000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	79-20-9	Methyl acetate	UG_KG		11	U	7800000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	108-87-2	Methylcyclohexane	UG_KG		11	U	650000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	75-09-2	Methylene chloride	UG_KG		11	U	35000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		11	U	47000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	100-42-5	Styrene	UG_KG		11	U	600000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	127-18-4	Tetrachloroethene	UG_KG		11	U	8100	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	108-88-3	Toluene	UG_KG		11	U	490000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		11	U	160000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		11	U	160000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	79-01-6	Trichloroethene	UG_KG		11	U	410	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		11	U	73000	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	75-01-4	Vinyl chloride	UG_KG		11	U	59	No
EPI04-SO08	SO	25-Jan-06	FD	EPI04-SS08P-0001	VOA	1330-20-7	Xylene, total	UG_KG		11	U	58000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	METAL	7439-97-6	Mercury	MG_KG		0.11	U	0.94	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	METAL	7440-22-4	Silver	MG_KG		1.1	UJ	39	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	METAL	7440-28-0	Thallium	MG_KG		0.56	U	0.078	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	309-00-2	Aldrin	UG_KG		1.9	U	31	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	319-84-6	alpha-BHC	UG_KG		1.9	U	85	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		1.9	U	1800	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	12674-11-2	Aroclor-1016	UG_KG		37	U	400	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	11104-28-2	Aroclor-1221	UG_KG		75	U	150	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	11141-16-5	Aroclor-1232	UG_KG		37	U	150	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	53469-21-9	Aroclor-1242	UG_KG		37	U	240	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	12672-29-6	Aroclor-1248	UG_KG		37	U	240	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	11097-69-1	Aroclor-1254	UG_KG		37	U	110	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	319-85-7	beta-BHC	UG_KG		1.9	U	300	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	60-57-1	Dieldrin	UG_KG		3.7	U	33	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		3.7	U	37000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		3.7	U	37000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	72-20-8	Endrin	UG_KG		3.7	U	1800	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		3.7	U	1800	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		1.9	U	560	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	76-44-8	Heptachlor	UG_KG		1.9	U	120	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		1.9	U	59	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	72-43-5	Methoxychlor	UG_KG		19	U	31000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	PEST/PCB	8001-35-2	Toxaphene	UG_KG		190	U	480	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	92-52-4	1,1-Biphenyl	UG_KG		370	U	4700	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		370	U	4900	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		930	U	620000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		370	U	6200	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		370	U	18000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		370	U	120000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		370	U	1700	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		370	U	360	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		370	U	630000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	95-57-8	2-Chlorophenol	UG_KG		370	U	39000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		370	U	23000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	95-48-7	2-Methylphenol	UG_KG		370	U	310000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	88-74-4	2-Nitroaniline	UG_KG		930	U	61000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	88-75-5	2-Nitrophenol	UG_KG		370	U	NA	NA
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		370	U	1200	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	99-09-2	3-Nitroaniline	UG_KG		930	U	NA	NA
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		930	U	490	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		370	U	NA	NA
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		370	U	620000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	106-47-8	4-Chloroaniline	UG_KG		370	U	2700	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		370	U	NA	NA
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	106-44-5	4-Methylphenol	UG_KG		370	U	620000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	100-01-6	4-Nitroaniline	UG_KG		930	U	25000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	100-02-7	4-Nitrophenol	UG_KG		930	U	NA	NA
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	83-32-9	Acenaphthene	UG_KG		370	U	350000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	208-96-8	Acenaphthylene	UG_KG		370	U	350000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	98-86-2	Acetophenone	UG_KG		370	U	780000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	120-12-7	Anthracene	UG_KG		370	U	1700000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	1912-24-9	Atrazine	UG_KG		370	UJ	2300	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	100-52-7	Benzaldehyde	UG_KG		370	UJ	780000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		370	U	150	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		370	U	18000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		370	U	230	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		370	U	280000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	105-60-2	Caprolactam	UG_KG		370	U	3100000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	86-74-8	Carbazole	UG_KG		370	U	NA	NA
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	218-01-9	Chrysene	UG_KG		370	U	15000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	132-64-9	Dibenzofuran	UG_KG		370	U	7200	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	84-66-2	Diethylphthalate	UG_KG		370	U	4900000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	131-11-3	Dimethyl phthalate	UG_KG		370	U	NA	NA
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		370	U	620000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	206-44-0	Fluoranthene	UG_KG		370	U	230000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	86-73-7	Fluorene	UG_KG		370	U	230000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	118-74-1	Hexachlorobenzene	UG_KG		370	U	330	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		370	U	6200	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		370	U	37000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	67-72-1	Hexachloroethane	UG_KG		370	U	4300	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	78-59-1	Isophorone	UG_KG		370	U	560000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	91-20-3	Naphthalene	UG_KG		370	U	3800	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	98-95-3	Nitrobenzene	UG_KG		370	U	5100	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		370	U	76	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		370	U	110000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	87-86-5	Pentachlorophenol	UG_KG		930	U	990	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	85-01-8	Phenanthrene	UG_KG		370	U	1700000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	108-95-2	Phenol	UG_KG		370	U	1800000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	SVOA	129-00-0	Pyrene	UG_KG		370	U	170000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		10	U	810000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		10	U	600	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		10	U	4000000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		10	U	150	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	75-34-3	1,1-Dichloroethane	UG_KG		10	U	3600	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	75-35-4	1,1-Dichloroethene	UG_KG		10	U	23000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		10	U	5800	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		10	U	5.3	Yes
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	106-93-4	1,2-Dibromoethane	UG_KG		10	U	36	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		10	U	180000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	107-06-2	1,2-Dichloroethane	UG_KG		10	U	460	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	78-87-5	1,2-Dichloropropane	UG_KG		10	U	1000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	78-93-3	2-Butanone	UG_KG		10	U	2700000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	591-78-6	2-Hexanone	UG_KG		10	U	20000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		10	U	530000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	71-43-2	Benzene	UG_KG		10	U	1200	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	75-27-4	Bromodichloromethane	UG_KG		10	U	290	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	75-25-2	Bromoform	UG_KG		10	U	67000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	74-83-9	Bromomethane	UG_KG		10	U	680	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	56-23-5	Carbon tetrachloride	UG_KG		10	U	650	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	108-90-7	Chlorobenzene	UG_KG		10	U	28000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	75-00-3	Chloroethane	UG_KG		10	U	1400000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	67-66-3	Chloroform	UG_KG		10	U	320	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	74-87-3	Chloromethane	UG_KG		10	U	11000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		10	U	16000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	110-82-7	Cyclohexane	UG_KG		10	U	650000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	124-48-1	Dibromochloromethane	UG_KG		10	U	730	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		10	U	8700	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	100-41-4	Ethylbenzene	UG_KG		10	U	5800	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	98-82-8	Isopropylbenzene	UG_KG		10	U	190000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	79-20-9	Methyl acetate	UG_KG		10	U	7800000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	108-87-2	Methylcyclohexane	UG_KG		10	U	650000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	75-09-2	Methylene chloride	UG_KG		10	U	35000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		10	U	47000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	100-42-5	Styrene	UG_KG		10	U	600000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	127-18-4	Tetrachloroethene	UG_KG		10	U	8100	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	108-88-3	Toluene	UG_KG		10	U	490000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		10	U	160000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	79-01-6	Trichloroethene	UG_KG		10	U	410	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		10	U	73000	No
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	75-01-4	Vinyl chloride	UG_KG		10	U	59	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO09	SO	24-Jan-06	N	EPI04-SS09-0001	VOA	1330-20-7	Xylene, total	UG_KG		10	U	58000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	METAL	7439-97-6	Mercury	MG_KG		0.11	U	0.94	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	METAL	7440-22-4	Silver	MG_KG		1.1	U	39	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	METAL	7440-28-0	Thallium	MG_KG		0.54	U	0.078	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	309-00-2	Aldrin	UG_KG		1.8	U	31	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	319-84-6	alpha-BHC	UG_KG		1.8	U	85	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		1.8	U	1800	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	12674-11-2	Aroclor-1016	UG_KG		36	U	400	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	11104-28-2	Aroclor-1221	UG_KG		73	U	150	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	11141-16-5	Aroclor-1232	UG_KG		36	U	150	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	53469-21-9	Aroclor-1242	UG_KG		36	U	240	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	12672-29-6	Aroclor-1248	UG_KG		36	U	240	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	11097-69-1	Aroclor-1254	UG_KG		36	U	110	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	319-85-7	beta-BHC	UG_KG		1.8	U	300	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	60-57-1	Dieldrin	UG_KG		3.6	U	33	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		3.6	U	37000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		3.6	U	37000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	72-20-8	Endrin	UG_KG		3.6	U	1800	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		3.6	U	1800	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		1.8	U	560	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	76-44-8	Heptachlor	UG_KG		1.8	U	120	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		1.8	U	59	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	72-43-5	Methoxychlor	UG_KG		18	U	31000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	PEST/PCB	8001-35-2	Toxaphene	UG_KG		180	U	480	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	92-52-4	1,1-Biphenyl	UG_KG		360	U	4700	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		360	U	4900	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		900	U	620000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		360	U	6200	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		360	U	18000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		360	U	120000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		360	U	1700	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		360	U	360	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		360	U	630000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	95-57-8	2-Chlorophenol	UG_KG		360	U	39000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		360	U	23000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	95-48-7	2-Methylphenol	UG_KG		360	U	310000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	88-74-4	2-Nitroaniline	UG_KG		900	U	61000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	88-75-5	2-Nitrophenol	UG_KG		360	U	NA	NA
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		360	U	1200	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	99-09-2	3-Nitroaniline	UG_KG		900	U	NA	NA
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		900	U	490	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		360	U	NA	NA
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		360	U	620000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	106-47-8	4-Chloroaniline	UG_KG		360	U	2700	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		360	U	NA	NA
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	106-44-5	4-Methylphenol	UG_KG		360	U	620000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	100-01-6	4-Nitroaniline	UG_KG		900	U	25000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	100-02-7	4-Nitrophenol	UG_KG		900	UJ	NA	NA
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	83-32-9	Acenaphthene	UG_KG		360	U	350000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	208-96-8	Acenaphthylene	UG_KG		360	U	350000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	98-86-2	Acetophenone	UG_KG		360	U	780000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	120-12-7	Anthracene	UG_KG		360	U	1700000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	1912-24-9	Atrazine	UG_KG		360	UJ	2300	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	100-52-7	Benzaldehyde	UG_KG		360	UJ	780000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		360	U	150	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		360	U	18000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		360	U	230	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		360	U	280000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	105-60-2	Caprolactam	UG_KG		360	U	3100000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	86-74-8	Carbazole	UG_KG		360	U	NA	NA
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	218-01-9	Chrysene	UG_KG		360	U	15000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	132-64-9	Dibenzofuran	UG_KG		360	U	7200	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	84-66-2	Diethylphthalate	UG_KG		360	U	4900000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	131-11-3	Dimethyl phthalate	UG_KG		360	U	NA	NA
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		360	U	620000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	206-44-0	Fluoranthene	UG_KG		360	U	230000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	86-73-7	Fluorene	UG_KG		360	U	230000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	118-74-1	Hexachlorobenzene	UG_KG		360	U	330	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		360	U	6200	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		360	U	37000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	67-72-1	Hexachloroethane	UG_KG		360	U	4300	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	78-59-1	Isophorone	UG_KG		360	U	560000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	91-20-3	Naphthalene	UG_KG		360	U	3800	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	98-95-3	Nitrobenzene	UG_KG		360	U	5100	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		360	U	76	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		360	U	110000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	87-86-5	Pentachlorophenol	UG_KG		900	U	990	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	85-01-8	Phenanthrene	UG_KG		360	U	1700000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	108-95-2	Phenol	UG_KG		360	U	1800000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	SVOA	129-00-0	Pyrene	UG_KG		360	U	170000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		10	U	810000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		10	U	600	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		10	U	4000000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		10	U	150	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	75-34-3	1,1-Dichloroethane	UG_KG		10	U	3600	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	75-35-4	1,1-Dichloroethene	UG_KG		10	U	23000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		10	U	5800	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		10	U	5.3	Yes
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	106-93-4	1,2-Dibromoethane	UG_KG		10	U	36	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		10	U	180000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	107-06-2	1,2-Dichloroethane	UG_KG		10	U	460	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	78-87-5	1,2-Dichloropropane	UG_KG		10	U	1000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	78-93-3	2-Butanone	UG_KG		10	U	2700000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	591-78-6	2-Hexanone	UG_KG		10	U	20000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		10	U	530000	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	71-43-2	Benzene	UG_KG		10	U	1200	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	75-27-4	Bromodichloromethane	UG_KG		10	U	290	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	75-25-2	Bromoform	UG_KG		10	U	67000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	74-83-9	Bromomethane	UG_KG		10	U	680	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	56-23-5	Carbon tetrachloride	UG_KG		10	U	650	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	108-90-7	Chlorobenzene	UG_KG		10	U	28000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	75-00-3	Chloroethane	UG_KG		10	U	1400000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	67-66-3	Chloroform	UG_KG		10	U	320	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	74-87-3	Chloromethane	UG_KG		10	U	11000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		10	U	16000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	110-82-7	Cyclohexane	UG_KG		10	U	650000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	124-48-1	Dibromochloromethane	UG_KG		10	U	730	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		10	U	8700	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	100-41-4	Ethylbenzene	UG_KG		10	U	5800	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	98-82-8	Isopropylbenzene	UG_KG		10	U	190000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	79-20-9	Methyl acetate	UG_KG		10	U	7800000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	108-87-2	Methylcyclohexane	UG_KG		10	U	650000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	75-09-2	Methylene chloride	UG_KG		10	U	35000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		10	U	47000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	100-42-5	Styrene	UG_KG		10	U	600000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	127-18-4	Tetrachloroethene	UG_KG		10	U	8100	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	108-88-3	Toluene	UG_KG		10	U	490000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		10	U	160000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	79-01-6	Trichloroethene	UG_KG		10	U	410	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		10	U	73000	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	75-01-4	Vinyl chloride	UG_KG		10	U	59	No
EPI04-SO10	SO	24-Jan-06	N	EPI04-SS10-0001	VOA	1330-20-7	Xylene, total	UG_KG		10	U	58000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	METAL	7439-97-6	Mercury	MG_KG		0.11	U	0.94	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	METAL	7440-22-4	Silver	MG_KG		1.1	U	39	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	METAL	7440-28-0	Thallium	MG_KG		0.55	U	0.078	Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	309-00-2	Aldrin	UG_KG		1.8	U	31	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	319-84-6	alpha-BHC	UG_KG		1.8	U	85	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		1.8	U	1800	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	12674-11-2	Aroclor-1016	UG_KG		36	U	400	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	11104-28-2	Aroclor-1221	UG_KG		73	U	150	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	11141-16-5	Aroclor-1232	UG_KG		36	U	150	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	53469-21-9	Aroclor-1242	UG_KG		36	U	240	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	12672-29-6	Aroclor-1248	UG_KG		36	U	240	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	11097-69-1	Aroclor-1254	UG_KG		36	U	110	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	319-85-7	beta-BHC	UG_KG		1.8	U	300	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	60-57-1	Dieldrin	UG_KG		3.6	U	33	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		3.6	U	37000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		3.6	U	37000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	72-20-8	Endrin	UG_KG		3.6	U	1800	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		3.6	U	1800	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		1.8	U	560	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	76-44-8	Heptachlor	UG_KG		1.8	U	120	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		1.8	U	59	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	72-43-5	Methoxychlor	UG_KG		18	U	31000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	PEST/PCB	8001-35-2	Toxaphene	UG_KG		180	U	480	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	92-52-4	1,1-Biphenyl	UG_KG		360	U	4700	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		360	U	4900	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		900	U	620000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		360	U	6200	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		360	U	18000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		360	U	120000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		360	U	1700	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		360	U	360	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		360	U	630000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	95-57-8	2-Chlorophenol	UG_KG		360	U	39000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		360	U	23000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	95-48-7	2-Methylphenol	UG_KG		360	U	310000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	88-74-4	2-Nitroaniline	UG_KG		900	U	61000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	88-75-5	2-Nitrophenol	UG_KG		360	U	NA	NA
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		360	U	1200	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	99-09-2	3-Nitroaniline	UG_KG		900	U	NA	NA
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		900	U	490	Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		360	U	NA	NA
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		360	U	620000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	106-47-8	4-Chloroaniline	UG_KG		360	U	2700	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		360	U	NA	NA
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	106-44-5	4-Methylphenol	UG_KG		360	U	620000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	100-01-6	4-Nitroaniline	UG_KG		900	U	25000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	100-02-7	4-Nitrophenol	UG_KG		900	U	NA	NA
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	83-32-9	Acenaphthene	UG_KG		360	U	350000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	208-96-8	Acenaphthylene	UG_KG		360	U	350000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	98-86-2	Acetophenone	UG_KG		360	U	780000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	120-12-7	Anthracene	UG_KG		360	U	1700000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	1912-24-9	Atrazine	UG_KG		360	UJ	2300	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	100-52-7	Benzaldehyde	UG_KG		360	UJ	780000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		360	U	150	Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		360	U	18000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		360	U	230	Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		360	U	280000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	105-60-2	Caprolactam	UG_KG		360	U	3100000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	86-74-8	Carbazole	UG_KG		360	U	NA	NA
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	218-01-9	Chrysene	UG_KG		360	U	15000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	132-64-9	Dibenzofuran	UG_KG		360	U	7200	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	84-66-2	Diethylphthalate	UG_KG		360	U	4900000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	131-11-3	Dimethyl phthalate	UG_KG		360	U	NA	NA
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		360	U	620000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	206-44-0	Fluoranthene	UG_KG		360	U	230000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	86-73-7	Fluorene	UG_KG		360	U	230000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	118-74-1	Hexachlorobenzene	UG_KG		360	U	330	Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		360	U	6200	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		360	U	37000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	67-72-1	Hexachloroethane	UG_KG		360	U	4300	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	78-59-1	Isophorone	UG_KG		360	U	560000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	91-20-3	Naphthalene	UG_KG		360	U	3800	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	98-95-3	Nitrobenzene	UG_KG		360	U	5100	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		360	U	76	Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		360	U	110000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	87-86-5	Pentachlorophenol	UG_KG		900	U	990	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	85-01-8	Phenanthrene	UG_KG		360	U	1700000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	108-95-2	Phenol	UG_KG		360	U	1800000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	SVOA	129-00-0	Pyrene	UG_KG		360	U	170000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		11	U	810000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		11	U	600	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		11	U	4000000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		11	U	150	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	75-34-3	1,1-Dichloroethane	UG_KG		11	U	3600	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	75-35-4	1,1-Dichloroethene	UG_KG		11	U	23000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		11	U	5800	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		11	U	5.3	Yes
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	106-93-4	1,2-Dibromoethane	UG_KG		11	U	36	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		11	U	180000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	107-06-2	1,2-Dichloroethane	UG_KG		11	U	460	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	78-87-5	1,2-Dichloropropane	UG_KG		11	U	1000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		11	U	2600	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		11	U	2600	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	78-93-3	2-Butanone	UG_KG		11	U	2700000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	591-78-6	2-Hexanone	UG_KG		11	U	20000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		11	U	530000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	71-43-2	Benzene	UG_KG		11	U	1200	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	75-27-4	Bromodichloromethane	UG_KG		11	U	290	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	75-25-2	Bromoform	UG_KG		11	U	67000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	74-83-9	Bromomethane	UG_KG		11	U	680	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	56-23-5	Carbon tetrachloride	UG_KG		11	U	650	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	108-90-7	Chlorobenzene	UG_KG		11	U	28000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	75-00-3	Chloroethane	UG_KG		11	U	1400000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	67-66-3	Chloroform	UG_KG		11	U	320	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	74-87-3	Chloromethane	UG_KG		11	U	11000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		11	U	16000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		11	U	160000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	110-82-7	Cyclohexane	UG_KG		11	U	650000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	124-48-1	Dibromochloromethane	UG_KG		11	U	730	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		11	U	8700	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	100-41-4	Ethylbenzene	UG_KG		11	U	5800	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	98-82-8	Isopropylbenzene	UG_KG		11	U	190000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	79-20-9	Methyl acetate	UG_KG		11	U	7800000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	108-87-2	Methylcyclohexane	UG_KG		11	U	650000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	75-09-2	Methylene chloride	UG_KG		11	U	35000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		11	U	47000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	100-42-5	Styrene	UG_KG		11	U	600000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	127-18-4	Tetrachloroethene	UG_KG		11	U	8100	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	108-88-3	Toluene	UG_KG		11	U	490000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		11	U	160000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		11	U	160000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	79-01-6	Trichloroethene	UG_KG		11	U	410	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		11	U	73000	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	75-01-4	Vinyl chloride	UG_KG		11	U	59	No
EPI04-SO11	SO	25-Jan-06	N	EPI04-SS11-0001	VOA	1330-20-7	Xylene, total	UG_KG		11	U	58000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	METAL	7439-97-6	Mercury	MG_KG		0.11	U	0.94	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	METAL	7440-22-4	Silver	MG_KG		1.1	U	39	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	METAL	7440-28-0	Thallium	MG_KG		0.55	U	0.078	Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	309-00-2	Aldrin	UG_KG		1.8	U	31	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	319-84-6	alpha-BHC	UG_KG		1.8	U	85	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		1.8	U	1800	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	12674-11-2	Aroclor-1016	UG_KG		36	U	400	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	11104-28-2	Aroclor-1221	UG_KG		73	U	150	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	11141-16-5	Aroclor-1232	UG_KG		36	U	150	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	53469-21-9	Aroclor-1242	UG_KG		36	U	240	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	12672-29-6	Aroclor-1248	UG_KG		36	U	240	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	11097-69-1	Aroclor-1254	UG_KG		36	U	110	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	319-85-7	beta-BHC	UG_KG		1.8	U	300	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	60-57-1	Dieldrin	UG_KG		3.6	U	33	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		3.6	U	37000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		3.6	U	37000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	72-20-8	Endrin	UG_KG		3.6	U	1800	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		3.6	U	1800	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		1.8	U	560	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	76-44-8	Heptachlor	UG_KG		1.8	U	120	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		1.8	U	59	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	72-43-5	Methoxychlor	UG_KG		18	U	31000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	PEST/PCB	8001-35-2	Toxaphene	UG_KG		180	U	480	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	92-52-4	1,1-Biphenyl	UG_KG		360	U	4700	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		360	U	4900	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		900	U	620000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		360	U	6200	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		360	U	18000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		360	U	120000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		360	U	1700	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		360	U	360	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		360	U	630000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	95-57-8	2-Chlorophenol	UG_KG		360	U	39000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		360	U	23000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	95-48-7	2-Methylphenol	UG_KG		360	U	310000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	88-74-4	2-Nitroaniline	UG_KG		900	U	61000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	88-75-5	2-Nitrophenol	UG_KG		360	U	NA	NA
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		360	U	1200	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	99-09-2	3-Nitroaniline	UG_KG		900	U	NA	NA
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		900	U	490	Yes

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		360	U	NA	NA
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		360	U	620000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	106-47-8	4-Chloroaniline	UG_KG		360	U	2700	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		360	U	NA	NA
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	106-44-5	4-Methylphenol	UG_KG		360	U	620000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	100-01-6	4-Nitroaniline	UG_KG		900	U	25000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	100-02-7	4-Nitrophenol	UG_KG		900	U	NA	NA
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	83-32-9	Acenaphthene	UG_KG		360	U	350000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	208-96-8	Acenaphthylene	UG_KG		360	U	350000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	98-86-2	Acetophenone	UG_KG		360	U	780000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	120-12-7	Anthracene	UG_KG		360	U	1700000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	1912-24-9	Atrazine	UG_KG		360	UJ	2300	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	100-52-7	Benzaldehyde	UG_KG		360	UJ	780000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		360	U	150	Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		360	U	18000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		360	U	230	Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		360	U	280000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	105-60-2	Caprolactam	UG_KG		360	U	3100000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	86-74-8	Carbazole	UG_KG		360	U	NA	NA
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	218-01-9	Chrysene	UG_KG		360	U	15000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	132-64-9	Dibenzofuran	UG_KG		360	U	7200	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	84-66-2	Diethylphthalate	UG_KG		360	U	4900000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	131-11-3	Dimethyl phthalate	UG_KG		360	U	NA	NA
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		360	U	620000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	206-44-0	Fluoranthene	UG_KG		360	U	230000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	86-73-7	Fluorene	UG_KG		360	U	230000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	118-74-1	Hexachlorobenzene	UG_KG		360	U	330	Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		360	U	6200	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		360	U	37000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	67-72-1	Hexachloroethane	UG_KG		360	U	4300	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	78-59-1	Isophorone	UG_KG		360	U	560000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	91-20-3	Naphthalene	UG_KG		360	U	3800	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	98-95-3	Nitrobenzene	UG_KG		360	U	5100	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		360	U	76	Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		360	U	110000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	87-86-5	Pentachlorophenol	UG_KG		900	U	990	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	85-01-8	Phenanthrene	UG_KG		360	U	1700000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	108-95-2	Phenol	UG_KG		360	U	1800000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	SVOA	129-00-0	Pyrene	UG_KG		360	U	170000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		10	U	810000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		10	U	600	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		10	U	4000000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		10	U	150	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	75-34-3	1,1-Dichloroethane	UG_KG		10	U	3600	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	75-35-4	1,1-Dichloroethene	UG_KG		10	U	23000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		10	U	5800	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		10	U	5.3	Yes
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	106-93-4	1,2-Dibromoethane	UG_KG		10	U	36	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		10	U	180000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	107-06-2	1,2-Dichloroethane	UG_KG		10	U	460	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	78-87-5	1,2-Dichloropropane	UG_KG		10	U	1000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		10	U	2600	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	78-93-3	2-Butanone	UG_KG		10	U	2700000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	591-78-6	2-Hexanone	UG_KG		10	U	20000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		10	U	530000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	71-43-2	Benzene	UG_KG		10	U	1200	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	75-27-4	Bromodichloromethane	UG_KG		10	U	290	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	75-25-2	Bromoform	UG_KG		10	U	67000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	74-83-9	Bromomethane	UG_KG		10	U	680	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	56-23-5	Carbon tetrachloride	UG_KG		10	U	650	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	108-90-7	Chlorobenzene	UG_KG		10	U	28000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	75-00-3	Chloroethane	UG_KG		10	U	1400000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	67-66-3	Chloroform	UG_KG		10	U	320	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	74-87-3	Chloromethane	UG_KG		10	U	11000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		10	U	16000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	110-82-7	Cyclohexane	UG_KG		10	U	650000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	124-48-1	Dibromochloromethane	UG_KG		10	U	730	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		10	U	8700	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	100-41-4	Ethylbenzene	UG_KG		10	U	5800	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	98-82-8	Isopropylbenzene	UG_KG		10	U	190000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	79-20-9	Methyl acetate	UG_KG		10	U	7800000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	108-87-2	Methylcyclohexane	UG_KG		10	U	650000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	75-09-2	Methylene chloride	UG_KG		10	U	35000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		10	U	47000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	100-42-5	Styrene	UG_KG		10	U	600000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	127-18-4	Tetrachloroethene	UG_KG		10	U	8100	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	108-88-3	Toluene	UG_KG		10	U	490000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		10	U	160000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		10	U	160000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	79-01-6	Trichloroethene	UG_KG		10	U	410	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		10	U	73000	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	75-01-4	Vinyl chloride	UG_KG		10	U	59	No
EPI04-SO12	SO	24-Jan-06	N	EPI04-SS12-0001	VOA	1330-20-7	Xylene, total	UG_KG		10	U	58000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	METAL	7439-97-6	Mercury	MG_KG		0.11	U	0.94	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	METAL	7440-22-4	Silver	MG_KG		1.1	UJ	39	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	METAL	7440-28-0	Thallium	MG_KG		0.55	U	0.078	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	309-00-2	Aldrin	UG_KG		1.9	U	31	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	319-84-6	alpha-BHC	UG_KG		1.9	U	85	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	5103-71-9	alpha-Chlordane	UG_KG		1.9	U	1800	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	12674-11-2	Aroclor-1016	UG_KG		37	U	400	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	11104-28-2	Aroclor-1221	UG_KG		74	U	150	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	11141-16-5	Aroclor-1232	UG_KG		37	U	150	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	53469-21-9	Aroclor-1242	UG_KG		37	U	240	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	12672-29-6	Aroclor-1248	UG_KG		37	U	240	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	11097-69-1	Aroclor-1254	UG_KG		37	U	110	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	319-85-7	beta-BHC	UG_KG		1.9	U	300	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	60-57-1	Dieldrin	UG_KG		3.7	U	33	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	33213-65-9	Endosulfan II	UG_KG		3.7	U	37000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	1031-07-8	Endosulfan sulfate	UG_KG		3.7	U	37000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	72-20-8	Endrin	UG_KG		3.7	U	1800	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	53494-70-5	Endrin ketone	UG_KG		3.7	U	1800	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	58-89-9	gamma-BHC (Lindane)	UG_KG		1.9	U	560	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	76-44-8	Heptachlor	UG_KG		1.9	U	120	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	1024-57-3	Heptachlor epoxide	UG_KG		1.9	U	59	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	72-43-5	Methoxychlor	UG_KG		19	U	31000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	PEST/PCB	8001-35-2	Toxaphene	UG_KG		190	U	480	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	92-52-4	1,1-Biphenyl	UG_KG		370	U	4700	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		370	U	4900	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		920	U	620000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		370	U	6200	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		370	U	18000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		370	U	120000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		370	U	1700	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		370	U	360	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		370	U	630000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	95-57-8	2-Chlorophenol	UG_KG		370	U	39000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		370	U	23000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	95-48-7	2-Methylphenol	UG_KG		370	U	310000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	88-74-4	2-Nitroaniline	UG_KG		920	U	61000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	88-75-5	2-Nitrophenol	UG_KG		370	U	NA	NA
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		370	U	1200	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	99-09-2	3-Nitroaniline	UG_KG		920	U	NA	NA
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		920	U	490	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		370	U	NA	NA
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		370	U	620000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	106-47-8	4-Chloroaniline	UG_KG		370	U	2700	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		370	U	NA	NA
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	106-44-5	4-Methylphenol	UG_KG		370	U	620000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	100-01-6	4-Nitroaniline	UG_KG		920	U	25000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	100-02-7	4-Nitrophenol	UG_KG		920	UJ	NA	NA
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	83-32-9	Acenaphthene	UG_KG		370	U	350000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	208-96-8	Acenaphthylene	UG_KG		370	U	350000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	98-86-2	Acetophenone	UG_KG		370	U	780000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	120-12-7	Anthracene	UG_KG		370	U	1700000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	1912-24-9	Atrazine	UG_KG		370	UJ	2300	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	100-52-7	Benzaldehyde	UG_KG		370	UJ	780000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		370	U	150	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		370	U	18000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		370	U	230	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		370	U	280000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	105-60-2	Caprolactam	UG_KG		370	U	3100000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	86-74-8	Carbazole	UG_KG		370	U	NA	NA
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	218-01-9	Chrysene	UG_KG		370	U	15000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	132-64-9	Dibenzofuran	UG_KG		370	U	7200	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	84-66-2	Diethylphthalate	UG_KG		370	U	4900000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	131-11-3	Dimethyl phthalate	UG_KG		370	U	NA	NA
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		370	U	620000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	206-44-0	Fluoranthene	UG_KG		370	U	230000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	86-73-7	Fluorene	UG_KG		370	U	230000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	118-74-1	Hexachlorobenzene	UG_KG		370	U	330	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		370	U	6200	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		370	U	37000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	67-72-1	Hexachloroethane	UG_KG		370	U	4300	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	78-59-1	Isophorone	UG_KG		370	U	560000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	91-20-3	Naphthalene	UG_KG		370	U	3800	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	98-95-3	Nitrobenzene	UG_KG		370	U	5100	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		370	U	76	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		370	U	110000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	87-86-5	Pentachlorophenol	UG_KG		920	U	990	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	85-01-8	Phenanthrene	UG_KG		370	U	1700000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	108-95-2	Phenol	UG_KG		370	U	1800000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	SVOA	129-00-0	Pyrene	UG_KG		370	U	170000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		12	U	810000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		12	U	600	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		12	U	4000000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		12	U	150	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	75-34-3	1,1-Dichloroethane	UG_KG		12	U	3600	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	75-35-4	1,1-Dichloroethene	UG_KG		12	U	23000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		12	U	5800	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		12	U	5.3	Yes
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	106-93-4	1,2-Dibromoethane	UG_KG		12	U	36	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		12	U	180000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	107-06-2	1,2-Dichloroethane	UG_KG		12	U	460	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	78-87-5	1,2-Dichloropropane	UG_KG		12	U	1000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		12	U	2600	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		12	U	2600	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	78-93-3	2-Butanone	UG_KG		12	U	2700000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	591-78-6	2-Hexanone	UG_KG		12	U	20000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		12	U	530000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	71-43-2	Benzene	UG_KG		12	U	1200	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	75-27-4	Bromodichloromethane	UG_KG		12	U	290	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	75-25-2	Bromoform	UG_KG		12	U	67000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	74-83-9	Bromomethane	UG_KG		12	U	680	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	56-23-5	Carbon tetrachloride	UG_KG		12	U	650	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	108-90-7	Chlorobenzene	UG_KG		12	U	28000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	75-00-3	Chloroethane	UG_KG		12	U	1400000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	67-66-3	Chloroform	UG_KG		12	U	320	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	74-87-3	Chloromethane	UG_KG		12	U	11000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		12	U	16000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		12	U	160000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	110-82-7	Cyclohexane	UG_KG		12	U	650000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	124-48-1	Dibromochloromethane	UG_KG		12	U	730	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		12	U	8700	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	100-41-4	Ethylbenzene	UG_KG		12	U	5800	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	98-82-8	Isopropylbenzene	UG_KG		12	U	190000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	79-20-9	Methyl acetate	UG_KG		12	U	7800000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	108-87-2	Methylcyclohexane	UG_KG		12	U	650000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	75-09-2	Methylene chloride	UG_KG		12	U	35000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		12	U	47000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	100-42-5	Styrene	UG_KG		12	U	600000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	127-18-4	Tetrachloroethene	UG_KG		12	U	8100	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	108-88-3	Toluene	UG_KG		12	U	490000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		12	U	160000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		12	U	160000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	79-01-6	Trichloroethene	UG_KG		12	U	410	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		12	U	73000	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	75-01-4	Vinyl chloride	UG_KG		12	U	59	No
EPI04-SO13	SO	25-Jan-06	N	EPI04-SS13-0001	VOA	1330-20-7	Xylene, total	UG_KG		12	U	58000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	METAL	7439-97-6	Mercury	MG_KG		0.11	U	0.94	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	METAL	7440-22-4	Silver	MG_KG		1.1	U	39	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	METAL	7440-28-0	Thallium	MG_KG		0.55	U	0.078	Yes
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	92-52-4	1,1-Biphenyl	UG_KG		360	U	4700	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		360	U	4900	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		910	U	620000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		360	U	6200	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		360	U	18000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		360	U	120000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		360	U	1700	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		360	U	360	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		360	U	630000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	95-57-8	2-Chlorophenol	UG_KG		360	U	39000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		360	U	23000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	95-48-7	2-Methylphenol	UG_KG		360	U	310000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	88-74-4	2-Nitroaniline	UG_KG		910	U	61000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	88-75-5	2-Nitrophenol	UG_KG		360	U	NA	NA
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		360	UJ	1200	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	99-09-2	3-Nitroaniline	UG_KG		910	U	NA	NA
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		910	UJ	490	Yes
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		360	U	NA	NA
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		360	U	620000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	106-47-8	4-Chloroaniline	UG_KG		360	U	2700	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		360	U	NA	NA
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	106-44-5	4-Methylphenol	UG_KG		360	U	620000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	100-01-6	4-Nitroaniline	UG_KG		910	UJ	25000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	100-02-7	4-Nitrophenol	UG_KG		910	U	NA	NA
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	83-32-9	Acenaphthene	UG_KG		360	U	350000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	208-96-8	Acenaphthylene	UG_KG		360	U	350000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	98-86-2	Acetophenone	UG_KG		360	U	780000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	120-12-7	Anthracene	UG_KG		360	U	1700000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	1912-24-9	Atrazine	UG_KG		360	U	2300	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	100-52-7	Benzaldehyde	UG_KG		360	U	780000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		360	U	150	Yes
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		360	U	18000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		360	U	230	Yes
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		360	U	280000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	105-60-2	Caprolactam	UG_KG		360	U	3100000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	86-74-8	Carbazole	UG_KG		360	U	NA	NA
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	218-01-9	Chrysene	UG_KG		360	U	15000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	132-64-9	Dibenzofuran	UG_KG		360	U	7200	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	84-66-2	Diethylphthalate	UG_KG		360	U	4900000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	131-11-3	Dimethyl phthalate	UG_KG		360	U	NA	NA
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		360	U	620000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	206-44-0	Fluoranthene	UG_KG		360	U	230000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	86-73-7	Fluorene	UG_KG		360	U	230000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	118-74-1	Hexachlorobenzene	UG_KG		360	U	330	Yes
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		360	U	6200	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		360	U	37000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	67-72-1	Hexachloroethane	UG_KG		360	U	4300	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	78-59-1	Isophorone	UG_KG		360	U	560000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	91-20-3	Naphthalene	UG_KG		360	U	3800	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	98-95-3	Nitrobenzene	UG_KG		360	U	5100	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		360	U	76	Yes
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		360	U	110000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	87-86-5	Pentachlorophenol	UG_KG		910	U	990	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	85-01-8	Phenanthrene	UG_KG		360	U	1700000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	108-95-2	Phenol	UG_KG		360	U	1800000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	SVOA	129-00-0	Pyrene	UG_KG		360	U	170000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		14	U	810000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		14	U	600	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		14	U	4000000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		14	U	150	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	75-34-3	1,1-Dichloroethane	UG_KG		14	U	3600	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	75-35-4	1,1-Dichloroethene	UG_KG		14	U	23000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		14	U	5800	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		14	U	5.3	Yes
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	106-93-4	1,2-Dibromoethane	UG_KG		14	U	36	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		14	U	180000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	107-06-2	1,2-Dichloroethane	UG_KG		14	U	460	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	78-87-5	1,2-Dichloropropane	UG_KG		14	U	1000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		14	U	2600	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		14	U	2600	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	78-93-3	2-Butanone	UG_KG		14	U	2700000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	591-78-6	2-Hexanone	UG_KG		14	U	20000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		14	U	530000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	71-43-2	Benzene	UG_KG		14	U	1200	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	75-27-4	Bromodichloromethane	UG_KG		14	U	290	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	75-25-2	Bromoform	UG_KG		14	U	67000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	74-83-9	Bromomethane	UG_KG		14	U	680	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	56-23-5	Carbon tetrachloride	UG_KG		14	U	650	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	108-90-7	Chlorobenzene	UG_KG		14	U	28000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	75-00-3	Chloroethane	UG_KG		14	U	1400000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	67-66-3	Chloroform	UG_KG		14	U	320	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	74-87-3	Chloromethane	UG_KG		14	U	11000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		14	U	16000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		14	U	160000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	110-82-7	Cyclohexane	UG_KG		14	U	650000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	124-48-1	Dibromochloromethane	UG_KG		14	U	730	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		14	U	8700	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	100-41-4	Ethylbenzene	UG_KG		14	U	5800	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	98-82-8	Isopropylbenzene	UG_KG		14	U	190000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	79-20-9	Methyl acetate	UG_KG		14	U	7800000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	108-87-2	Methylcyclohexane	UG_KG		14	U	650000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	75-09-2	Methylene chloride	UG_KG		14	U	35000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		14	U	47000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	100-42-5	Styrene	UG_KG		14	U	600000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	127-18-4	Tetrachloroethene	UG_KG		14	U	8100	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	108-88-3	Toluene	UG_KG		14	U	490000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		14	U	160000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		14	U	160000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	79-01-6	Trichloroethene	UG_KG		14	U	410	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		14	U	73000	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	75-01-4	Vinyl chloride	UG_KG		14	U	59	No
EPI04-SO14	SO	31-Jan-06	N	EPI04-SS14-0006	VOA	1330-20-7	Xylene, total	UG_KG		14	U	58000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	METAL	7439-97-6	Mercury	MG_KG		0.11	U	0.94	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	METAL	7440-22-4	Silver	MG_KG		1.1	U	39	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	METAL	7440-28-0	Thallium	MG_KG		0.55	U	0.078	Yes
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	92-52-4	1,1-Biphenyl	UG_KG		360	U	4700	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	108-60-1	2,2'-Oxybis(1-chloropropane)	UG_KG		360	U	4900	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	95-95-4	2,4,5-Trichlorophenol	UG_KG		900	U	620000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	88-06-2	2,4,6-Trichlorophenol	UG_KG		360	U	6200	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	120-83-2	2,4-Dichlorophenol	UG_KG		360	U	18000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	105-67-9	2,4-Dimethylphenol	UG_KG		360	U	120000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	121-14-2	2,4-Dinitrotoluene	UG_KG		360	U	1700	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	606-20-2	2,6-Dinitrotoluene	UG_KG		360	U	360	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	91-58-7	2-Chloronaphthalene	UG_KG		360	U	630000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	95-57-8	2-Chlorophenol	UG_KG		360	U	39000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	91-57-6	2-Methylnaphthalene	UG_KG		360	U	23000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	95-48-7	2-Methylphenol	UG_KG		360	U	310000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	88-74-4	2-Nitroaniline	UG_KG		900	U	61000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	88-75-5	2-Nitrophenol	UG_KG		360	U	NA	NA
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	91-94-1	3,3'-Dichlorobenzidine	UG_KG		360	UJ	1200	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	99-09-2	3-Nitroaniline	UG_KG		900	U	NA	NA
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	534-52-1	4,6-Dinitro-2-methylphenol	UG_KG		900	U	490	Yes
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	101-55-3	4-Bromophenyl-phenylether	UG_KG		360	U	NA	NA
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	59-50-7	4-Chloro-3-methylphenol	UG_KG		360	U	620000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	106-47-8	4-Chloroaniline	UG_KG		360	U	2700	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	7005-72-3	4-Chlorophenyl-phenylether	UG_KG		360	U	NA	NA
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	106-44-5	4-Methylphenol	UG_KG		360	U	620000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	100-01-6	4-Nitroaniline	UG_KG		900	UJ	25000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	100-02-7	4-Nitrophenol	UG_KG		900	U	NA	NA
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	83-32-9	Acenaphthene	UG_KG		360	U	350000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	208-96-8	Acenaphthylene	UG_KG		360	U	350000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	98-86-2	Acetophenone	UG_KG		360	U	780000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	120-12-7	Anthracene	UG_KG		360	U	1700000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	1912-24-9	Atrazine	UG_KG		360	UJ	2300	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	100-52-7	Benzaldehyde	UG_KG		360	UJ	780000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	56-55-3	Benzo(a)anthracene	UG_KG		360	U	150	Yes
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	111-91-1	bis(2-Chloroethoxy)methane	UG_KG		360	U	18000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	111-44-4	bis(2-Chloroethyl)ether	UG_KG		360	U	230	Yes
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	85-68-7	Butylbenzylphthalate	UG_KG		360	U	280000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	105-60-2	Caprolactam	UG_KG		360	U	3100000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	86-74-8	Carbazole	UG_KG		360	UJ	NA	NA
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	218-01-9	Chrysene	UG_KG		360	U	15000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	132-64-9	Dibenzofuran	UG_KG		360	U	7200	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	84-66-2	Diethylphthalate	UG_KG		360	U	4900000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	131-11-3	Dimethyl phthalate	UG_KG		360	U	NA	NA
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	84-74-2	Di-n-butylphthalate	UG_KG		360	U	620000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	206-44-0	Fluoranthene	UG_KG		360	U	230000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	86-73-7	Fluorene	UG_KG		360	U	230000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	118-74-1	Hexachlorobenzene	UG_KG		360	U	330	Yes
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	87-68-3	Hexachlorobutadiene	UG_KG		360	U	6200	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	77-47-4	Hexachlorocyclopentadiene	UG_KG		360	U	37000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	67-72-1	Hexachloroethane	UG_KG		360	U	4300	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	78-59-1	Isophorone	UG_KG		360	U	560000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	91-20-3	Naphthalene	UG_KG		360	U	3800	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	98-95-3	Nitrobenzene	UG_KG		360	U	5100	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	621-64-7	n-Nitroso-di-n-propylamine	UG_KG		360	UJ	76	Yes
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	86-30-6	n-Nitrosodiphenylamine	UG_KG		360	U	110000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	87-86-5	Pentachlorophenol	UG_KG		900	U	990	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	85-01-8	Phenanthrene	UG_KG		360	U	1700000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	108-95-2	Phenol	UG_KG		360	U	1800000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	SVOA	129-00-0	Pyrene	UG_KG		360	U	170000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	71-55-6	1,1,1-Trichloroethane	UG_KG		14	U	810000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	79-34-5	1,1,2,2-Tetrachloroethane	UG_KG		14	U	600	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	UG_KG		14	U	4000000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	79-00-5	1,1,2-Trichloroethane	UG_KG		14	U	150	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	75-34-3	1,1-Dichloroethane	UG_KG		14	U	3600	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	75-35-4	1,1-Dichloroethene	UG_KG		14	U	23000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	120-82-1	1,2,4-Trichlorobenzene	UG_KG		14	U	5800	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	96-12-8	1,2-Dibromo-3-chloropropane	UG_KG		14	U	5.3	Yes
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	106-93-4	1,2-Dibromoethane	UG_KG		14	U	36	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	95-50-1	1,2-Dichlorobenzene	UG_KG		14	U	180000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	107-06-2	1,2-Dichloroethane	UG_KG		14	U	460	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	78-87-5	1,2-Dichloropropane	UG_KG		14	U	1000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	541-73-1	1,3-Dichlorobenzene	UG_KG		14	U	2600	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	106-46-7	1,4-Dichlorobenzene	UG_KG		14	U	2600	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	78-93-3	2-Butanone	UG_KG		14	U	2700000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	591-78-6	2-Hexanone	UG_KG		14	U	20000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	108-10-1	4-Methyl-2-pentanone	UG_KG		14	U	530000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	71-43-2	Benzene	UG_KG		14	U	1200	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	75-27-4	Bromodichloromethane	UG_KG		14	U	290	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	75-25-2	Bromoform	UG_KG		14	U	67000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	74-83-9	Bromomethane	UG_KG		14	U	680	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	56-23-5	Carbon tetrachloride	UG_KG		14	U	650	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	108-90-7	Chlorobenzene	UG_KG		14	U	28000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	75-00-3	Chloroethane	UG_KG		14	U	1400000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	67-66-3	Chloroform	UG_KG		14	U	320	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	74-87-3	Chloromethane	UG_KG		14	U	11000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG		14	U	16000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	10061-01-5	cis-1,3-Dichloropropene	UG_KG		14	U	160000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	110-82-7	Cyclohexane	UG_KG		14	U	650000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	124-48-1	Dibromochloromethane	UG_KG		14	U	730	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	75-71-8	Dichlorodifluoromethane (Freon-12)	UG_KG		14	U	8700	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	100-41-4	Ethylbenzene	UG_KG		14	U	5800	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	98-82-8	Isopropylbenzene	UG_KG		14	U	190000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	79-20-9	Methyl acetate	UG_KG		14	U	7800000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	108-87-2	Methylcyclohexane	UG_KG		14	U	650000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	75-09-2	Methylene chloride	UG_KG		14	U	35000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	1634-04-4	Methyl-tert-butyl ether (MTBE)	UG_KG		14	U	47000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	100-42-5	Styrene	UG_KG		14	U	600000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	127-18-4	Tetrachloroethene	UG_KG		14	U	8100	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	108-88-3	Toluene	UG_KG		14	U	490000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG		14	U	160000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	10061-02-6	trans-1,3-Dichloropropene	UG_KG		14	U	160000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	79-01-6	Trichloroethene	UG_KG		14	U	410	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	75-69-4	Trichlorofluoromethane (Freon-11)	UG_KG		14	U	73000	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	75-01-4	Vinyl chloride	UG_KG		14	U	59	No
EPI04-SO15	SO	31-Jan-06	N	EPI04-SS15-0006	VOA	1330-20-7	Xylene, total	UG_KG		14	U	58000	No
EPI04-SO21	SO	17-Sep-14	N	VEP4-SB21-0406	VOA	75-35-4	1,1-Dichloroethene	UG_KG	1.29	5.14	U	23000	No
EPI04-SO21	SO	17-Sep-14	N	VEP4-SB21-0406	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG	1.29	5.14	U	16000	No
EPI04-SO21	SO	17-Sep-14	N	VEP4-SB21-0406	VOA	127-18-4	Tetrachloroethene	UG_KG	1.29	5.14	U	8100	No
EPI04-SO21	SO	17-Sep-14	N	VEP4-SB21-0406	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG	1.29	5.14	U	160000	No
EPI04-SO21	SO	17-Sep-14	N	VEP4-SB21-0406	VOA	79-01-6	Trichloroethene	UG_KG	1.29	5.14	U	410	No
EPI04-SO21	SO	17-Sep-14	N	VEP4-SB21-0406	VOA	75-01-4	Vinyl chloride	UG_KG	1.29	5.14	U	59	No
EPI04-SO22	SO	16-Sep-14	N	VEP4-SB22-0406	VOA	75-35-4	1,1-Dichloroethene	UG_KG	1.22	4.86	U	23000	No
EPI04-SO22	SO	16-Sep-14	N	VEP4-SB22-0406	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG	1.22	4.86	U	16000	No
EPI04-SO22	SO	16-Sep-14	N	VEP4-SB22-0406	VOA	127-18-4	Tetrachloroethene	UG_KG	1.22	4.86	U	8100	No
EPI04-SO22	SO	16-Sep-14	N	VEP4-SB22-0406	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG	1.22	4.86	U	160000	No
EPI04-SO22	SO	16-Sep-14	N	VEP4-SB22-0406	VOA	79-01-6	Trichloroethene	UG_KG	1.22	4.86	U	410	No
EPI04-SO22	SO	16-Sep-14	N	VEP4-SB22-0406	VOA	75-01-4	Vinyl chloride	UG_KG	1.22	4.86	U	59	No
EPI04-SO23	SO	22-Sep-14	N	VEP4-SB23-0406	VOA	75-35-4	1,1-Dichloroethene	UG_KG	1.7	6.81	U	23000	No
EPI04-SO23	SO	22-Sep-14	N	VEP4-SB23-0406	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG	1.7	6.81	U	16000	No
EPI04-SO23	SO	22-Sep-14	N	VEP4-SB23-0406	VOA	127-18-4	Tetrachloroethene	UG_KG	1.7	6.81	U	8100	No
EPI04-SO23	SO	22-Sep-14	N	VEP4-SB23-0406	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG	1.7	6.81	U	160000	No
EPI04-SO23	SO	22-Sep-14	N	VEP4-SB23-0406	VOA	79-01-6	Trichloroethene	UG_KG	1.7	6.81	U	410	No
EPI04-SO23	SO	22-Sep-14	N	VEP4-SB23-0406	VOA	75-01-4	Vinyl chloride	UG_KG	1.7	6.81	U	59	No
EPI04-SO24	SO	18-Sep-14	N	VEP4-SB24-0406	VOA	75-35-4	1,1-Dichloroethene	UG_KG	1.66	6.64	U	23000	No
EPI04-SO24	SO	18-Sep-14	N	VEP4-SB24-0406	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG	1.66	6.64	U	16000	No
EPI04-SO24	SO	18-Sep-14	N	VEP4-SB24-0406	VOA	127-18-4	Tetrachloroethene	UG_KG	1.66	6.64	U	8100	No
EPI04-SO24	SO	18-Sep-14	N	VEP4-SB24-0406	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG	1.66	6.64	U	160000	No
EPI04-SO24	SO	18-Sep-14	N	VEP4-SB24-0406	VOA	79-01-6	Trichloroethene	UG_KG	1.66	6.64	U	410	No
EPI04-SO24	SO	18-Sep-14	N	VEP4-SB24-0406	VOA	75-01-4	Vinyl chloride	UG_KG	1.66	6.64	U	59	No
EPI04-SO25	SO	22-Sep-14	N	VEP4-SB25-0406	VOA	75-35-4	1,1-Dichloroethene	UG_KG	1.35	5.4	U	23000	No
EPI04-SO25	SO	22-Sep-14	N	VEP4-SB25-0406	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG	1.35	5.4	U	16000	No
EPI04-SO25	SO	22-Sep-14	N	VEP4-SB25-0406	VOA	127-18-4	Tetrachloroethene	UG_KG	1.35	5.4	U	8100	No
EPI04-SO25	SO	22-Sep-14	N	VEP4-SB25-0406	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG	1.35	5.4	U	160000	No
EPI04-SO25	SO	22-Sep-14	N	VEP4-SB25-0406	VOA	79-01-6	Trichloroethene	UG_KG	1.35	5.4	U	410	No
EPI04-SO25	SO	22-Sep-14	N	VEP4-SB25-0406	VOA	75-01-4	Vinyl chloride	UG_KG	1.35	5.4	U	59	No
EPI04-SO21	SO	17-Sep-14	N	VEP4-SS21-0001	VOA	75-35-4	1,1-Dichloroethene	UG_KG	1.2	4.79	U	23000	No
EPI04-SO21	SO	17-Sep-14	N	VEP4-SS21-0001	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG	1.2	4.79	U	16000	No
EPI04-SO21	SO	17-Sep-14	N	VEP4-SS21-0001	VOA	127-18-4	Tetrachloroethene	UG_KG	1.2	4.79	U	8100	No
EPI04-SO21	SO	17-Sep-14	N	VEP4-SS21-0001	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG	1.2	4.79	U	160000	No
EPI04-SO21	SO	17-Sep-14	N	VEP4-SS21-0001	VOA	79-01-6	Trichloroethene	UG_KG	1.2	4.79	U	410	No
EPI04-SO21	SO	17-Sep-14	N	VEP4-SS21-0001	VOA	75-01-4	Vinyl chloride	UG_KG	1.2	4.79	U	59	No
EPI04-SO21	SO	17-Sep-14	FD	VEP4-SS21P-0001	VOA	75-35-4	1,1-Dichloroethene	UG_KG	1.25	4.98	U	23000	No
EPI04-SO21	SO	17-Sep-14	FD	VEP4-SS21P-0001	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG	1.25	4.98	U	16000	No
EPI04-SO21	SO	17-Sep-14	FD	VEP4-SS21P-0001	VOA	127-18-4	Tetrachloroethene	UG_KG	1.25	4.98	U	8100	No
EPI04-SO21	SO	17-Sep-14	FD	VEP4-SS21P-0001	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG	1.25	4.98	U	160000	No
EPI04-SO21	SO	17-Sep-14	FD	VEP4-SS21P-0001	VOA	79-01-6	Trichloroethene	UG_KG	1.25	4.98	U	410	No
EPI04-SO21	SO	17-Sep-14	FD	VEP4-SS21P-0001	VOA	75-01-4	Vinyl chloride	UG_KG	1.25	4.98	U	59	No
EPI04-SO22	SO	16-Sep-14	N	VEP4-SS22-0001	VOA	75-35-4	1,1-Dichloroethene	UG_KG	1.28	5.11	U	23000	No
EPI04-SO22	SO	16-Sep-14	N	VEP4-SS22-0001	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG	1.28	5.11	U	16000	No
EPI04-SO22	SO	16-Sep-14	N	VEP4-SS22-0001	VOA	127-18-4	Tetrachloroethene	UG_KG	1.28	5.11	UJ	8100	No
EPI04-SO22	SO	16-Sep-14	N	VEP4-SS22-0001	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG	1.28	5.11	U	160000	No
EPI04-SO22	SO	16-Sep-14	N	VEP4-SS22-0001	VOA	79-01-6	Trichloroethene	UG_KG	1.28	5.11	U	410	No
EPI04-SO22	SO	16-Sep-14	N	VEP4-SS22-0001	VOA	75-01-4	Vinyl chloride	UG_KG	1.28	5.11	U	59	No
EPI04-SO23	SO	22-Sep-14	N	VEP4-SS23-0001	VOA	75-35-4	1,1-Dichloroethene	UG_KG	1.51	6.02	U	23000	No
EPI04-SO23	SO	22-Sep-14	N	VEP4-SS23-0001	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG	1.51	6.02	U	16000	No
EPI04-SO23	SO	22-Sep-14	N	VEP4-SS23-0001	VOA	127-18-4	Tetrachloroethene	UG_KG	1.51	6.02	U	8100	No
EPI04-SO23	SO	22-Sep-14	N	VEP4-SS23-0001	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG	1.51	6.02	U	160000	No
EPI04-SO23	SO	22-Sep-14	N	VEP4-SS23-0001	VOA	79-01-6	Trichloroethene	UG_KG	1.51	6.02	U	410	No
EPI04-SO23	SO	22-Sep-14	N	VEP4-SS23-0001	VOA	75-01-4	Vinyl chloride	UG_KG	1.51	6.02	U	59	No
EPI04-SO24	SO	18-Sep-14	N	VEP4-SS24-0001	VOA	75-35-4	1,1-Dichloroethene	UG_KG	1.29	5.15	U	23000	No
EPI04-SO24	SO	18-Sep-14	N	VEP4-SS24-0001	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG	1.29	5.15	U	16000	No
EPI04-SO24	SO	18-Sep-14	N	VEP4-SS24-0001	VOA	127-18-4	Tetrachloroethene	UG_KG	1.29	5.15	U	8100	No
EPI04-SO24	SO	18-Sep-14	N	VEP4-SS24-0001	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG	1.29	5.15	U	160000	No
EPI04-SO24	SO	18-Sep-14	N	VEP4-SS24-0001	VOA	79-01-6	Trichloroethene	UG_KG	1.29	5.15	U	410	No
EPI04-SO24	SO	18-Sep-14	N	VEP4-SS24-0001	VOA	75-01-4	Vinyl chloride	UG_KG	1.29	5.15	U	59	No
EPI04-SO25	SO	22-Sep-14	N	VEP4-SS25-0001	VOA	75-35-4	1,1-Dichloroethene	UG_KG	1.51	6.03	U	23000	No
EPI04-SO25	SO	22-Sep-14	N	VEP4-SS25-0001	VOA	156-59-2	cis-1,2-Dichloroethene	UG_KG	1.51	6.03	U	16000	No
EPI04-SO25	SO	22-Sep-14	N	VEP4-SS25-0001	VOA	127-18-4	Tetrachloroethene	UG_KG	1.51	6.03	U	8100	No
EPI04-SO25	SO	22-Sep-14	N	VEP4-SS25-0001	VOA	156-60-5	trans-1,2-Dichloroethene	UG_KG	1.51	6.03	U	160000	No
EPI04-SO25	SO	22-Sep-14	N	VEP4-SS25-0001	VOA	79-01-6	Trichloroethene	UG_KG	1.51	6.03	U	410	No

Table 1
Comparison of Non-Detected Analyte Results to Screening Levels
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Location Name	Location Type Code	Sample Date	Sample Type Code	Sample Name	Analytical Group	CAS Number	Analyte Name	Result Units	Method Detection Limit	Reporting Limit	Result Flag	Screening Level (RSL @ 1E-06 or HQ or 0.1)	RL Result Exceed?
EPI04-SO25	SO	22-Sep-14	N	VEP4-SS25-0001	VOA	75-01-4	Vinyl chloride	UG_KG	1.51	6.03	U	59	No

Table 2

Risk Estimates for Non-Detected Analyte Exceeding Screening Levels

SWMU 20 Remedial Investigation

Former Vieques Naval Training Range, Vieques, Puerto Rico

Cas Number	Analyte Name	Minimum Reporting Limit	Maximum Reporting Limit	Units	Screening Level (1)	Frequency of Exceedance	Carcinogenic RSL (Risk Level = 1E-06)	Noncancer RSL (HQ = 1)	ELCR (2)	HQ (2)
Groundwater										
123-91-1	1,4-Dioxane	0.926	1.05	UG_L	0.78	44 / 44	0.78	600	1E-06	0.002
Soil										
96-12-8	1,2-Dibromo-3-chloropropane	10	14	UG_KG	5.3	30 / 30	5.3	4700	3E-06	0.003
606-20-2	2,6-Dinitrotoluene	370	380	UG_KG	360	9 / 9	360	19000	1E-06	0.02
534-52-1	4,6-Dinitro-2-methylphenol	680	950	UG_KG	490	30 / 30	NA	4900	NA	0.2
56-55-3	Benzo(a)anthracene	340	380	UG_KG	150	30 / 30	150	NA	3E-06	NA
111-44-4	bis(2-Chloroethyl)ether	340	380	UG_KG	230	30 / 30	230	NA	2E-06	NA
118-74-1	Hexachlorobenzene	340	380	UG_KG	330	30 / 30	330	49000	1E-06	0.008
621-64-7	n-Nitroso-di-n-propylamine	340	380	UG_KG	76	30 / 30	76	NA	5E-06	NA
7440-28-0	Thallium	0.52	0.58	MG_KG	0.078	30 / 30	NA	0.78	NA	0.7

Notes:

[1] Regional Screening Levels for Chemical Contaminants at Superfund Sites (January, 2015. [Online]. Concentrations based on non-carcinogenic health effects are adjusted using HQ=0.1. Available: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm

[2] Maximum reporting limit is used for risk estimates.

Risk corresponding to the maximum RL was calculated using a ratio of RSLs to the RL. RSL for residential soil and tap water were used conservatively.

ELCR = Max RL x 10^{-6} / RSL_{ca}

noncancer HQ = Max RL / RSL_{nc}

ELCR = Excess Lifetime Cancer Risk

HQ = Hazard Quotient

NA = not available/not applicable

RSL = Regional Screening Level

Attachment K-8
Chromium Speciation at SWMU 20

Chromium Speciation at SWMU 20

Chromium occurs ubiquitously in nature; the most important economic mineral deposit being in the form of chromite ($FeOCr_2O_3$) and more commonly as a trace metal in pyroxenes and amphiboles, two dark-colored ferromagnesian silicate (mafic) mineral groups. The concentration of chromium in rocks varies from an average of 5 mg/kg (range of 2 - 60 mg/kg) in granitic rocks (i.e., felsic), to an average 1800 mg/kg (range, 1100 - 3400 mg/kg) in ultramafic and serpentine rocks (US NAS, 1974). Almost all the sources of chromium in the earth's crust (e.g., chromite and all silicate forms) are in the trivalent (Cr^{3+}) state. Chromium deposits in the hexavalent (Cr^{6+}) oxidation state (e.g. crocoite, $PbCrO_4$) have been observed, but the occurrence is rare and the amount is small. Oxidation of Cr^{3+} to Cr^{6+} does not occur readily by exposure to oxygen in nature, but does occur in the presence of manganese oxides (often associated with mafic rocks along with chromium). The Cr^{3+} is oxidized after adsorbing to the surface of the manganese oxide and is released into solution as chromate ($HCrO_4^-$ and CrO_4^{2-}), the main form of Cr^{6+}. Chromate is highly soluble and only weakly adsorbs to mineral surfaces (similar to sulfate), so it is only rarely found in solid forms. Anthropogenically, hexavalent chromium is derived from the industrial oxidation of mined chromium deposits and possibly from the combustion of fossil fuels, wood, paper, etc. Chromate is readily reduced to the Cr^{3+} state when it comes into contact with organic matter in biota, soil, and water (i.e., see ATSDR, 2008; WHO, 1988). Once back in the Cr^{3+} state, chromium quickly precipitates as an oxide or hydroxide, and remains below analytical detection limits in the normal pH range (6 to 8).

Soil forming processes (e.g., weathering) may either enrich or deplete the resulting soil in chromium relative to the parent igneous material. Owing to their high density, mafic minerals may often be deposited and concentrated in higher energy environments. The weathering of rocks produces chromium complexes that are almost exclusively in the Cr^{3+} state. In most soils, chromium occurs in low concentrations; an average of 863 soil samples from the United States contained 53 mg/kg (Shacklette et al., 1970), but higher values are observed in weathered volcanic and igneous terrains. The highest concentrations, as high as 3,500 mg/kg, are always found in serpentine soils. Conversely, low chromium concentrations (10 - 40 mg/kg) have been detected in soils derived from granite or sandstone (Swaine and Mitchell, 1960).

The island of Vieques was formed from volcanic and other igneous rock. The island bedrock is mostly granodiorite, quartz diorite, and some lavas. Diorites and granodiorites are intermediate to intermediate-felsic igneous rocks, respectively, which means they have a mafic mineral (commonly containing chromium) content that is intermediate between the granitic and ultramafic end members. SWMU 20 is located in the Former Vieques Naval Training Range (VNTR) on the eastern end of Vieques, where the bedrock is weathered. Because of the weathering of the bedrock, gravel, sands, and finer particles wash downhill during storms. Over the years this material has gathered in valleys near the ocean, forming alluvial, floodplain, terrace, and piedmont fan deposits. These sedimentary deposits generally consist of a mixture of gravel, sand, silt, and clay, which originated from weathering of adjacent plutonic rocks, largely granodiorites in this area. The soil data indicate that the range of total chromium concentrations found at SWMU 20 (8.8 – 18.1 mg/kg, average of 11.5 mg/kg) is within the expected natural range for soil derived from intermediate igneous (i.e., granodiorite) terrain (WHO, 1988). Moreover, these concentrations are below the background concentration (72 mg/kg) as measured in Vieques Background Zones KTd and Qa.

Solubility

The solubility of chromium compounds varies, depending primarily on the oxidation state. Trivalent chromium compounds, with the exception of acetate, hexahydrate of chloride, and nitrate salts, are generally insoluble in water. Consequently, nearly all natural forms of Cr^{3+} are insoluble in pH ranging from mildly acidic to basic, most commonly found as silicates in their original form and oxide/hydroxides in secondary (weathered) form. In contrast, nearly all Cr^{6+} compounds, such as chromium(VI) oxide (or chromic acid), and the ammonium and alkali metal salts (e.g., sodium and potassium) of chromic acid are readily soluble in water. The Cr^{6+} compounds are reduced to the Cr^{3+} form under mildly reducing conditions (i.e. in which nitrate is reduced). The presence of

oxidizable organic matter would easily produce such reducing conditions. At SWMU 20, the chromium is most likely present in the relatively immobile Cr^{3+} state.

Mobility in Soil

The mobility of chromium in soil is dependent upon the speciation of chromium, which is a function of redox potential and the pH of the water leaching the soil. In most soils, chromium will be present predominantly in the Cr^{3+} oxidation state. This form has very low solubility and low reactivity, resulting in low mobility in the environment. Under oxidizing conditions, Cr^{6+} may be present in soil as CrO_4^{2-} and $HCrO_4^-$. In these forms, chromium is soluble and mobile. The assumption that most soil chromium is in the immobile Cr^{3+} state is further supported by a leachability investigation in which soil chromium mobility was studied for a period of four years (Sheppard and Thibault 1991). The vertical migration pattern of chromium in this soil indicated that after an initial period of mobility, chromium forms insoluble complexes and little leaching is observed. Chromium present as insoluble oxide, $Cr_2O_3 \cdot nH_2O$, exhibited limited mobility in soil. Flooding of soils and the subsequent anaerobic decomposition of plant detritus matters may increase the mobilization of Cr^{3+} in soils due to formation of soluble organic complexes. This complexation may be facilitated by a lower pH of infiltrating water.

A smaller percentage of total chromium in soil exists as soluble Cr^{6+} and Cr^{3+} complexes, which are more mobile in soil. Organic matter in soil is expected to convert soluble chromate, Cr^{6+}, to insoluble Cr^{3+} oxide, Cr_2O_3. At SWMU 20, the soil total organic carbon (TOC) ranges from 362 mg/kg to 41,600 mg/kg in 19 samples. While not considered an organic “rich” soil, the organic carbon present may act as a reductant, thereby limiting chromium mobility. Soluble and unadsorbed Cr^{6+} and Cr^{3+} complexes in soil may leach into groundwater. The leachability of Cr^{6+} in the soil increases as the pH of the soil increases. On the other hand, lower pH may facilitate leaching of acid-soluble Cr^{3+} complexes along with Cr^{6+} compounds in soil. Limited soil pH data from SWMU 20 indicate a pH between 7.5 and 8, and pH in groundwater is in the 6 to 7 range. Conditions at SWMU 20 therefore favor retention of uncomplexed Cr^{3+} and leaching of Cr^{6+}.

Given the slightly alkaline soil pH, it is expected that almost all of the detected soil chromium at SWMU 20 is in the Cr^{3+} state; had any anthropogenic Cr^{6+} ever existed on site, it would have been washed from the soil. Moreover, no samples with chromium concentrations above background (72 mg/kg) were detected in soil.

Conclusions

In conclusion, based on the geologic nature of chromium and the relatively low concentrations found across the site, the “total” chromium measured in the soils at SWMU 20 is very likely natural and almost solely in the immobile Cr^{3+} state.

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Appendix L
Ecological Risk Assessment

Final

Ecological Risk Assessment
Solid Waste Management Unit 20

Atlantic Fleet Weapons Training Area – Vieques
Former Vieques Naval Training Range
Vieques, Puerto Rico

Contract Task Order 013

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Acronyms and Abbreviations

amsl	above mean sea level
AUF	area use factor
AWQC	ambient water quality criteria
BAF	bioaccumulation factor
BCF	bioconcentration factor
BERA	Baseline Ecological Risk Assessment
bgs	below ground surface
BW	body weight
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPC	constituent of potential concern
CSM	conceptual site model
EPA	Environmental Protection Agency
EPC	exposure point concentration
ERA	Ecological Risk Assessment
ESI	Expanded Site Inspection
ESV	ecological screening value
HMW	high molecular weight
HQ	hazard quotient
LMW	low molecular weight
LOAEL	lowest observed adverse effect level
MATC	maximum acceptable toxicant concentration
mg/kg	milligram per kilogram
NASD	Naval Ammunition Support Detachment
NOAEL	no observed adverse effect level
PA	Preliminary Assessment
PAH	polycyclic aromatic hydrocarbon
PI	Photo Identified (site)
ppt	parts per thousand
RI	Remedial Investigation
SERA	Screening Ecological Risk Assessment
SI	Site Inspection
SMDP	scientific management decision point
SQL	sample quantitation limit
SSL	soil screening level
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit
TRV	toxicity reference value
UCL	upper confidence limit
USFWS	United States Fish and Wildlife Service
UTL	upper tolerance limit
VNTR	Vieques Naval Training Range
VOC	volatile organic compound

SECTION 1

Ecological Risk Assessment

This appendix contains a Screening Ecological Risk Assessment (SERA), constituting Steps 1 and 2 of the Ecological Risk Assessment (ERA) process, and the first step (Step 3A) of a Baseline Ecological Risk Assessment (BERA) for Solid Waste Management Unit (SWMU) 20 (formerly PI-4), Former Vieques Naval Training Range (VNTR), Vieques, Puerto Rico. The general approach, methods, and assumptions used to conduct this ERA were based on Revision 1 to the ERA Protocol (CH2M, 2015a), the ERA interim deliverable for SWMU 20 (CH2M, 2015b), and regulator comments on the interim deliverable. Some of the existing surface soil samples have been previously evaluated for potential ecological risks as part of the Preliminary Assessment (PA)/Site Inspection (SI) report (CH2M, 2008) and the SI/Expanded Site Inspection (ESI) Report (CH2M, 2010).

1.1 Ecological Risk Assessment Process

This ERA was conducted in accordance with the *Navy Policy for Conducting Ecological Risk Assessments* (CNO, 1999) and the Navy guidance for implementing this ERA policy (NAVFAC, 2003; 2012). The Navy ERA policy and guidance, which describe a process consisting of eight steps organized into three tiers, are conceptually similar to the eight-step ERA process outlined in United States Environmental Protection Agency (EPA) ERA guidance for the Superfund program (EPA, 1997). For both sets of guidance, Steps 1 and 2 involve conducting an SERA using very conservative assumptions. The BERA represents Steps 3 through 7. The BERA uses less conservative, but more realistic, assumptions and site-specific data to refine the risk estimates from the SERA for components that fail the initial screen. Step 8 addresses risk management issues. The major differences between the Navy ERA policy/guidance and the EPA ERA guidance are:

- The Navy policy/guidance provides clearly defined criteria for exiting the ERA process at specific points
- The Navy policy/guidance divides Step 3 (the first step of the BERA) into two distinct sub-steps (Steps 3A and 3B), with a potential exit point after Step 3A
- The Navy policy/guidance incorporates risk management considerations throughout all tiers of the ERA process

ERAs are conducted using a tiered, step-wise approach and are punctuated with Scientific Management Decision Points (SMDPs). SMDPs represent points in the ERA process where agreement on conclusions, actions, or methodologies is needed so that the ERA process can continue (or terminate) in a technically defensible manner. The results of the ERA at a particular SMDP are used to determine how the ERA process should proceed, for example, to the next step in the process or directly to a later step. The process continues until a final decision has been reached (for example, remedial action or controls if unacceptable risks are identified, or no further action if risks are acceptable). The process can also be iterative if data needs are identified at any step; the needed data are collected and the process starts again at the point appropriate to the type of data collected.

The screening (preliminary) problem formulation is the first step of an ERA and establishes the goals, scope, and focus of the SERA. As part of problem formulation, the environmental setting of the site is characterized in terms of the habitats and biota known or likely to be present. The types and concentrations of chemicals that are present in ecologically relevant media (such as surface soil) are also described based on available analytical data. A preliminary Conceptual Site Model (CSM) is developed that describes potential source areas, potential transport pathways (the mechanisms whereby chemicals may be transported from a source of contamination to ecologically relevant media) and exposure media, potential exposure pathways (an exposure pathway links a potential source of contamination with one or more receptors through exposure via one or more media and exposure routes), potential exposure routes (such as ingestion), and potential receptors. Assessment endpoints, measurement endpoints, and risk hypotheses are then selected to evaluate those receptors for which complete and potentially

significant exposure pathways are likely to exist[1]. The fate, transport, and toxicological properties of the chemicals present at the site, particularly the potential for bioaccumulation, are also considered during the problem formulation process.

Step 1 of the ERA process is intended to answer two main questions:

1. Do complete exposure pathways exist?
2. Are sufficient data available to conduct the SERA?

If no complete exposure pathways exist, the ERA process terminates at Step 1 with a conclusion of negligible (acceptable) risk because exposure, and thus potential risk, can only occur if complete exposure pathways exist. If one or more complete exposure pathways are known to exist, or are likely to exist, the ERA process continues to Step 2 but only evaluates those pathways that have been determined to be "critical" (ecologically important), that is, represent exposures to sensitive receptors that are associated with the predominant fate and transport mechanisms at the site (EPA, 1997). An evaluation of the available data is then conducted to determine if they are adequate to support the SERA. If not, additional data are collected before the ERA process continues. The second step of the ERA process involves conducting a screening exposure assessment, a screening effects assessment, and a screening risk calculation (risk characterization).

The results of the SERA are used to evaluate the potential for unacceptable ecological risks based on very conservative assumptions. If the results of the SERA suggest that further ecological risk evaluation is warranted, the ERA process proceeds to the BERA (Steps 3 through 7), which is a more detailed phase of the ERA process, for the exposure pathways, chemicals, receptors, and areas identified in the SERA. As previously indicated, the first step of the BERA (Step 3) is divided into two distinct sub-steps (3A and 3B) in Navy ERA guidance.

Step 3 of the EPA ERA guidance consists of the following activities (EPA, 1997):

1. Refinement of the Constituent of Potential Concern (COPCs) from the SERA
2. Further characterizing the potential ecological effects of contaminants
3. Refining information on contaminant fate and transport, complete exposure pathways, and receptors potentially at risk
4. Selecting assessment endpoints
5. Refining the CSM and risk hypotheses from the SERA

Step 3A of the Navy policy/guidance (refinement of conservative exposure assumptions) corresponds to the first activity listed above for the EPA ERA guidance. In Step 3A, a refined evaluation of exposure estimates is conducted using less conservative, but more realistic, assumptions and additional methods relative to those used in the SERA, which is intended to be a very conservative assessment. Examples of more realistic exposure assumptions include using central tendency (such as means or medians) estimates (rather than maximums) for bioaccumulation factors (BAFs) and/or exposure parameters, and central tendency (arithmetic mean and 95% upper confidence limit [UCL] on the arithmetic mean) estimates (rather than maximums) for media concentrations. Examples of additional methods include consideration of background and upgradient concentrations, bioavailability, and detection frequency (CNO, 1999; NAVFAC, 2003; 2012).

If risk estimates (and their associated uncertainty) are acceptable following Step 3A, the site will meet the conditions of the exit criterion specified in the Navy policy/guidance. If the Step 3A evaluation does not support a determination of acceptable risk within acceptable uncertainty, the site continues to Step 3B.

[1] An assessment endpoint is an explicit expression of the environmental component or value that is to be protected. A measurement endpoint is a measurable ecological characteristic that is related to the component or value chosen as the assessment endpoint. Risk hypotheses are testable hypotheses about the relationship among the assessment endpoints and their predicted responses when exposed to contaminants or other stressors.

Step 3B of the Navy policy/guidance (problem formulation) corresponds conceptually to the last four activities of Step 3 listed above for the EPA ERA guidance. In Step 3B, the preliminary CSM from the SERA is refined based on the results of the Step 3A evaluation to develop a revised list of key receptors, critical exposure pathways, key COPCs, assessment endpoints, measurement endpoints, and risk hypotheses. Based on the refined CSM, the lines of evidence to be used in characterizing risk are determined. Agreement on the refined CSM, COPCs, exposure pathways, endpoints, and risk hypotheses constitutes the SMDP at the end of Step 3 in both Navy and EPA ERA guidance.

Following the completion of Step 3, a decision point is reached with two potential outcomes:

1. If the refined risk estimates are acceptable for each selected assessment endpoint, the investigation proceeds to risk characterization (Step 7) to document this conclusion and the ERA process terminates.
2. If the uncertainties associated with the refined risk estimates are unacceptable and/or the risk estimates indicate that unacceptable risks may exist, site-specific evaluations or studies might be appropriate to determine if actual effects are occurring; if so, the ERA process continues (Steps 4 through 6). Consistent with Step 4 of the ERA process, site-specific evaluations (encompassing multiple lines of evidence) or studies can be conducted and may include a wide variety of activities to further characterize the potential for ecological effects of contaminants. Examples include: (1) qualitative, semi-quantitative, or quantitative characterizations of the structure and function of biological communities or ecosystems associated with a site; (2) tissue sampling to assess site-specific COPC concentrations in wildlife prey items, followed by updated food web modeling using these measured tissue concentrations in place of modeled values; and (3) laboratory or *in-situ* toxicity testing of site media.

Step 4 is a work planning step where additional site-specific studies are scoped and designed. Step 5 consists of the verification of the field sampling design developed in Step 4 while Step 6 constitutes the site investigation and data analysis phase of the process. The scope (the spatial extent of sampling) and components of any site-specific studies are determined by the conclusions of Step 3 and the pathways/endpoints associated with the potential unacceptable risks.

Step 7 consists of the documentation and synthesis of the information and data identified in Steps 1 through 3 (no additional study) or Steps 1 through 6 (additional study). In this step, ecological risk is evaluated and characterized using both quantitative and qualitative methods. Conclusions are made as to whether or not there is a reasonable potential for unacceptable ecological risk and, if there is a potential for unacceptable ecological risk, the magnitude of that risk. The results of the completed BERA (Step 7) are used to make necessary risk management decisions (Step 8) related to current or future risks. Possible decisions include:

- Adequate information exists to conclude that no unacceptable ecological risks exist. The assessment should stop at Step 7.
- Adequate information exists to conclude that unacceptable ecological risks exist for which remedial actions or controls are warranted. Whether remedial actions or controls are taken, and the specific actions or controls taken, will depend on a number of risk management factors such as the results of human health risk assessments (if applicable) and the potential impact of the remedial action or control itself on the habitats and biota present. This analysis would occur as part of Step 8.
- Adequate information does not exist to estimate risk or the risk estimate is believed to be too conservative or uncertain to recommend remediation. The assessment should be refined further.

SECTION 2

Problem Formulation

Problem formulation establishes the goals, scope, and focus of the ERA. As part of problem formulation, the ecological setting of SWMU 20 is characterized in terms of the habitats and biota known or likely to be present. The types and concentrations of chemicals that are present in ecologically relevant media are also described based on available analytical data. Surface soil (0 to 12 inches below ground surface [bgs]) is the primary ecologically relevant medium at SWMU 20. Surface water and sediment samples were not collected at SWMU 20 because the site lacks surface water bodies.

A CSM is developed that describes source areas, transport pathways and exposure media, exposure pathways and routes, and receptors. Assessment endpoints, measurement endpoints, and risk hypotheses are developed to evaluate those receptors for which critical exposure pathways exist. The fate, transport, and toxicological properties of the chemicals present in SWMU 20 media, particularly the potential for bioaccumulation, are also considered during this process.

2.1 Site Description

SWMU 20 (formerly PI-4) is located on the south side of the main access road leading from the main gate of Camp Garcia (**Figure 2-2**). Historical information suggests that the site was primarily used as a helicopter maintenance area and as a storage area for fuel bladders.

The site was identified in an aerial photography study completed in 2000, which showed a series of trenches and disturbed ground, active between 1959 and 1964. The trenches, visible in a 1959 aerial photograph, had been covered by 1962. An area of disturbed ground (other than that associated with the trenches) was visible in the 1962 aerial photograph just south of the former helicopter maintenance area. Two rectangular bermed areas, identified as having been historically used for fuel bladder storage, were also visible in the 1962 aerial photograph, as is the helicopter maintenance area (active at the time). An area of disturbed ground appears in the southeastern corner of the trenched area in the 1964 photograph. Interviews and records also indicate that barracks and a mess hall were present at the site, although no buildings are currently present. Based on the configuration of the trenches, and the presence of concrete slabs and a concrete vault in the area of the trenches, it is possible that the trenches were associated with a sanitary leach field for the barracks and mess.

During the 2001 site inspection of photo-identified (PI) sites, several man-made structures, including three 20-feet wide by 50-feet long concrete pads that may be relics of the foundations of historical buildings, were identified at SWMU 20 (PI-4). The easternmost pad had several sections of 48-inch diameter reinforced concrete pipe and pre-cast square manhole access sections stored on it. A concrete vault, approximately 10-feet long by 6-feet wide by 5-feet deep, with the entrance covered by plywood, was noted approximately 10 feet east of the concrete pads. Stagnant water was observed inside the vault, which was sampled during the PA/SI. A second concrete vault box, approximately 2-feet wide by 4-feet long by 3-feet deep, was found approximately 100 feet south of the aforementioned vault. Several openings (4-inch diameter) were noted at the bottom of the south-facing side of the manhole. As noted previously, these vaults may have been associated with a sanitary septic system for the barracks and mess potentially located at this site.

Based on the above information, five potential sources of a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)-related release were originally identified based on historical activities at the site: (1) former trenches; (2) area of disturbed ground south of the helicopter maintenance area; (3) former fuel bladder storage area; (4) former helicopter maintenance area; and (5) disturbed area in the southeastern part of the trenched area (**Figure 2-3; Figure L-1**).

The site slopes gently to the southeast with elevations dropping from about 45 feet above mean sea level (amsl) to approximately 30 feet amsl. The land around SWMU 20 was at one time maintained as cleared, but became re-vegetated once operations at the site ceased. Soils are primarily dry sands and dry silty sands (KTd soil type).

There are no surface water bodies on, or immediately adjacent to, the site. The closest surface water body topographically downgradient of the site is Bahia Tapón along the coast, approximately 0.5 miles southeast of the site (**Figure 2-5**). Based on water level readings from site monitoring wells, groundwater flows through the fractured bedrock aquifer toward the southeast.

2.2 Environmental Setting

The description of the environmental setting is based primarily on the habitat characterization that was conducted by Geo-Marine in September 2005 (Geo-Marine, 2005) which included a biological survey of plants, animals, and critical habitats. While no more recent biological evaluations of this area are known to have been conducted (e.g., by USFWS), qualitative surveys of vegetation/habitats and wildlife on SWMU 20 were conducted by a CH2M biologist in September 2008 and in July 2014. Based on the results of these surveys, no significant changes have occurred to the habitats present on the site, or the biota potentially using the site, relative to the 2005 Geo-Marine survey.

The site is located just north of the airfield. Numerous concrete foundations, concrete culverts associated with ditches, and piles of rubble and soil were observed on or near the site during the biological survey. Vegetative communities in this area consisted primarily of *Prosopis/Acacia* successional savanna with a dense, nearly continuous herbaceous layer (dominated by *Commelina diffusa*) covering most of the ground surface, including the concrete pads. Invasive shrubs and vines were also common. Non-leguminous trees were scarce, both in number of species and individuals, but included *Ziziphus mauritiana*, *Bucida buceras*, *Citharexylum fruticosum*, *Zanthoxylum monophyllum*, *Bursera simaruba*, and *Bourreria succulenta*. Low herbaceous plants dominated the area surrounding the runway.

2.2.1 Flora

A total of 98 plant species were identified on the site and adjacent (runway) areas (Geo-Marine, 2005; **Table L-1**). None of the identified species are listed as endangered, threatened, or rare.

2.2.2 Fauna

A list of mammals, birds, and reptiles observed in and around SWMU 20 is provided in **Table L-1**. The only mammal observed was the Indian mongoose (*Herpestes auropunctatus*), a common invasive species on Vieques. No amphibians were observed but three species of reptiles (lizards) were. A total of 18 species of birds were observed on or near the site (Geo-Marine, 2005).

2.2.3 Rare, Threatened, and Endangered Species

Thirteen federally listed species are known to occur or have the potential to occur on or near Naval Ammunition Support Detachment (NASD) Vieques (**Table L-2**). No federally protected species or preferred habitats were observed at this site (Geo-Marine, 2005).

2.3 Analytical Data Used in the ERA

Surface soil samples (0 to 1 foot depth) evaluated in this ERA are listed in **Table L-3** and their locations are shown on **Figure L-1**. The analytical data for these samples are included in **Appendix H**. Samples include those collected in 2006 from 15 borings (SO01 through SO15) as part of the PA/SI, two samples collected in 2013 as part of the supplemental ESI, and five samples collected in 2014 for this Remedial Investigation (RI). The 15 samples collected in 2006 have been previously evaluated as part of the PA/SI and SI/ESI reports. Background surface soil upper tolerance limits (UTLs) from the East Vieques background study (CH2M, 2007) were also used in this ERA.

2.4 Conceptual Site Model

The CSM relates potentially exposed receptor populations with potential source areas based on physical site characteristics and complete exposure pathways. Important components of the CSM are the identification of potential source areas, potential transport pathways and exposure media, potential exposure pathways and routes, and potential receptors. Actual or potential exposures of ecological receptors associated with a site are

determined by identifying the most likely, and most important, mechanisms and pathways of contaminant release and transport. A complete exposure pathway has three components: (1) a source or sources of contamination that results in a release to the environment; (2) a pathway and mechanism of chemical transport through an environmental medium; and (3) an exposure or contact point for an ecological receptor. **Figure L-2** illustrates a diagrammatic CSM for SWMU 20. Key components of this CSM are discussed in the following subsections.

2.4.1 Potential Source Areas

As discussed in Section 2.1, five potential sources of a CERCLA-related release were originally identified based on historical activities at the site: (1) former trenches; (2) area of disturbed ground south of the helicopter maintenance area; (3) former fuel bladder storage area; (4) former helicopter maintenance area; and (5) disturbed area in the southeastern part of the trenched area (**Figure 2-3**). Based on the historical activities and extent of contamination identified during the PA/SI, SI/ESI, and supplemental ESI (volatile organic compounds [VOCs] in groundwater), the release mechanism at the site is unknown, but is likely associated with spills or discharges of solvents utilized in the former helicopter maintenance activities, although no specific source area of these solvents has been identified.

2.4.2 Transport Pathways and Exposure Media

A transport pathway describes the mechanisms whereby site-related chemicals, once released, may be transported from a source area to ecologically relevant media (such as surface soil) where exposures may occur. These transport pathways are shown on **Figure L-2**. The primary release mechanisms and transport pathways at SWMU 20 include:

- Overland flow (runoff) that redistributes surface soil contaminants within terrestrial habitats
- Uptake of contaminants from surface soil and accumulation in the tissues of terrestrial biota

Vertical leaching through soil to groundwater and subsequent transport with groundwater flow through interstitial spaces in the fractured rock (and to a lesser extent, the unconsolidated material overlying the fractured rock) is also an existing transport pathway at the site but is not relevant to the ERA because there are no direct exposures to groundwater for ecological receptors and there are no nearby surface water bodies to which groundwater may discharge to.

Concentration gradients from potential source areas through the appropriate pathway(s) are evaluated in order to determine if there are any links between site contamination and potential ecological receptors (habitats and biota).

Exposure media for ecological receptors are typically limited to surface water, surface sediment, and surface soil. Surface water and sediment are not relevant to SWMU 20. Groundwater is generally considered only as a transport medium since there are no ecological exposures to groundwater until it discharges to a water body or surfaces as a seep. In this ERA, groundwater is not evaluated as a potential transport medium to downgradient water bodies since there are none in close proximity to the site. Air is not addressed in this ERA since this medium is not likely to result in significant contributions to total exposures. Thus, exposure media evaluated in this ERA are limited to surface soil (0 to 1 foot) across the terrestrial habitats of the site.

2.4.3 Exposure Pathways and Routes

An exposure pathway links a source of contamination with one or more receptors through exposure via one or more media and exposure routes. Exposure, and thus potential risk, can only occur if complete exposure pathways exist. **Figure L-2** shows the potentially complete exposure pathways to ecological receptors associated with SWMU 20.

Complete exposure pathways exist to lower trophic level terrestrial receptors (terrestrial plants, soil invertebrates, and reptiles) from direct contact with surface soil, and to terrestrial upper trophic level receptors (birds, mammals, and reptiles) from incidental ingestion of surface soil and exposure via terrestrial food webs. There are no complete exposure pathways for aquatic habitats.

An exposure route describes the specific mechanism(s) by which a receptor is exposed to a chemical present in an environmental medium. The most common exposure routes are dermal contact, direct uptake, ingestion, and inhalation. Terrestrial plants may be exposed to chemicals present in surface soil through their root surfaces during water and nutrient uptake. Terrestrial invertebrates may be exposed to chemicals in surface soil through direct contact and ingestion.

Animals may be exposed to chemicals through the: (1) inhalation of gaseous chemicals or of chemicals adhered to airborne particulate matter; (2) incidental ingestion of contaminated abiotic media (surface soil) during feeding or preening activities; (3) ingestion of contaminated drinking water; (4) ingestion of contaminated plant and/or animal tissues for chemicals that have entered food webs; and/or (5) dermal contact with contaminated abiotic media. These routes, where applicable, are depicted on **Figure L-2**.

Direct contact is the primary exposure route for lower trophic level receptors (terrestrial plants, soil invertebrates, and reptiles) at the site. Incidental ingestion of soil and exposure via terrestrial food webs are the primary exposure routes for upper trophic level receptors (birds, mammals, and reptiles). The contribution to the total dose from the inhalation route is generally insignificant for upper trophic level ecological receptors relative to ingestion pathways. Thus, the inhalation pathway is not generally considered for ecological receptors and was not evaluated in this ERA. Exposure to chemicals present in surface soil via dermal contact may occur but is unlikely to represent a major exposure pathway for most upper trophic level receptors because fur or feathers minimize transfer of chemicals across dermal tissue. Thus, dermal contact was not evaluated for upper trophic level receptors in this ERA. Incidental ingestion of surface soil during feeding, preening, or grooming activities was, however, considered in the risk estimates. Direct contact was considered for lower trophic level receptors (soil invertebrates).

Direct ingestion of drinking water is only considered when a permanent or semi-permanent source of water with a salinity below 15 parts per thousand (ppt), the approximate toxic threshold for wildlife receptors (Humphreys, 1988), exists on a site. There are no surface water bodies on or near the site; thus, exposure via direct ingestion of drinking water was not included in the ERA (water ingestion was set to zero).

2.4.4 Receptors

Because of the complexity of natural systems, it is generally not practical to directly assess the potential impacts to all ecological receptors present at a site. Therefore, specific receptor species (such as red-tailed hawk) or species groups (such as plants) are selected as surrogates to evaluate potential risks to larger components of the ecological community (guilds; such as carnivorous birds) used to represent the assessment endpoints (such as survival and reproduction of carnivorous birds). Selection criteria typically include those species that:

- Are known to occur, or are likely to occur, at the site
- Have a particular ecological, economic, or aesthetic value
- Are representative of taxonomic groups, life history traits, and/or trophic levels in the habitats present for which complete exposure pathways are likely to exist
- Can, because of toxicological sensitivity or potential exposure magnitude, be expected to represent potentially sensitive populations

The following upper trophic level receptors were selected for exposure modeling in terrestrial habitats based on the previously listed criteria and the habitats present on the site:

- Norway rat (*Rattus norvegicus*) – terrestrial mammalian omnivore (modeled as a herbivore in the SERA portion of the ERA)
- Indian mongoose (*Herpestes auropunctatus*) – terrestrial mammalian omnivore (modeled as an invertivore in the SERA portion of the ERA)
- Pearly-eyed thrasher (*Margarops fuscatus*) – terrestrial avian omnivore (modeled as an invertivore in the SERA portion of the ERA)

- Red-tailed hawk (*Buteo jamaicensis*) – terrestrial avian carnivore
- Common ground dove (*Columbina passerina*) – terrestrial avian herbivore

Upper trophic level receptors quantitatively evaluated in the ERA were limited to birds and mammals, the taxonomic groups with the most available information regarding exposure and toxicological effects. The rat and mongoose were evaluated as receptors in this ERA; however, should unacceptable risks be found for these receptors, risk managers should consider their status as invasive species. The primary issue is that, should populations of these mammals be reduced, there could be an adverse effect of reduced dietary sources for native predator species such as the red-tailed hawk.

Lower trophic level receptors were evaluated based on those taxonomic groupings for which soil ecological screening values (ESVs) have been developed. As such, specific species of terrestrial biota (plants and soil invertebrates) were not chosen as receptors because of the limited information available for specific species and because these receptors were evaluated on a community level via a comparison of chemical concentrations in surface soil to soil ESVs developed for these groups.

Reptiles are also an applicable receptor group. However, individual species of reptiles were not selected for evaluation because of the general lack of available toxicological information for this taxonomic group for direct effects and effects from exposures via food webs. Potential risks to reptiles from food web exposures were evaluated using other terrestrial fauna (birds and mammals) as surrogates. Similarly, potential risks to reptiles from direct exposures to surface soil are evaluated using ESVs developed for other taxonomic groups (described previously). This is discussed further in Section 6 (uncertainties).

2.4.5 Endpoints and Risk Hypotheses

The conclusion of the problem formulation includes the selection of ecological endpoints and risk hypotheses, which are based on the CSM. Two types of endpoints, assessment endpoints and measurement endpoints, are defined as part of the ERA process (EPA, 1997). An assessment endpoint is an explicit expression of the environmental component or value that is to be protected. A measurement endpoint is a measurable ecological characteristic that is related to the component or value chosen as the assessment endpoint. The considerations for selecting assessment and measurement endpoints are summarized in EPA (1997) and discussed in detail in Suter (1989; 1990; 1993). Risk hypotheses are testable hypotheses about the relationship among the assessment endpoints and their predicted responses when exposed to contaminants.

Endpoints define ecological attributes that are to be protected (assessment endpoints) and measurable characteristics of those attributes (measurement endpoints) that can be used to gauge the degree of impact that has or may occur. Assessment endpoints most often relate to attributes of biological populations or communities, and are intended to focus the risk assessment on particular components of the ecosystem that could be adversely affected by chemicals attributable to a site (EPA, 1997). Assessment endpoints contain an entity (such as hawk population) and an attribute of that entity (such as survival rate). Individual assessment endpoints usually encompass a group of species or populations (the receptor) with some common characteristic, such as specific exposure route or contaminant sensitivity, with the receptor then used to represent the assessment endpoint in the risk evaluation.

Assessment and measurement endpoints may involve ecological components from any level of biological organization, from individual organisms to the ecosystem itself. Effects on individual organisms are important for some receptors, such as rare and endangered species; population- and community-level effects are typically more relevant to ecosystems. Population- and community-level effects are usually difficult to evaluate directly without long-term and extensive study. However, measurement endpoint evaluations at the individual level, such as an evaluation of the effects of chemical exposure on reproduction, can be used to predict effects on an assessment endpoint at the population or community level. In addition, use of criteria values designed to protect the majority of the components of a community (such as the Ambient Water Quality Criteria [AWQC] for the Protection of Aquatic Life) can be useful in evaluating potential community- and/or population-level effects.

Table L-4 shows the assessment endpoints, risk hypotheses, and measurement endpoints used in the ERA. **Table L-4** also shows the receptors associated with each endpoint.

SECTION 3

Exposure Assessment

The principal activity associated with exposure assessment is the estimation of chemical concentrations in applicable media, termed exposure point concentrations (EPCs), to which the receptors may be exposed. This is accomplished through the selection of appropriate sets of the available analytical data using a set of criteria (such as validation status and sampling date). Once the analytical data sets are selected, EPCs are calculated as a particular point on the distribution of concentrations. At the screening level (Step 2), the EPC is the maximum detected concentration. At the baseline level (Step 3A), EPCs are central tendency estimates (such as the arithmetic mean). EPCs are then used in bioaccumulation and food web models to estimate exposures to upper trophic level receptors.

For conservatism, the maximum (SERA) and mean (BERA) reporting limits for chemicals analyzed for but not detected were also compared to medium-specific ESVs and (where applicable) used for food web exposure modeling. This will be done to determine if reporting limits were less than chemical concentrations at which potential adverse effects to ecological receptors may occur.

3.1 Selection Criteria for Analytical Data

Available analytical data (Section 2.3) were selected for use in the ERA based on the following:

- Data must have been validated by a qualified data validator using acceptable data validation methods. Rejected (R) values were not used in the ERA. Unqualified data and data qualified as J (estimated), L (biased low), or K (biased high) were treated as detected. Data qualified as U (undetected) or B (blank contamination) were treated as non-detected.
- For samples with duplicate analyses, the higher of the two concentrations was used, for conservatism, when both values were detects or when both values were non-detects. In cases where one result was a detection and the other a non-detect, the detected value was used in the assessment.
- For non-detected results, the sample quantitation (reporting) limit (SQL) was used to represent the concentration. When calculating statistics (such as the arithmetic mean), one-half of the SQL was used for non-detected results.

3.2 Exposure Point Concentrations

EPCs are calculated as a particular point on the distribution of concentrations. At the screening level (Step 2), the EPC is the maximum detected concentration. At the baseline level (Step 3A), EPCs are central tendency estimates, which provide a more representative estimate of potential exposures and risks to receptor populations (the focus of the selected assessment endpoints). In this ERA, the maximum, arithmetic mean, and 95% UCL of the arithmetic mean concentrations were evaluated for direct exposures. Exposures via food webs also utilized the maximum, arithmetic mean, and 95% UCL of the arithmetic mean. If the calculated 95% UCL and/or mean concentrations were greater than the maximum detected concentration, the maximum detected concentration was used in place of the 95% UCL and/or mean concentrations.

These three medium-specific EPCs were also used in bioaccumulation and food web models to estimate exposures to upper trophic level receptors. Dietary items for which tissue concentrations were modeled included terrestrial plants, soil invertebrates, and small mammals. Incidental ingestion of surface soil was also included when calculating the total dietary exposure. The models and parameter values used for calculating the tissue concentrations are outlined in the following subsections.

Not all chemicals were evaluated for food web exposures. Only those chemicals with the potential to bioaccumulate to a significant extent, as defined in Table 4-2 of EPA (2000), were evaluated. This list of bioaccumulating chemicals is provided in **Table L-5** for chemicals relevant to SWMU 20 and is based on the list

and selection process outlined in the ERA Protocol (CH2M, 2015a). The list of relevant chemicals for SWMU 20 includes: (1) all sampled chemicals on the EPA (2000) list; (2) all explosive compounds detected in site surface soil (none); and (3) chemicals not on the list of important bioaccumulative chemicals (EPA, 2000) for which bird and/or mammal Eco-soil screening levels (SSLs) have been developed.

For the screening (Step 2) exposure estimates, the uptake of chemicals from the abiotic media into food items was based on conservative (e.g., 90th percentile) bioconcentration factors (BCFs) or BAFs from the literature, where available. The 90th percentile is generally recommended to provide for a conservative screening assessment (Sample et al., 1998a; 1998b; Bechtel Jacobs, 1998a). If 90th percentile values were not available in the cited reference, the maximum value was used, if available. If only central tendency (such as median) values were reported, they were used for both Step 2 and Step 3A. Where an individual study (as opposed to a compilation of multiple studies) was cited, the best available value was sometimes a single value or the derivation was not specified. Default (assumed) factors of 1.0 were used only when data were not readily available for a chemical in the literature. In some cases, chemical concentrations in food items were directly estimated from maximum surface soil concentrations using available literature-based regression models.

BCFs and BAFs used for baseline (Step 3A) exposure estimates were based on, or modeled from, central tendency estimates (such as median or mean). Baseline values considered both the distribution of the data (normal or log-normal) and the recommendations in the cited reference. Geometric means were preferred for log-normal distributions and arithmetic means for normal distributions. In some cases, neither distribution was applicable or the distribution was biased by an outlying value. In these cases, point estimates like the median were then considered. Where an individual study (as opposed to a compilation of multiple studies) was cited, the best available value was sometimes a single value or the derivation was not specified. Default (assumed) factors of 1.0 were used only when data were not readily available for a chemical in the literature. In some cases, chemical concentrations in food items were directly estimated from mean and 95% UCL surface soil concentrations using available literature-based regression models.

In the BERA, using central tendency estimates (rather than high-end values or maximums) for exposure parameters such as BAFs provides a more representative estimate of potential exposures and risks to receptor populations (which are the focus of the selected assessment endpoints) of upper trophic level receptors. Since these upper trophic level species are highly mobile, they would be expected to effectively average their exposure over time as they forage within the area defining their home range. Average prey concentrations are most appropriately estimated using central tendency estimates of media concentrations and accumulation factors. For example, the wildlife dietary exposure models contained in the *Wildlife Exposure Factors Handbook* (EPA, 1993) specify the calculation of an average daily dose. Increasing the representativeness of the exposure estimates relative to population-level effects is consistent with the intent of the BERA. In cases where adequate spatial sampling coverage exists, mean concentrations are also appropriate for evaluating potential risks to populations of lower trophic level receptors because the members of the population are expected to be found throughout a site (where suitable habitat is present), rather than concentrated in one particular area. While effects on individual organisms might be important for some receptors, such as rare and endangered species, population- and community-level effects are typically more relevant to ecosystems.

For direct exposures to soil, polycyclic aromatic hydrocarbons (PAHs) were evaluated based on the sum total concentration of the individual constituents for the high molecular weight (HMW) and low molecular weight (LMW) fractions.

3.2.1 Terrestrial Plants

For most chemicals, tissue concentrations in the aboveground vegetative portion of terrestrial plants were estimated by multiplying the maximum (SERA) or mean and 95% UCL (BERA) surface soil concentration for each bioaccumulative chemical by chemical-specific soil-to-plant BAFs obtained from the literature. These BAFs, for both the SERA and BERA, are listed in **Table L-6**. For some chemicals, tissue concentrations were directly estimated from surface soil concentrations using regression equations; these algorithms are listed in **Table L-7**.

The BAF values used were based on root uptake from soil and on the ratio between dry-weight soil and dry-weight plant tissue. Literature values based on the ratio between dry-weight soil and wet-weight plant tissue were converted to a dry-weight basis by dividing the wet-weight BAF by an estimated solids content for terrestrial plants (15 percent [0.15] [Sample et al., 1997]).

For inorganic chemicals lacking literature-based, chemical-specific BAFs or applicable algorithms, a soil-to-plant BAF of 1.0 was used. For non-ionic organic chemicals (with a log K_{ow} of between 3 and 8) without literature-based BAFs, soil-to-plant BAFs were estimated using the rinsed foliage algorithm provided on Figure 5B of EPA (2007j):

$$\log BAF = (-0.4057)(\log K_{ow}) + 1.781$$

where: BAF = Soil-to-plant BAF (unitless; dry-weight basis)
K_{ow} = Octanol-water partitioning coefficient (unitless)

The log K_{ow} values used in this equation are listed in **Table L-5**.

3.2.2 Soil Invertebrates (Earthworms)

For most chemicals, tissue concentrations in soil invertebrates (earthworms) were estimated by multiplying the maximum (SERA) or mean and 95% UCL (BERA) surface soil concentration for each bioaccumulative chemical by chemical-specific soil-to-invertebrate BCFs or BAFs obtained from the literature. These BCF/BAF values, for both the SERA and BERA, are listed in **Table L-8**. For some chemicals, tissue concentrations were directly estimated from surface soil concentrations using regression equations; these algorithms are listed in **Table L-7**.

BCFs are calculated by dividing the concentration of a chemical in earthworm tissue by the concentration of that same chemical in the surrounding environmental medium (surface soil) without accounting for uptake via the diet. BAFs consider both direct exposure to soil and exposure via the diet. Because earthworms consume soil, BAFs are more appropriate values and were used when available. BAFs based on depurated analyses (soil was purged from the gut of the earthworm prior to analysis) were given preference over undepurated analyses when selecting BAF values because direct ingestion of soil is accounted for separately in the food web model.

The BCF/BAF values selected were based on the ratio between dry-weight soil and dry-weight earthworm tissue. Literature values based on the ratio between dry-weight soil and wet-weight earthworm tissue were converted to a dry-weight basis by dividing the wet-weight BCF/BAF by the estimated solids content for earthworms (16 percent [0.16]; EPA, 1993). For chemicals without available measured BAFs/BCFs, an earthworm BAF was estimated using available regression equations from the literature, was estimated using data for similar chemicals, or a BAF of 1.0 was assumed.

3.2.3 Small Mammals

Whole-body tissue concentrations in small mammals (omnivores) were estimated using one of two methodologies. For chemicals with literature-based soil-to-small mammal BAFs, the small mammal tissue concentration was calculated by multiplying the maximum (SERA) or mean and 95% UCL (BERA) surface soil concentration for each bioaccumulative chemical by a chemical-specific soil-to-small mammal BAF obtained from the literature. These BAFs, for both the SERA and BERA, are listed in **Table L-9**. For some chemicals, tissue concentrations were directly estimated from surface soil concentrations using regression equations; these algorithms are listed in **Table L-7**.

The BAF values selected were based on the ratio between dry-weight soil and whole-body dry-weight tissue. Literature values based on the ratio between dry-weight soil and wet-weight tissue were converted to a dry-weight basis by dividing the wet-weight BAF by the estimated solids content for small mammals (32 percent [0.32] [EPA, 1993]).

For chemicals without soil-to-small mammal BAF values or algorithms, an alternate approach was used to estimate whole-body tissue concentrations. Because most chemical exposure for these small mammals is via the diet, it was assumed that the concentration of each bioaccumulative chemical in the small mammal's tissues was

equal to the chemical concentration in its diet multiplied by a diet to whole-body BAF derived from the literature. The small mammal tissue concentration was calculated as follows:

$$TC_x = [[\sum_i (FC_{xi})(PDF_i)] + [(SC_x)(PDS)]] (BAF_{diet\text{-}whole\ body})$$

where:	TC_x	=	Small mammal tissue concentration for chemical x (mg/kg, dry weight)
	FC_{xi}	=	Concentration of chemical x in food item i (mg/kg, dry weight)
	PDF_i	=	Proportion of diet composed of food item i (dry-weight basis)
	SC_x	=	Concentration of chemical x in soil (mg/kg, dry weight)
	PDS	=	Proportion of diet composed of soil (dry-weight basis)
	BAF	=	Diet to whole-body BAF (unitless, dry-weight basis)

This equation is basically a weighted average of the chemical concentration in the various dietary components (including soil ingestion) for the small mammal species, multiplied by a diet-to-whole body BAF, and thus excludes water ingestion.

For chemicals lacking diet to whole-body BAF values (not to be confused with the soil-to-small mammal BAFs listed in **Table L-9**), a diet to whole-body BAF of one was assumed. The use of a diet to whole-body BAF of one is likely to result in a conservative estimate of chemical concentrations for chemicals that are not known to biomagnify in terrestrial food webs and a reasonable estimate of chemical concentrations for chemicals that are known to bioaccumulate or biomagnify, based on reported literature values. For example, a maximum diet to whole-body BAF value of 1.0 was reported by Simmons and McKee (1992) for PCBs based on laboratory studies with white-footed mice. Menzie et al. (1992) reported diet to whole-body BAF values for DDT of 0.3 for voles and 0.2 for short-tailed shrews. Reported diet to whole-body BAF values for dioxin were only slightly above 1 (1.4) for the deer mouse (EPA, 1990).

3.2.4 Dietary Intakes

Upper trophic level receptor exposures via food webs to chemicals present in surface soil were determined using estimated chemical concentrations in each relevant dietary component for each upper trophic level receptor, as described in the previous subsection. Incidental ingestion of surface soil was also included when calculating the total dose. Drinking water exposures were not included because the site lacks a drinking water source.

Dietary intakes for each upper trophic level receptor were calculated using the following formula (modified from EPA [1993]):

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

where:	DI_x	=	Dietary intake for chemical x (mg chemical/kg body weight/day)
	FIR	=	Food ingestion rate (kg/day, dry weight)
	FC_{xi}	=	Concentration of chemical x in food item i (mg/kg, dry weight)
	PDF_i	=	Proportion of diet composed of food item i (dry-weight basis)
	SC_x	=	Concentration of chemical x in soil (mg/kg, dry weight)
	PDS	=	Proportion of diet composed of soil (dry-weight basis)
	WIR	=	Water ingestion rate (L/day) – set to zero
	WC_x	=	Concentration of chemical x in water (mg/L) – set to zero
	BW	=	Body weight (kg)

Incidental ingestion of soil was modeled as a dietary component rather than using a separate soil ingestion rate. Parameter values for the selected receptors are listed in **Tables L-10** (SERA) and **L-11** (BERA). When measured food ingestion rates were not available for a receptor from the literature, the rates were estimated using

allometric equations from Nagy (2001). For receptors that consume small mammals (mongoose and red-tailed hawk), it was assumed that the small mammal portion of the diet was composed of rats (omnivores).

The exposure parameter values were selected to provide for a conservative evaluation at the screening level (Step 2). Examples of these conservative assumptions include:

- All of the dietary items consumed by the receptor are obtained from the site (an Area Use Factor [AUF] of 1 was assumed) at the point of maximum concentration
- Chemicals are 100 percent bioavailable
- Maximum food ingestion rates were used (calculated maximum ingestion rates using allometric equations were based on the maximum adult body weight)
- Minimum adult body weights were used. The selection focused on the most geographically appropriate values available from standard literature sources (such as EPA, 1993).
- Exclusive diets (composed of one primary prey item) were used

For the baseline (Step 3A) estimates:

- Central tendency estimates (such as mean, median, or midpoint) for adult body weight and ingestion rates were used. Central tendency estimates for these exposure parameters are more relevant for a BERA because they better represent the characteristics of a greater proportion of the individuals in the population. Populations or communities (rather than individual organisms) were emphasized when developing the assessment endpoints for the BERA.
- More realistic dietary compositions were also used in Step 3A. In rare cases, the shift from exclusive diets in Step 2 to more realistic diets in Step 3A may result in HQs exceeding 1 in Step 3A for chemicals whose HQ did not exceed 1 in Step 2. When this occurred, the chemical was carried into Step 3A for that receptor.
- An AUF of 1.0 was retained in Step 3A

SECTION 4

Effects Assessment

One of the purposes of the effects assessment is to establish chemical exposure levels (ESVs and toxicity reference values [TRVs]) that represent conservative thresholds for adverse ecological effects. Typically, one set of ESVs or TRVs is developed for each selected assessment endpoint. Based on the CSM, direct exposure to surface soil and exposure via terrestrial food webs are the complete pathways at the site that are relevant to this RI.

The effects assessment defines the methods and data used to define an adverse ecological effect. Effects data are available from multiple lines of evidence, which are reflected in the measurement endpoints, and include:

- **ESVs for Soil** – Analytical surface soil data are compared to the literature-based soil ESVs developed in Section 4.1
- **TRVs for Ingestion Exposures** – Food web exposure estimates are compared to the ingestion-based TRVs developed in Section 4.2 for upper trophic level receptors

In addition, a comparison of site surface soil concentrations to East Vieques background soil concentrations (UTLs) was conducted as an additional line of evidence (see Sections 5.3 and 5.4).

4.1 Medium-Specific ESVs

Medium-specific ESVs were established for each ecologically relevant medium. Based on the CSM (**Figure L-2**), direct exposure to surface soil is the complete pathway relevant to this RI.

4.1.1 Soil ESVs

The soil ESVs used in the ERA are summarized in **Tables L-12 and L-13**. When more than one ESV was available (such as fauna and flora) from a particular source for a chemical, the lowest of these values was selected.

4.2 Ingestion TRVs

Ingestion TRVs for dietary exposures were derived for each bioaccumulative chemical evaluated in the ERA. TRVs were derived for mammalian and avian upper trophic level receptors, the only two taxonomic groups for which sufficient toxicological information was generally available for the range of bioaccumulative chemicals evaluated. Toxicological information from the literature for wildlife species most closely related to the receptor species were used, where available, but were supplemented by laboratory studies of non-wildlife species (such as laboratory mice) where necessary. The ingestion TRVs are expressed as milligrams of the chemical per kilogram body weight of the receptor per day (mg/kg-BW/day).

Survival, growth, and reproduction were emphasized as toxicological endpoints because they are the most relevant, ecologically, to maintaining viable populations and because they are generally the most studied toxicological endpoints for ecological receptors. Endpoints based on reproduction were generally preferred to those based on growth which were preferred to those based on survival. If several chronic toxicological studies were available from the literature, the most appropriate study was selected for each receptor based on study design, study methodology, study duration, study endpoint, and test species.

Ingestion TRVs were derived for both chronic no observed adverse effect level (NOAEL) and chronic lowest observed adverse effect level (LOAEL) endpoints. The applicable uncertainty factors from **Table L-14** were used to derive these TRVs where appropriate (uncertainty factors were not generally applied to TRVs obtained from Eco-SSL documents because these TRVs often encompassed multiple studies). Because assessment endpoints were based on population- or community-level effects, no intraspecies uncertainty factors were applied. Taxonomic class-type uncertainty factors were also not applied because the TRVs selected were typically derived based on data from a broad range of taxonomic groups. Maximum acceptable toxicant concentrations (MATCs), defined as the geometric mean of the NOAEL and LOAEL, were also calculated.

For terrestrial habitats, Step 2 food web COPCs were selected by first comparing the maximum surface soil concentration with the lower of the available bird and mammal Eco-SSLs (**Table L-15**). Chemicals that exceeded the Eco-SSLs based on the maximum detected surface soil concentration were retained for site-specific food web modeling. Those that did not were not evaluated further for terrestrial food web exposures. The final Step 2 food web COPCs were selected based on a comparison of maximum exposure doses from site-specific food web modeling with the NOAEL-based ingestion TRV. Those chemicals with an exposure dose equaling or exceeding the NOAEL-based ingestion TRV were identified as Step 2 COPCs. For Step 3A, ingestion-based (food web) COPCs were based on a comparison of mean and 95% UCL exposure doses with ingestion TRVs based on the NOAEL, MATC, and LOAEL. Only Step 2 COPCs were generally evaluated in Step 3A. An exceedance of the MATC was generally considered an unacceptable effect at Step 3A, although chemicals that exceeded the MATC, but not the LOAEL, were discussed for possible risk management considerations.

Ingestion TRVs for mammals and birds are provided in **Tables L-16** and **L-17**, respectively. For some chemicals, relevant toxicological information was available for more than one test species that represented different guilds (based on factors such as dietary composition and trophic level). In these instances, the TRV considered most applicable to the receptor evaluated at the site was used in the food web model (this is discussed in more detail in Revision 1 to the ERA Protocol (CH2M, 2015a). **Tables L-16** and **L-17** indicate which test organism TRV was applied to each receptor (see also **Attachment L-1**).

SECTION 5

Risk Characterization

The risk characterization portion of the ERA uses the information generated during the three previous parts of the ERA (problem formulation, exposure assessment, and effects assessment) to estimate potential risks to ecological receptors.

5.1 SERA Approach

The main objective of risk characterization at the screening level (termed risk calculation) is to derive a list of COPCs. As part of this risk calculation, the maximum exposure concentrations (abiotic media) or maximum exposure doses (upper trophic level receptors) are compared with the corresponding ESVs or TRVs to derive risk estimates using the hazard quotient (HQ) method. HQs are calculated by dividing the chemical concentration in the medium being evaluated by the corresponding medium-specific ESV or by dividing the exposure dose by the corresponding ingestion-based TRV. HQs equaling or exceeding 1 indicate the potential for unacceptable risk since the chemical concentration or dose (exposure) equals or exceeds the ESV or TRV (effect); these chemicals are identified as COPCs at Step 2. However, ESVs/TRVs and exposure estimates are derived using intentionally conservative assumptions at the screening level such that HQs greater than or equal to 1 do not necessarily indicate that unacceptable risks are present. Rather, it identifies chemical-pathway-receptor combinations requiring further evaluation using more realistic exposure scenarios and assumptions. HQs less than 1 indicate that unacceptable risks are unlikely, enabling a conclusion of negligible (acceptable) risk to be reached with high confidence.

In addition to chemicals that equaled or exceeded medium-specific ESVs based on maximum detected concentrations, or that equaled or exceeded TRVs based on maximum ingestion doses, the following also applied to COPC selection at Step 2:

- Non-detected chemicals were retained as COPCs if the maximum detection limit equaled or exceeded the ESV for that medium or if the ingestion dose calculated using the maximum detection limit equaled or exceeded the TRV
- All detected chemicals lacking a TRV and/or ESV were retained as COPCs
- The essential nutrients calcium, magnesium, potassium, and sodium were excluded as potential COPCs since they are essential macronutrients that are needed in relatively high concentrations for normal metabolism, growth, and reproduction

5.2 BERA Approach

COPCs from the SERA were reevaluated in the BERA (Step 3A). As discussed previously, this reevaluation involves using more realistic assumptions about exposures and a comparison of these revised exposure estimates (based on central tendency estimates of media concentrations, BAFs, and/or exposure parameters) with ESVs and TRVs.

In addition to chemicals that equaled or exceeded medium-specific ESVs based on mean and/or 95% UCL detected concentrations, or that equaled or exceeded TRVs based on mean and/or 95% UCL ingestion doses, the following also applied to COPC selection at Step 3A:

- All detected chemicals lacking a TRV and/or ESV were retained as COPCs for risk evaluation
- Ingestion-based (food web) COPCs were based on a comparison of mean and 95% UCL exposure doses with ingestion TRVs based on the NOAEL, MATC, and LOAEL. An exceedance of the MATC was generally considered an unacceptable risk at Step 3A, although chemicals that exceeded the MATC, but not the LOAEL, were discussed for possible risk management considerations.

For Step 3A, the following additional factors were also considered, as appropriate:

- **Frequency of Detection.** Frequency of detection was used as a line of evidence in Step 3A but was not used as the sole basis for eliminating a chemical from further evaluation. Chemicals that were detected in less than five percent of the samples in a medium were generally eliminated as COPCs in that medium if at least 20 samples were available (EPA, 1989). It is unlikely that infrequently detected chemicals represent an unacceptable risk to receptors at the population level, due to limited spatial exposure. However, the magnitude of any ESV exceedances was also considered concurrently with frequency of detection to ensure that "hot spot" areas were not eliminated from consideration based on this screening criterion.
- **East Vieques Background Concentrations.** Background concentrations (UTLs) from the East Vieques background study (CH2M, 2007) were also considered in the Step 3A reevaluation for surface soil. The background evaluation consisted of a direct comparison of site surface soil concentrations to the 95% UTLs developed for inorganic constituents in the background study, or that have been developed for pesticides as part of various site-specific evaluations (CH2M, 2010) using available facility-wide surface soil data (**Table L-18**), in a manner analogous to the comparison to ESVs. SWMU 20 falls within soil type KTd so UTLs based on this soil type were used in the ERA (**Table L-18**).

5.3 Terrestrial Habitats

Vegetative communities on SWMU 20 consist primarily of *Prosopis/Acacia* successional savanna with a dense, nearly continuous herbaceous layer (dominated by *Commelina diffusa*) covering most of the ground surface.

5.3.1 Comparison With Ecological Screening Values

As discussed in Section 3.2, the maximum, arithmetic mean, and 95% UCL of the arithmetic mean concentrations were compared with ESVs. Chemicals were excluded from further consideration in the SERA (Step 2) if the HQ based on the maximum concentration was less than 1. Chemicals were generally excluded from further consideration in the BERA (Step 3A) if the HQ based on the 95% UCL was less than 1 and/or if the maximum detected concentration was less than the background UTL.

5.3.1.1. Surface Soil

Maximum surface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table L-19**. **Table L-20** identifies the exceedances of ESVs and background UTLs for each surface soil sample. Five metals (aluminum, cobalt, iron, manganese, and selenium) and two pesticides (4,4'-DDE and 4,4'-DDT) had HQs that equaled or exceeded 1 based on maximum detected concentrations (**Tables L-19** and **L-20**). These seven chemicals were identified as Step 2 COPCs. One metal (mercury), six pesticides, two semivolatile organic compounds (SVOCs), and two VOCs were not detected but maximum detection limits equaled or exceeded ESVs. These 11 chemicals were also identified as Step 2 COPCs.

Mean and 95% UCL surface soil concentrations are compared to soil ESVs for plants and soil invertebrates in **Table L-19**. Selenium was the only chemical that had a HQ that equaled or exceeded 1 based on detected 95% UCL concentrations and also equaled or exceeded background UTLs. Thus, selenium was identified as a Step 3A COPC for further risk evaluation (Section 5.4).

Two SVOCs (4-nitrophenol and atrazine) were not detected but mean detection limits exceeded ESVs. These two chemicals were not identified as Step 3A COPCs for further risk evaluation but are evaluated further in the uncertainty section (Section 6).

5.3.2 Terrestrial Food Web Exposures

In terrestrial habitats, Step 2 food web COPCs were selected by first comparing maximum surface soil concentrations with the lower of the available bird and mammal Eco-SSLs for the chemicals listed in **Table L-5**. These Eco-SSL values are listed in **Table L-15**. Chemicals that equaled or exceeded the Eco-SSLs based on the maximum surface soil concentration were retained for site-specific food web modeling. Those that did not were not evaluated further for terrestrial food web exposures. Chemicals that were on the bioaccumulative chemicals

list (**Table L-5**) and did not have Eco-SSLs were automatically included in site-specific food web modeling. The final Step 2 food web COPCs were selected based on a comparison of maximum exposure doses from site-specific food web modeling with the NOAEL-based ingestion TRV. Those chemicals with an exposure dose equaling or exceeding the NOAEL-based ingestion TRV were identified as Step 2 COPCs. For Step 3A, ingestion-based (food web) COPCs were based on a comparison of mean and 95% UCL exposure doses with ingestion TRVs based on the NOAEL, MATC, and LOAEL. An exceedance of the 95% UCL-based MATC was generally considered an unacceptable risk at Step 3A, although chemicals that exceeded the MATC, but not the LOAEL, were discussed for possible risk management considerations.

Table L-21 shows the results of the initial screening against bird and mammal Eco-SSLs. Five metals (antimony, copper, lead, selenium, and vanadium), three pesticides (4,4'-DDE, 4,4'-DDT, and dieldrin), and HMW PAHs had HQs based on maximum detected (maximum detection limits in the case of dieldrin and HMW PAHs) surface soil concentrations that equaled or exceeded 1 for one or both of the Eco-SSLs. These nine chemicals were retained for site-specific food web modeling (see **Attachment L-1**).

HQs based on maximum exposure doses for each upper trophic level terrestrial receptor are listed in **Table L-22** (calculations are shown in **Attachment L-1**). Based on a comparison to NOAELs, four metals (antimony, copper, mercury, and vanadium), three pesticides (4,4'-DDE, 4,4'-DDT, and dieldrin), and hexachlorobenzene had HQs equaling or exceeding 1 for one or more receptors. The exceedances for mercury, dieldrin, and hexachlorobenzene were based on maximum detection limits. Ingestion TRVs were not available for any receptor for 4-bromophenyl-phenylether and 4-chlorophenyl-phenylether, neither of which was detected in surface soil.

HQs based on 95% UCL exposure doses for each upper trophic level terrestrial receptor are listed in **Table L-23** (calculations are shown in **Attachment L-1**). Based on a comparison to NOAELs, only vanadium and 4,4'-DDE had HQs that equaled or exceeded 1 for one or more receptors. HQs for vanadium based on the MATC also exceeded 1 for the thrasher and dove.

HQs based on the arithmetic mean for each terrestrial upper trophic level receptor are listed in **Table L-24** (calculations are shown in **Attachment L-1**). Based on a comparison to NOAELs, only vanadium had HQs that equaled or exceeded 1 for one or more receptors. HQs for vanadium based on the MATC also exceeded 1 for the thrasher and dove.

Based on these results, vanadium was identified as a Step 3A COPC for further risk evaluation in terrestrial food webs.

5.4 Risk Evaluation

In this section, the various lines of evidence discussed in the previous section are integrated in order to evaluate the potential for unacceptable risks.

5.4.1 Terrestrial Habitats

Eight assessment endpoints were developed for terrestrial habitats on SWMU 20 (**Table L-4**). Lines of evidence for terrestrial habitats included:

- Comparison of surface soil concentrations with ESVs
- Comparison of modeled dietary doses with ingestion TRVs
- Comparison of site surface soil concentrations with background concentrations

In SWMU 20 surface soil, selenium was identified as a Step 3A COPC for further risk evaluation (**Table L-19**). Vanadium was identified as a Step 3A COPC for further risk evaluation for terrestrial food web exposures (**Table L-23**).

As discussed in both the PA/SI and SI/ESI reports, selenium does not pose an unacceptable risk to plants and soil invertebrates based on the following:

- The site is overgrown with vegetation, with no signs of stressed vegetation. Although a quantitative plant survey has not been conducted at the site, a qualitative one has (see Section 2.2). There were no observed impacts to the terrestrial plant community based on the species composition found and the lack of stressed vegetation.
- Selenium exceeded the soil ESV in 7 of 15 samples at a maximum HQ of 1.50 (**Table L-19**). In the East Vieques background study, three (KTd, Kv, and Qa) of the four soil types were combined when developing background soil UTLs (SWMU 20 is in the KTd type). The maximum detected surface soil concentration at SWMU 20 (0.78 mg/kg) is not that elevated relative to the UTL for this group (0.51 mg/kg; ratio is about 1.50). However, detection limits for selenium in the background study soil samples were generally in the 3 to 5 mg/kg range for these soil types. The East Vieques background UTL for the fourth (Tl) soil type, which also occurs in the vicinity of SWMU 20, is 1.30 mg/kg (**Table L-18**; the UTL for the combined set [all soil types]) and is higher than the maximum surface soil concentration at SWMU 20. Further, maximum background concentrations of selenium in the KTd (0.73 mg/kg) and Qa (2.00 mg/kg) soil types from West Vieques are similar to (KTd; ratio of 1.07) or greater than (Qa; ratio of 0.39) the maximum site concentration. These data support the conclusion that selenium concentrations detected in surface soils at SWMU 20 (maximum of 0.78 mg/kg) are within the range of background. Further, the soil ESV (0.52 mg/kg) is based on potential impacts to plants. The site is heavily vegetated, with no observed impacts to the terrestrial plant community based on the results of a qualitative plant survey. Maximum surface soil concentrations are less than soil ESVs based on other receptors (e.g., 4.10 mg/kg for soil invertebrates).

Surface soil concentrations of vanadium did not exceed background UTLs (**Table L-20**). Thus, potential risks to avian receptors from food web exposures are not elevated above background levels and are thus acceptable.

In summary, no chemical was identified as a final Step 3A COPC in surface soils or for terrestrial food web exposures at SWMU 20. Thus, potential ecological risks for the site are considered acceptable.

SECTION 6

Uncertainties

Uncertainties are present in all risk assessments because of the limitations of the available data and the need to make certain assumptions and extrapolations based on incomplete information. In addition, the use of various models (such as for uptake and food web exposures) carries with it some associated uncertainty as to how well the model reflects actual conditions. Since conservative assumptions were generally used in the exposure and effects assessments, these uncertainties are more likely to result in an overestimation rather than an underestimation of the likelihood and magnitude of risks to ecological receptors. The uncertainties in this ERA are mainly attributable to the following factors:

- Reporting Limits – Reporting limits for some undetected analytes exceeded applicable ESVs in soil. **Table L-25** summarizes these chemicals and reports both the ratio of the minimum and maximum reporting limits to the ESV as well as the ratio of the mean value (calculated using one-half of the reporting limit for each sample) to the ESV. Because these chemicals were not detected, they are not known to be present on the site but the potential for unacceptable risks cannot be totally discounted because the reporting limits are higher than the ESVs. The magnitude of the ratios can be used to qualitatively evaluate the magnitude of the associated uncertainty (that is, higher ratios are indicative of a greater likelihood that chemicals are present at concentrations that exceed the ESV relative to lower ratios). In surface soil, only 4-nitrophenol and atrazine exceeded reporting limits based on the mean ratio. Neither chemical is likely to be present on the site based on site history.

  In summary, there were no chemicals with very high mean ratios, suggesting that the associated uncertainties are relatively low. Because standard analytical methods were used and the sample reporting limits were not elevated relative to the method reporting limits for the vast majority of samples and analytes, these uncertainties are considered acceptable and are unlikely to impact the conclusions of the ERA.

- Duplicate Analyses – When evaluating samples with field duplicates, the value used in the ERA was always the detect when one result was a detect and the duplicate was a non-detect, regardless of whether or not the non-detected value was higher. In these cases, the use of the detect has less uncertainty since it represents an actual measured value (versus an upper limit bound) and the two samples will have identical or similar reporting limits.

- Selection of COPCs – Chemicals without available ESVs for a medium were not retained as COPCs for risk evaluation unless they were detected. These uncertainties are unlikely to impact the conclusions of the ERA since these chemicals are not known to be present on the site.

- Ingestion TRVs – Data on the toxicity of many chemicals to the receptor species were sparse or lacking, requiring the extrapolation of data from other wildlife species or from laboratory studies with non-wildlife species. This is a typical limitation and extrapolation for ERAs because so few wildlife species have been tested directly for most chemicals. The uncertainties associated with toxicity extrapolation were minimized through the selection of the most appropriate test species for which suitable toxicity data were available. The factors considered in selecting a test species to represent a receptor species included taxonomic relatedness, trophic level, foraging method, and similarity of diet. It is difficult to predict if these extrapolations would result in overestimating or underestimating potential risks.

  A second uncertainty related to the derivation of ingestion TRVs applies to metals. Most of the toxicological studies on which the ingestion TRVs for metals were based used forms of the metal (such as salts) that have high water solubility and high bioavailability to receptors. Because the analytical samples on which site-specific exposure estimates were based measured total metal concentration, regardless of form, and these highly bioavailable forms are expected to compose only a fraction of the total metal concentration, this is likely to result in an overestimation of potential risks for these chemicals but not to the extent that it would unduly impact the conclusions of the ERA.

A third source of uncertainty related to the derivation of ingestion-based TRVs applies to mercury and selenium. The ingestion-based TRVs used for these two metals were based on organometallic (methylated) forms. TRVs for inorganic forms tend to be substantially higher. Given that inorganic forms likely contribute significantly to the total mercury and selenium, the use of TRVs based on organometallic forms tends to make the TRVs for these metals extremely conservative and likely overestimates potential risk.

- Chemical Mixtures – Information on the toxicological effects of chemical interactions is generally lacking for ecological receptors, which required (as is standard for ERAs) that the chemicals be evaluated on a compound-by-compound basis during the comparison to ESVs and TRVs. This could result in an underestimation of risk (if there are additive or synergistic effects among chemicals) or an overestimation of risks (if there are antagonistic effects among chemicals).
- Receptor Species Selection – Reptiles were selected as receptors in the ERA, but were not evaluated quantitatively even when exposure pathways were likely to be complete. For food web exposures, this taxon was evaluated using other fauna (birds and mammals) as surrogates due to the general lack of taxon-specific toxicological data. This represents an uncertainty in the ERA. It was also assumed that any reptiles present on the site were not exposed to significantly higher concentrations of chemicals and were not more sensitive to chemicals than other receptor species evaluated in the ERA that were used as surrogates for these groups. This assumption was a source of uncertainty in the ERA. In addition, there is some uncertainty associated with the use of specific receptor species to represent larger groups of organisms (such as guilds).
- Calculation of the Total Exposure Dose – For most chemicals, the contribution to the total dose from the inhalation route is insignificant for upper trophic level ecological receptors, especially relative to ingestion pathways. Thus, and given the general lack of data for evaluating this pathway (EPA, 1999), the air pathway is not generally included in the total dose calculations for these ecological receptors. This could lead to an underestimation of the total dose to which these receptors are exposed. However, this underestimation is likely to be very small, especially given the relatively low frequency of detection and the low magnitude of the concentrations of volatile organic compounds (the constituents most likely to contribute to exposures via the inhalation route) in site soils. Exposure to chemicals present in surface soil via dermal contact may occur but is unlikely to represent a major exposure pathway for most upper trophic level receptors because fur or feathers minimize transfer of chemicals across dermal tissue. As for the inhalation pathway, there is a general lack of data for evaluating this pathway (EPA, 1999) and not including this pathway in the calculation of the total dose is not likely to significantly underestimate total exposure, especially since incidental ingestion of surface soil during feeding, preening, or grooming activities is included in the total dose calculations.
- Food Web Exposure Modeling – Chemical concentrations in terrestrial food items (terrestrial plants, soil invertebrates, and small mammals) were modeled from measured surface soil concentrations and were not directly measured. The use of generic, literature-derived exposure models and BAFs introduces some uncertainty into the resulting estimates. The values selected and methodology employed were intended to provide a conservative (Step 2) or reasonable (Step 3A) estimate of potential food web exposure concentrations.

  Another source of uncertainty is the use of default assumptions for exposure parameters such as BCFs and BAFs. Although BCFs or BAFs for many bioaccumulative chemicals were readily available from the literature and were used in the ERA, the use of a default factor of 1.0 to estimate the concentration of some chemicals in receptor prey items is a source of uncertainty.

  AUFs were assumed to equal 1. This is a very conservative assumption since a significant percentage of each upper trophic level receptor species' time could be spent foraging off-site in unimpacted areas or in areas where chemical concentrations are expected to be significantly lower.
- Mean Versus Maximum Media Concentrations – As is typical in an ERA, a finite number of samples of environmental media were used to develop the exposure estimates. The maximum concentration provides a conservative estimate of risk for immobile biota or those with a limited home range. The most realistic

exposure estimates for mobile upper trophic level species with relatively large home ranges are those based on central tendency estimates of chemical concentrations in each medium to which these receptors are exposed. This is reflected in the wildlife dietary exposure models contained in the *Wildlife Exposure Factors Handbook* (EPA, 1993), which specify the calculation of an average daily dose. Given the mobility of the upper trophic level receptor species used in the ERA, the use of maximum chemical concentrations (rather than 95% UCL and mean concentrations) in the SERA (Step 2) to estimate the exposure via food webs is very conservative. This conservatism was reduced to more realistic levels in the values selected for use in the BERA (Step 3A) food web evaluation.

In cases where adequate spatial sampling coverage exists, central tendency estimates of chemical concentrations in exposure media are also appropriate for evaluating potential risks to populations of lower trophic level receptors because the members of the population are expected to be found throughout a site (where suitable habitat is present), rather than concentrated in one particular area. While effects on individual organisms might be important for some receptors, such as rare and endangered species, population- and community-level effects are typically more relevant to ecosystems. The 95% UCL of the arithmetic mean was typically used quantitatively in the BERA portion of this ERA to represent the average exposure scenarios during COPC selection.

- Comparisons to Background Concentrations – Background concentrations were used to judge the site-relatedness of individual chemicals in surface soil. If site concentrations were consistent with background levels, it was assumed that the concentrations were not related to known site-related source areas. There exists the possibility that concentrations below background were indeed site-related, rendering the assumption false. However, the potential impact of this possibility is minimal since chemicals at concentrations consistent with background should exhibit no different ecological effects than commonly occurring in areas not affected by releases, regardless of their source.

SECTION 7

Risk Summary and Conclusions

This section provides a summary of the results of the ERA and outlines the conclusions.

7.1 Terrestrial Habitats

In summary, no chemical was identified as a final Step 3A COPC in surface soils or for terrestrial food web exposures at SWMU 20. Thus, potential ecological risks for the site are considered acceptable.

SECTION 8

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Tables

TABLE L-1
Plants and Animals Observed in the SWMU 20 (PI-4) Area
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Common Name	Scientific Name
Plants	
Twisted acacia	*Acacia tortuosa*
--	*Acalypha indica*
Man-better man	*Achyrantes aspera*
--	*Aeschynomene americana*
--	*Ageratum conyzoides conyzoides*
--	*Ayenia insulicola*
Margarita	*Bidens alba*
--	*Boerhavia coccinea*
Hog-weed	*Boerhavia diffusa*
Hurricane grass	*Bothriochloa pertusa*
--	*Bourreria succulenta*
Yerba mesquite	*Bouteloua americana*
--	*Brachiaria fasciculata*
--	*Brachiaria sp.*
Ucar	*Bucida buceras*
--	*Bursera simaruba*
Giant milkweed	*Calotropis procera*
Caper tree	*Capparis flexuosa*
Goat weed	*Capraria biflora*
Spiked-bur grass	*Cenchrus myosuroides*
Butterfly pea	*Centrosema pubescens*
--	*Centrosema virginianum*
Wild peaunt	*Chamaecrista diphylla*
--	*Chamaecrista nictitans pattelaria*
--	*Chamaesyce hirta*
--	*Chamaesyce hyssopifolia*
--	*Chamaesyce turpinii*
Blue grass	*Chloris inflata*
Plush-grass	*Chloris radiata*
Pinakoop	*Cissus verticillata*
Old woman bitter	*Citharexylum fruticosum*
Yellow massambee	*Cleome viscosa*
Blue day flower	*Commelina diffusa*
Malvate	*Corchorus hirsutus*
Red manjack	*Cordia collococca*
--	*Crotalaria retusa*
--	*Cucumis anguria*
Maraimaray	*Dalbergia ecastaphyllum*
--	*Dalechampia scandens*
Silky grass	*Digitaria insularis*
--	*Eragrostis pilosa*
--	*Eragrostis sp.*
--	*Evalvulus convolvuloides*
--	*Galactia dubia*
--	*Galactia striata*
Seaside heliotrope	*Heliotropium curassavicum*
--	*Ipomoea indica*
Goat foot	*Ipomoea tiliacea*
--	*Ipomoea triloba*

TABLE L-1
Plants and Animals Observed in the SWMU 20 (PI-4) Area
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Common Name	Scientific Name
--	*Jasminum fluminense*
--	*Jatropha gossypiifolia*
Yellow sage	*Lantana camara*
Button sage	*Lantana involucrata*
Wild tamarind	*Leucaena leucocephala*
Cat's claw	*Macfadyena unguis-cati*
--	*Malvastrum americanum*
--	*Malvastrum corchorifollum*
--	*Melochia nodiflora*
--	*Melochia pyramidata*
Pepinillo	*Melothria pendula*
--	*Merremia quinquefolia*
Guinea grass	*Panicum maximum*
Jerusalem thorn	*Parkinsonia aculeata*
--	*Paspalum distichum*
--	*Paspalum fimbriatum*
--	*Paspalum virgatum*
--	*Paspalum sp.*
--	*Passiflora suberosa*
--	*Pavonia spinifex*
Gale of the wind	*Phyllanthus niruri*
Purs lane	*Portulaca oleracea*
Chicken weed	*Portulaca quadrifida*
--	*Portulaca teretifolia*
Mesquite	*Prosopis juliflora*
Ink-berry	*Randia aculeata*
Bitter bush	*Rauvolfia viridis*
--	*Rhynchosia reticulata*
Cat's blood	*Rivina humilis*
Many-roots	*Ruellia tuberosa*
Yellow fostail	*Setaria geniculata*
--	*Sida ciliaris*
Sidastro	*Sidastrum multiflorum*
Salt grass	*Spartina patens*
--	*Spermacoce verticillata*
Waterweed	*Spigelia anthelmia*
--	*Sporobolus jacquemontii*
--	*Stachytarpheta jamaicensis*
Crab grass	*Stenotaphrum secundatum*
--	*Stigmaphyllon emarginatum*
Pencil flower	*Stylosanthes hamata*
--	*Tephrosia cinerea*
--	*Tournefortia volubilis*
Stinging vine	*Tragia volubilis*
Bur	*Urena lobata*
Malvavisco	*Waltheria indica*
Pichona	*Wissadula periplocifolia*
Yellow prickle	*Zanthoxylum monophyllum*
Indian jujube	*Ziziphus mauritiana*

TABLE L-1
Plants and Animals Observed in the SWMU 20 (PI-4) Area
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Common Name	Scientific Name
Mammals	
Mongoose	*Herpestes auropunctatus*
Reptiles	
Anole (Common Lizard)	*Anolis cristatellus*
Grass Anole (Garden Lizard)	*Anolis pulchellus*
Anole (Spotted Lizard}	*Anolis stratulus*
Birds	
Adelaide's warbler	*Dendroica adelaidae*
American kestrel	*Falco sparverius*
Antillean crested hummingbird	*Orthorhyncus cristatus*
Bananaquit	*Coereba flaveola*
Caribbean elaenia	*Elaenia martinica*
Cattle egret	*Bubulcus ibis*
Common ground dove	*Columbina passerina*
Gray kingbird	*Tyrannus dominicensis*
Greater Antillean grackle	*Quiscalus niger*
Killdeer	*Charadrius vociferus*
Mangrove cuckoo	*Coccyzus minor*
Northern mockingbird	*Mimus polyglottos*
Puerto Rican flycatcher	*Myiarchus antillarum*
Puerto Rican woodpecker	*Melanerpes portoricensis*
Scaly-breasted thrasher	*Margarops fuscus*
Scaly-naped pigeon	*Columba squamosa*
Smooth-billed ani	*Crotophaga ani*
White-winged dove	*Zenaida asiatica*
Source: Geo-Marine (2005)	

TABLE L-2
Federally Listed Species Occurring or Potentially Occurring at Vieques
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Scientific Name (Common Name)	Federal Status
Plants	
Chaemacrista glandulosa var. mirabilis (Herb)	Endangered
Stahlia monosperma (Cobana negra)	Threatened
Calyptranthes thomasiana (Thomas' lidflower)	Endangered
Eugenia woodburyana (Evergreen tree)	Endangered
Goetzea elegans	Endangered
Reptiles and Amphibians	
Chelonia mydas (Green sea turtle)	Threatened
Dermochelys coriacea (Leatherback sea turtle)	Endangered
Eretmochelys imbricata (Hawksbill sea turtle)	Endangered
Caretta caretta (Loggerhead sea turtle)	Threatened
Birds	
Sterna dougalli dougalli (Roseate tern)	Threatened
Mammals	
Physeter macrocephalus (Sperm whale)	Endangered
Megaptera novaeangliae (Humpback whale)	Endangered
Trichechus manatus (West Indian manatee)	Endangered

Source: Vieques Integrated Natural Resource Plan, Plan Years 2003 - 2012 (Geo-Marine, 2003)

TABLE L-3
Samples Used in the Ecological Risk Assessment
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Station ID	Sample ID	Sample Depth Range (feet)	Sample Date	Used in PA/SI ERA (2008)?	Used in SI/ESI ERA (2010)?
Surface Soil					
EPI04-SO01	EPI04-SS01-0001	0-1	1/26/2006	Yes	Yes
EPI04-SO02	EPI04-SS02-0001	0-1	1/26/2006	Yes	Yes
EPI04-SO03	EPI04-SS03-0001	0-1	1/26/2006	Yes	Yes
EPI04-SO04	EPI04-SS04-0001	0-1	1/26/2006	Yes	Yes
EPI04-SO05	EPI04-SS05-0001	0-1	1/26/2006	Yes	Yes
EPI04-SO05	EPI04-SS05P-0001	0-1	1/26/2006	Yes	Yes
EPI04-SO06	EPI04-SS06-0001	0-1	1/26/2006	Yes	Yes
EPI04-SO07	EPI04-SS07-0001	0-1	1/25/2006	Yes	Yes
EPI04-SO08	EPI04-SS08-0001	0-1	1/25/2006	Yes	Yes
EPI04-SO08	EPI04-SS08P-0001	0-1	1/25/2006	Yes	Yes
EPI04-SO09	EPI04-SS09-0001	0-1	1/24/2006	Yes	Yes
EPI04-SO10	EPI04-SS10-0001	0-1	1/24/2006	Yes	Yes
EPI04-SO11	EPI04-SS11-0001	0-1	1/25/2006	Yes	Yes
EPI04-SO12	EPI04-SS12-0001	0-1	1/24/2006	Yes	Yes
EPI04-SO13	EPI04-SS13-0001	0-1	1/25/2006	Yes	Yes
EPI04-SO14	EPI04-SS14-0006	0-1	1/31/2006	Yes	Yes
EPI04-SO15	EPI04-SS15-0006	0-1	1/31/2006	Yes	Yes
EPI04-MW13D	VEP4-SS16-0001	0-1	5/30/2013	--	--
EPI04-MW17D	VEP4-SS17-0001	0-1	6/5/2013	--	--
EPI04-MW17D	VEP4-SS17P-0001	0-1	6/5/2013	--	--
EPI04-SO21	VEP4-SS21-0001	0-1	9/17/2014	--	--
EPI04-SO21	VEP4-SS21P-0001	0-1	9/17/2014	--	--
EPI04-SO22	VEP4-SS22-0001	0-1	9/16/2014	--	--
EPI04-SO23	VEP4-SS23-0001	0-1	9/22/2014	--	--
EPI04-SO24	VEP4-SS24-0001	0-1	9/18/2014	--	--
EPI04-SO25	VEP4-SS25-0001	0-1	9/22/2014	--	--

Shaded cells indicate field duplicates

TABLE L-4
Assessment Endpoints, Risk Hypotheses, and Measurement Endpoints
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Assessment Endpoint	Risk Hypothesis	Measurement Endpoint	Receptor
Terrestrial Habitats			
Survival, growth, and reproduction of terrestrial soil invertebrate communities	Are site-related chemical concentrations in surface soil sufficient to adversely effect soil invertebrate communities?	Comparison of chemical concentrations in surface soil with soil ecological screening values (ESVs)	Soil invertebrates
Survival, growth, and reproduction of terrestrial plant communities	Are site-related chemical concentrations in surface soil sufficient to adversely effect terrestrial plant communities?	Comparison of chemical concentrations in surface soil with soil ecological screening values (ESVs)	Terrestrial plants
Survival, growth, and reproduction of terrestrial reptile populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to terrestrial reptile populations?	Comparison of chemical concentrations in surface soil with soil ecological screening values (ESVs) Evidence of potential risk to other upper trophic level terrestrial receptors evaluated in the ERA (birds and mammals used as surrogates)	Reptiles
Survival, growth, and reproduction of avian terrestrial invertivore (SERA)/ omnivore (BERA) populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to avian receptor populations that may consume terrestrial plants and soil invertebrates from the site?	Comparison of modeled dietary intakes using surface soil concentrations with literature-based ingestion TRVs; ratios ≥1 based on the NOAEL-LOAEL range indicate an effect	Pearly-eyed thrasher
Survival, growth, and reproduction of avian terrestrial herbivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to avian receptor populations that may consume terrestrial plants from the site?	Comparison of modeled dietary intakes using surface soil concentrations with literature-based ingestion TRVs; ratios ≥1 based on the NOAEL-LOAEL range indicate an effect	Common ground dove
Survival, growth, and reproduction of avian terrestrial carnivore populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to avian receptor populations that may consume small mammals from the site?	Comparison of modeled dietary intakes using surface soil concentrations with literature-based ingestion TRVs; ratios ≥1 based on the NOAEL-LOAEL range indicate an effect	Red-tailed hawk
Survival, growth, and reproduction of mammalian terrestrial herbivore (SERA)/ omnivore (BERA) populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to mammalian receptor populations that may consume terrestrial plants and soil invertebrates from the site?	Comparison of modeled dietary intakes using surface soil concentrations with literature-based ingestion TRVs; ratios ≥1 based on the NOAEL-LOAEL range indicate an effect	Norway rat
Survival, growth, and reproduction of mammalian terrestrial invertivore (SERA)/ omnivore (BERA) populations	Are site-related chemical concentrations in surface soil sufficient to cause adverse effects (on growth, survival, or reproduction) to mammalian receptor populations that may consume small mammals, soil invertebrates, and plants from the site?	Comparison of modeled dietary intakes using surface soil concentrations with literature-based ingestion TRVs; ratios ≥1 based on the NOAEL-LOAEL range indicate an effect	Indian mongoose

TABLE L-5

Bioaccumulative Chemicals List and Log K_{ow} Values For Relevant Chemicals

SWMU 20 Remedial Investigation

Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Log K_{ow} Range	Selected log K_{ow}	Reference
Metals			
Antimony[1]	-- - --	--	--
Arsenic	-- - --	--	--
Barium[1]	-- - --	--	--
Beryllium[1]	-- - --	--	--
Cadmium	-- - --	--	--
Chromium[2]	-- - --	--	--
Cobalt[1]	-- - --	--	--
Copper	-- - --	--	--
Lead	-- - --	--	--
Manganese[1]	-- - --	--	--
Mercury[3]	-- - --	--	--
Nickel	-- - --	--	--
Selenium	-- - --	--	--
Silver	-- - --	--	--
Vanadium[1]	-- - --	--	--
Zinc	-- - --	--	--
Polychlorinated Biphenyls[4]			
Aroclor-1016	Not reported	5.60	Sample et al. 1996
Aroclor-1221	Not reported	4.70	Jones et al. 1997
Aroclor-1232	Not reported	5.10	Jones et al. 1997
Aroclor-1242	Not reported	5.60	Jones et al. 1997
Aroclor-1248	Not reported	6.20	Jones et al. 1997
Aroclor-1254	Not reported	6.50	Jones et al. 1997
Aroclor-1260	Not reported	6.80	Jones et al. 1997
Pesticides			
4,4'-DDD	5.90 - 6.65	6.10	EPA 1995a
4,4'-DDE	5.63 - 6.96	6.76	EPA 1995a
4,4'-DDT	5.56 - 7.01	6.53	EPA 1995a
Aldrin	5.11 - 7.50	6.50	EPA 1995a
alpha-BHC	3.75 - 3.81	3.80	EPA 1995a
alpha-Chlordane[5]	5.80 - 6.41	6.32	EPA 1995a
beta-BHC	3.75 - 3.84	3.81	EPA 1995a
delta-BHC	Not reported	4.10	EPA 1996
Dieldrin	3.63 - 6.20	5.37	EPA 1995a
Endosulfan I	3.55 - 3.85	3.83	EPA 1995a
Endosulfan II	3.62 - 4.52	4.52	EPA 1995a
Endrin	2.92 - 5.20	5.06	EPA 1995a
gamma-BHC (Lindane)	3.61 - 3.90	3.73	EPA 1995a
gamma-Chlordane[5]	5.80 - 6.41	6.32	EPA 1995a
Heptachlor	4.93 - 6.26	6.26	EPA 1995a
Heptachlor epoxide	3.50 - 5.40	5.00	EPA 1995a
Methoxychlor	4.20 - 5.60	5.08	EPA 1995a
Toxaphene	4.33 - 5.56	5.50	EPA 1995a
Volatile and Semivolatile Organic Compounds			
1,1,2,2-Tetrachloroethane[6]	2.31 - 2.64	2.39	EPA 1995a
1,2,4,5-Tetrachlorobenzene	4.51 - 4.83	4.64	EPA 1995a
1,2,4-Trichlorobenzene	3.89 - 4.23	4.01	EPA 1995a

TABLE L-5

Bioaccumulative Chemicals List and Log K_{ow} Values For Relevant Chemicals

SWMU 20 Remedial Investigation

Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Log K_{ow} Range	Selected log K_{ow}	Reference
1,2-Dichlorobenzene	3.20 - 3.61	3.43	EPA 1995a
1,3-Dichlorobenzene	Not reported	3.50	EPA 1996
1,4-Dichlorobenzene	3.26 - 3.62	3.42	EPA 1995a
4-Bromophenyl-phenylether	4.89 - 5.24	5.00	EPA 1995a
4-Chlorophenyl-phenylether	4.08 - 5.09	4.95	EPA 1995a
Acenaphthene	3.77 - 4.49	3.92	EPA 1995a
Acenaphthylene	Not reported	3.90	EPA 2014
Anthracene	4.44 - 4.80	4.55	EPA 1995a
Benzo(a)anthracene	5.61 - 5.79	5.70	EPA 1995a
Benzo(a)pyrene	5.98 - 6.34	6.11	EPA 1995a
Benzo(b)fluoranthene	5.79 - 6.40	6.20	EPA 1995a
Benzo(g,h,i)perylene	6.58 - 7.05	6.70	EPA 1995a
Benzo(k)fluoranthene	6.12 - 6.27	6.20	EPA 1995a
Chrysene	5.41 - 5.79	5.70	EPA 1995a
Dibenz(a,h)anthracene	6.50 - 6.88	6.69	EPA 1995a
Fluoranthene	4.84 - 5.39	5.12	EPA 1995a
Fluorene	4.04 - 4.40	4.21	EPA 1995a
Hexachlorobenzene	5.23 - 6.92	5.89	EPA 1995a
Hexachlorobutadiene	4.74 - 5.16	4.81	EPA 1995a
Hexachlorocyclopentadiene	5.05 - 5.51	5.39	EPA 1995a
Hexachloroethane	3.82 - 4.14	4.00	EPA 1995a
Indeno(1,2,3-cd)pyrene	6.58 - 6.72	6.65	EPA 1995a
Pentachlorophenol	5.01 - 5.24	5.09	EPA 1995a
Phenanthrene	4.37 - 4.57	4.55	EPA 1995a
Pyrene	4.76 - 5.52	5.11	EPA 1995a

[1] Terrestrial habitats (soils) only (see text)

[2] Listed as chromium VI but applied to total chromium

[3] Listed as methylmercury but applied to total mercury

[4] PCB congeners 8, 18, 28, 44, 52, 66, 77, 81, 101, 105, 118, 126, 128, 138, 153, 156, 169, 170, 180, 187, 195, 206, and 209 are also listed in EPA (2000)

[5] Listed as "chlordane"

[6] Listed as "tetrachloroethane"

TABLE L-6
Soil Bioconcentration Factors For Plants (Dry Weight)
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Metals						
Antimony	--	See Table L-7	--	--	See Table L-7	--
Arsenic	--	See Table L-7	--	--	See Table L-7	--
Barium	0.477	90th percentile	Bechtel Jacobs 1998a	0.154	Geometric mean	Bechtel Jacobs 1998a
Beryllium	--	See Table L-7	--	--	See Table L-7	--
Cadmium	--	See Table L-7	--	--	See Table L-7	--
Chromium	0.084	90th percentile	Bechtel Jacobs 1998a	0.041	Median	Bechtel Jacobs 1998a; EPA 2007j
Cobalt	0.025	90th percentile	Bechtel Jacobs 1998a	0.008	Geometric mean	Bechtel Jacobs 1998a
Copper	--	See Table L-7	--	--	See Table L-7	--
Lead	--	See Table L-7	--	--	See Table L-7	--
Manganese	0.234	90th percentile	Bechtel Jacobs 1998a	0.081	Geometric mean	Bechtel Jacobs 1998a
Mercury	--	See Table L-7	--	--	See Table L-7	--
Nickel	--	See Table L-7	--	--	See Table L-7	--
Selenium	--	See Table L-7	--	--	See Table L-7	--
Silver	0.037	90th percentile	Bechtel Jacobs 1998a	0.014	Median	Bechtel Jacobs 1998a; EPA 2007j
Vanadium	0.010	90th percentile	Bechtel Jacobs 1998a	0.005	Geometric mean	Bechtel Jacobs 1998a
Zinc	--	See Table L-7	--	--	See Table L-7	--
Pesticides						
4,4'-DDD	--	See Table L-7	--	--	See Table L-7	--
4,4'-DDE	--	See Table L-7	--	--	See Table L-7	--
4,4'-DDT	--	See Table L-7	--	--	See Table L-7	--
Aldrin	0.139	Calculated[1]	EPA 2007j	0.139	Calculated	EPA 2007j
alpha-BHC	1.735	Calculated	EPA 2007j	1.735	Calculated	EPA 2007j
alpha-Chlordane	0.165	Calculated	EPA 2007j	0.165	Calculated	EPA 2007j
beta-BHC	1.719	Calculated	EPA 2007j	1.719	Calculated	EPA 2007j
delta-BHC	1.311	Calculated	EPA 2007j	1.311	Calculated	EPA 2007j
Dieldrin	0.410	Median	EPA 2007j	0.410	Median	EPA 2007j
Endosulfan I	1.687	Calculated	EPA 2007j	1.687	Calculated	EPA 2007j
Endosulfan II	0.886	Calculated	EPA 2007j	0.886	Calculated	EPA 2007j
Endrin	0.535	Calculated	EPA 2007j	0.535	Calculated	EPA 2007j
gamma-BHC (Lindane)	1.852	Calculated	EPA 2007j	1.852	Calculated	EPA 2007j
gamma-Chlordane	0.165	Calculated	EPA 2007j	0.165	Calculated	EPA 2007j

TABLE L-6
Soil Bioconcentration Factors For Plants (Dry Weight)
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Heptachlor	0.174	Calculated	EPA 2007j	0.174	Calculated	EPA 2007j
Heptachlor epoxide	0.566	Calculated	EPA 2007j	0.566	Calculated	EPA 2007j
Methoxychlor	0.525	Calculated	EPA 2007j	0.525	Calculated	EPA 2007j
Toxaphene	0.355	Calculated	EPA 2007j	0.355	Calculated	EPA 2007j
Polychlorinated Biphenyls						
Aroclor-1016	0.323	Calculated	EPA 2007j	0.323	Calculated	EPA 2007j
Aroclor-1221	0.749	Calculated	EPA 2007j	0.749	Calculated	EPA 2007j
Aroclor-1232	0.515	Calculated	EPA 2007j	0.515	Calculated	EPA 2007j
Aroclor-1242	0.323	Calculated	EPA 2007j	0.323	Calculated	EPA 2007j
Aroclor-1248	0.184	Calculated	EPA 2007j	0.184	Calculated	EPA 2007j
Aroclor-1254	0.139	Calculated	EPA 2007j	0.139	Calculated	EPA 2007j
Aroclor-1260	0.105	Calculated	EPA 2007j	0.105	Calculated	EPA 2007j
Volatile and Semivolatile Organic Compounds						
1,1,2,2-Tetrachloroethane	1.000	Assumed	--	1.000	Assumed	--
1,2,4,5-Tetrachlorobenzene	0.792	Calculated	EPA 2007j	0.792	Calculated	EPA 2007j
1,2,4-Trichlorobenzene	1.426	Calculated	EPA 2007j	1.426	Calculated	EPA 2007j
1,2-Dichlorobenzene	2.452	Calculated	EPA 2007j	2.452	Calculated	EPA 2007j
1,3-Dichlorobenzene	2.296	Calculated	EPA 2007j	2.296	Calculated	EPA 2007j
1,4-Dichlorobenzene	2.475	Calculated	EPA 2007j	2.475	Calculated	EPA 2007j
4-Bromophenyl-phenylether	0.566	Calculated	EPA 2007j	0.566	Calculated	EPA 2007j
4-Chlorophenyl-phenylether	0.593	Calculated	EPA 2007j	0.593	Calculated	EPA 2007j
Acenaphthene	--	See Table L-7	--	--	See Table L-7	--
Acenaphthylene	--	See Table L-7	--	--	See Table L-7	--
Anthracene	--	See Table L-7	--	--	See Table L-7	--
Benzo(a)anthracene	--	See Table L-7	--	--	See Table L-7	--
Benzo(a)pyrene	--	See Table L-7	--	--	See Table L-7	--
Benzo(b)fluoranthene	0.310	Median	EPA 2007j	0.310	Median	EPA 2007j
Benzo(g,h,i)perylene	--	See Table L-7	--	--	See Table L-7	--
Benzo(k)fluoranthene	--	See Table L-7	--	--	See Table L-7	--
Chrysene	--	See Table L-7	--	--	See Table L-7	--
Dibenz(a,h)anthracene	0.130	Median	EPA 2007j	0.130	Median	EPA 2007j
Fluoranthene	0.500	Median	EPA 2007j	0.500	Median	EPA 2007j
Fluorene	--	See Table L-7	--	--	See Table L-7	--
Hexachlorobenzene	0.246	Calculated	EPA 2007j	0.246	Calculated	EPA 2007j
Hexachlorobutadiene	0.675	Calculated	EPA 2007j	0.675	Calculated	EPA 2007j

TABLE L-6
Soil Bioconcentration Factors For Plants (Dry Weight)
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Hexachlorocyclopentadiene	0.393	Calculated	EPA 2007j	0.393	Calculated	EPA 2007j
Hexachloroethane	1.439	Calculated	EPA 2007j	1.439	Calculated	EPA 2007j
Indeno(1,2,3-cd)pyrene	0.110	Median	EPA 2007j	0.110	Median	EPA 2007j
Pentachlorophenol	5.93	Median	EPA 2007j	5.93	Median	EPA 2007j
Phenanthrene	--	See Table L-7	--	--	See Table L-7	--
Pyrene	0.720	Median	EPA 2007j	0.720	Median	EPA 2007j

[1] Calculated as described in the text using the "selected" log K_{ow} from Table L-5

TABLE L-7
Bioconcentration/Bioaccumulation Factor Models (Dry Weight)
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Plants[1]	Reference	Soil Invertebrates[2]	Reference	Small Mammal Omnivores[3]	Reference
Metals						
Antimony	$C_p = e^{(-3.233 + 0.938(\ln Cs))}$	EPA 2007j	--	--	--	--
Arsenic	$C_p = e^{(-1.992 + 0.564(\ln Cs))}$	Bechtel Jacobs 1998a	$C_w = e^{(-1.421 + 0.706(\ln Cs))}$	Sample et al. 1998a; EPA 2007j	$C_m = e^{(-4.5796 + 0.7354(\ln Cs))}$	Sample et al. 1998b
Beryllium	$C_p = e^{(-0.5361 + 0.7345(\ln Cs))}$	EPA 2007j	--	--	--	--
Cadmium	$C_p = e^{(-0.476 + 0.546(\ln Cs))}$	Bechtel Jacobs 1998a; EPA 2007j	$C_w = e^{(2.114 + 0.795(\ln Cs))}$	Sample et al. 1998a; EPA 2007j	$C_m = e^{(-1.5383 + 0.5660(\ln Cs))}$	Sample et al. 1998b
Chromium	--	--	--	--	$C_m = e^{(-1.4945 + 0.7326(\ln Cs))}$	Sample et al. 1998b
Cobalt	--	--	--	--	$C_m = e^{(-4.4669 + 1.3070(\ln Cs))}$	Sample et al. 1998b; EPA 2007j
Copper	$C_p = e^{(0.669 + 0.394(\ln Cs))}$	Bechtel Jacobs 1998a; EPA 2007j	$C_w = e^{(1.675 + 0.264(\ln Cs))}$	Sample et al. 1998a	$C_m = e^{(1.4592 + 0.2681(\ln Cs))}$	Sample et al. 1998b
Lead	$C_p = e^{(-1.328 + 0.561(\ln Cs))}$	Bechtel Jacobs 1998a; EPA 2007j	$C_w = e^{(-0.218 + 0.807(\ln Cs))}$	Sample et al. 1998a; EPA 2007j	$C_m = e^{(0.0761 + 0.4422(\ln Cs))}$	Sample et al. 1998b; EPA 2007j
Manganese	--	--	$C_w = e^{(-0.809 + 0.682(\ln Cs))}$	Sample et al. 1998a; EPA 2007j	--	--
Mercury	$C_p = e^{(-0.996 + 0.544(\ln Cs))}$	Bechtel Jacobs 1998a	--	--	--	--
Nickel	$C_p = e^{(-2.224 + 0.748(\ln Cs))}$	Bechtel Jacobs 1998a; EPA 2007j	--	--	$C_m = e^{(-0.2462 + 0.4658(\ln Cs))}$	Sample et al. 1998b; EPA 2007j
Selenium	$C_p = e^{(-0.678 + 1.104(\ln Cs))}$	Bechtel Jacobs 1998a; EPA 2007j	$C_w = e^{(-0.075 + 0.733(\ln Cs))}$	Sample et al. 1998a; EPA 2007j	$C_m = e^{(-0.4158 + 0.3764(\ln Cs))}$	Sample et al. 1998b; EPA 2007j
Zinc	$C_p = e^{(1.575 + 0.555(\ln Cs))}$	Bechtel Jacobs 1998a; EPA 2007j	$C_w = e^{(4.449 + 0.328(\ln Cs))}$	Sample et al. 1998a; EPA 2007j	$C_m = e^{(4.4713 + 0.0738(\ln Cs))}$	Sample et al. 1998b
Pesticides						
4,4'-DDD	$C_p = e^{(-2.5119 + 0.7524(\ln Cs))}$	EPA 2007j	$C_w = e^{(1.1613 + 0.6975(\ln Cs))}$	EPA 2007j	--	--
4,4'-DDE	$C_p = e^{(-2.5119 + 0.7524(\ln Cs))}$	EPA 2007j	$C_w = e^{(2.4771 + 0.8804(\ln Cs))}$	EPA 2007j	--	--
4,4'-DDT	$C_p = e^{(-2.5119 + 0.7524(\ln Cs))}$	EPA 2007j	$C_w = e^{(2.1247 + 0.8689(\ln Cs))}$	EPA 2007j	--	--

TABLE L-7
Bioconcentration/Bioaccumulation Factor Models (Dry Weight)
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Plants[1]	Reference	Soil Invertebrates[2]	Reference	Small Mammal Omnivores[3]	Reference
Polychlorinated Biphenyls						
Aroclor-1016	--	--	$C_w = e^{(1.410 + 1.361(\ln Cs))}$	Sample et al. 1998a	--	--
Aroclor-1221	--	--	$C_w = e^{(1.410 + 1.361(\ln Cs))}$	Sample et al. 1998a	--	--
Aroclor-1232	--	--	$C_w = e^{(1.410 + 1.361(\ln Cs))}$	Sample et al. 1998a	--	--
Aroclor-1242	--	--	$C_w = e^{(1.410 + 1.361(\ln Cs))}$	Sample et al. 1998a	--	--
Aroclor-1248	--	--	$C_w = e^{(1.410 + 1.361(\ln Cs))}$	Sample et al. 1998a	--	--
Aroclor-1254	--	--	$C_w = e^{(1.410 + 1.361(\ln Cs))}$	Sample et al. 1998a	--	--
Aroclor-1260	--	--	$C_w = e^{(1.410 + 1.361(\ln Cs))}$	Sample et al. 1998a	--	--
PAHs						
Acenaphthene	$C_p = e^{(-5.562 - 0.8556(\ln Cs))}$	EPA 2007j	--	--	--	--
Acenaphthylene	$C_p = e^{(-1.144 + 0.791(\ln Cs))}$	EPA 2007j	--	--	--	--
Anthracene	$C_p = e^{(-0.9887 + 0.7784(\ln Cs))}$	EPA 2007j	--	--	--	--
Benzo(a)anthracene	$C_p = e^{(-2.7078 + 0.5944(\ln Cs))}$	EPA 2007j	--	--	--	--
Benzo(a)pyrene	$C_p = e^{(-2.0615 + 0.9750(\ln Cs))}$	EPA 2007j	--	--	--	--
Benzo(g,h,i)perylene	$C_p = e^{(-0.9313 + 1.1829(\ln Cs))}$	EPA 2007j	--	--	--	--
Benzo(k)fluoranthene	$C_p = e^{(-2.1579 + 0.8595(\ln Cs))}$	EPA 2007j	--	--	--	--
Chrysene	$C_p = e^{(-2.7078 + 0.5944(\ln Cs))}$	EPA 2007j	--	--	--	--
Fluorene	$C_p = e^{(-5.562 - 0.8556(\ln Cs))}$	EPA 2007j	--	--	--	--
Phenanthrene	$C_p = e^{(-0.1665 + 0.6203(\ln Cs))}$	EPA 2007j	--	--	--	--

[1] Where C_p = Concentration in aboveground portion of plant (mg/kg dry wt) and C_s = Concentration in soil (mg/kg dry wt)
[2] Where C_w = Concentration in earthworm (mg/kg dry wt) and C_s = Concentration in soil (mg/kg dry wt)
[3] Where C_m = Concentration in whole-body small mammal (mg/kg dry wt) and C_s = Concentration in soil (mg/kg dry wt)

TABLE L-8
Soil Bioaccumulation Factors for Soil Invertebrates (Dry Weight)
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Metals						
Antimony	1.000	Assumed	--	1.000	Assumed	--
Arsenic	--	See Table L-7	--	--	See Table L-7	--
Barium	0.160	90th percentile	Sample et al. 1998a	0.060	Geometric mean	Sample et al. 1998a
Beryllium	1.182	90th percentile	Sample et al. 1998a	0.070	Geometric mean	Sample et al. 1998a
Cadmium	--	See Table L-7	--	--	See Table L-7	--
Chromium	3.162	90th percentile	Sample et al. 1998a	0.320	Geometric mean	Sample et al. 1998a
Cobalt	0.291	90th percentile	Sample et al. 1998a	0.113	Geometric mean	Sample et al. 1998a
Copper	--	See Table L-7	--	--	See Table L-7	--
Lead	--	See Table L-7	--	--	See Table L-7	--
Manganese	--	See Table L-7	--	--	See Table L-7	--
Mercury	20.63	90th percentile	Sample et al. 1998a	1.186	Geometric mean	Sample et al. 1998a
Nickel	4.730	90th percentile	Sample et al. 1998a	1.656	Arithmetic mean	Sample et al. 1998a
Selenium	--	See Table L-7	--	--	See Table L-7	--
Silver	15.34	90th percentile	Sample et al. 1998a	2.045	Median	Sample et al. 1998a; EPA 2007j
Vanadium	0.088	90th percentile	Sample et al. 1998a	0.039	Arithmetic mean	Sample et al. 1998a
Zinc	--	See Table L-7	--	--	See Table L-7	--
Pesticides						
4,4'-DDD	--	See Table L-7	--	--	See Table L-7	--
4,4'-DDE	--	See Table L-7	--	--	See Table L-7	--
4,4'-DDT	--	See Table L-7	--	--	See Table L-7	--
Aldrin	3.30	Mean	Edwards and Bohlen 1992	3.30	Mean	Edwards and Bohlen 1992
alpha-BHC	1.00	Assumed	--	1.00	Assumed	--
alpha-Chlordane	4.00	Mean	Edwards and Bohlen 1992	4.00	Mean	Edwards and Bohlen 1992
beta-BHC	1.00	Assumed	--	1.00	Assumed	--
delta-BHC	1.00	Assumed	--	1.00	Assumed	--
Dieldrin	14.7	Median	EPA 2007j	14.7	Median	EPA 2007j
Endosulfan I	1.00	Assumed	--	1.00	Assumed	--
Endosulfan II	1.00	Assumed	--	1.00	Assumed	--
Endrin	3.60	Mean	Edwards and Bohlen 1992	3.60	Mean	Edwards and Bohlen 1992
gamma-BHC (Lindane)	26.6	Maximum	Romijn et al. 1994	13.7	Mean	Romijn et al. 1994
gamma-Chlordane	4.00	Mean	Edwards and Bohlen 1992	4.00	Mean	Edwards and Bohlen 1992
Heptachlor	3.00	Mean	Edwards and Bohlen 1992	3.00	Mean	Edwards and Bohlen 1992
Heptachlor epoxide	10.0	Mean	Beyer and Gish 1980	10.0	Mean	Beyer and Gish 1980

TABLE L-8
Soil Bioaccumulation Factors for Soil Invertebrates (Dry Weight)
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Methoxychlor	1.00	Assumed	--	1.00	Assumed	--
Toxaphene	1.00	Assumed	--	1.00	Assumed	--
Polychlorinated Biphenyls						
Aroclor-1016	--	See Table L-7	--	--	See Table L-7	--
Aroclor-1221	--	See Table L-7	--	--	See Table L-7	--
Aroclor-1232	--	See Table L-7	--	--	See Table L-7	--
Aroclor-1242	--	See Table L-7	--	--	See Table L-7	--
Aroclor-1248	--	See Table L-7	--	--	See Table L-7	--
Aroclor-1254	--	See Table L-7	--	--	See Table L-7	--
Aroclor-1260	--	See Table L-7	--	--	See Table L-7	--
Volatile and Semivolatile Organic Compounds						
1,1,2,2-Tetrachloroethane	1.00	Assumed	--	1.00	Assumed	--
1,2,4,5-Tetrachlorobenzene	0.50	Mean	Beyer 1996	0.50	Mean	Beyer 1996
1,2,4-Trichlorobenzene	0.56	Mean	Beyer 1996	0.56	Mean	Beyer 1996
1,2-Dichlorobenzene	1.00	Assumed	--	1.00	Assumed	--
1,3-Dichlorobenzene	1.00	Assumed	--	1.00	Assumed	--
1,4-Dichlorobenzene	1.00	Assumed	--	1.00	Assumed	--
4-Bromophenyl-phenylether	1.00	Assumed	--	1.00	Assumed	--
4-Chlorophenyl-phenylether	1.00	Assumed	--	1.00	Assumed	--
Acenaphthene[1]	1.47	Modeled from K_{ow}	EPA 2007j	0.30	Median	Beyer and Stafford 1993
Acenaphthylene[1]	22.9	Modeled from K_{ow}	EPA 2007j	0.22	Median	Beyer and Stafford 1993
Anthracene[1]	2.42	Modeled from K_{ow}	EPA 2007j	0.32	Median	Beyer and Stafford 1993
Benzo(a)anthracene[1]	1.59	Modeled from K_{ow}	EPA 2007j	0.27	Median	Beyer and Stafford 1993
Benzo(a)pyrene[1]	1.33	Modeled from K_{ow}	EPA 2007j	0.34	Median	Beyer and Stafford 1993
Benzo(b)fluoranthene[1]	2.60	Modeled from K_{ow}	EPA 2007j	0.21	Median	Beyer and Stafford 1993
Benzo(g,h,i)perylene[1]	2.94	Modeled from K_{ow}	EPA 2007j	0.15	Median	Beyer and Stafford 1993
Benzo(k)fluoranthene[1]	2.60	Modeled from K_{ow}	EPA 2007j	0.21	Median	Beyer and Stafford 1993
Chrysene[1]	2.29	Modeled from K_{ow}	EPA 2007j	0.44	Median	Beyer and Stafford 1993
Dibenz(a,h)anthracene[1]	2.31	Modeled from K_{ow}	EPA 2007j	0.49	Median	Beyer and Stafford 1993
Fluoranthene[1]	3.04	Modeled from K_{ow}	EPA 2007j	0.37	Median	Beyer and Stafford 1993
Fluorene[1]	9.57	Modeled from K_{ow}	EPA 2007j	0.20	Median	Beyer and Stafford 1993
Hexachlorobenzene	1.69	Mean	Beyer 1996	1.69	Mean	Beyer 1996

TABLE L-8
Soil Bioaccumulation Factors for Soil Invertebrates (Dry Weight)
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Hexachlorobutadiene	1.00	Assumed	--	1.00	Assumed	--
Hexachlorocyclopentadiene	1.00	Assumed	--	1.00	Assumed	--
Hexachloroethane	1.00	Assumed	--	1.00	Assumed	--
Indeno(1,2,3-cd)pyrene[1]	2.86	Modeled from K_{ow}	EPA 2007j	0.41	Median	Beyer and Stafford 1993
Pentachlorophenol	14.6	Median	EPA 2007j	14.6	Median	EPA 2007j
Phenanthrene[1]	1.72	Modeled from K_{ow}	EPA 2007j	0.28	Median	Beyer and Stafford 1993
Pyrene[1]	1.75	Modeled from K_{ow}	EPA 2007j	0.39	Median	Beyer and Stafford 1993

1 - Eco-SSL values are used only for the SERA because they are modeled values; measured median values are available from the literature and are applied to the BERA

TABLE L-9
Soil Bioaccumulation Factors for Small Mammals (Dry Weight) - Omnivores
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Metals						
Antimony[1]	NA	--	See text	NA	--	See text
Arsenic	--	See Table L-7	--	--	See Table L-7	--
Barium[1]	0.069	90th percentile	Sample et al. 1998b	0.046	Median	Sample et al. 1998b
Beryllium[1]	NA	--	See text	NA	--	See text
Cadmium	--	See Table L-7	--	--	See Table L-7	--
Chromium	--	See Table L-7	--	--	See Table L-7	--
Cobalt	--	See Table L-7	--	--	See Table L-7	--
Copper	--	See Table L-7	--	--	See Table L-7	--
Lead	--	See Table L-7	--	--	See Table L-7	--
Manganese	0.037	90th percentile	Sample et al. 1998b	0.031	Median	Sample et al. 1998b
Mercury	0.130	90th percentile	Sample et al. 1998b	0.054	Median	Sample et al. 1998b
Nickel	--	See Table L-7	--	--	See Table L-7	--
Selenium	--	See Table L-7	--	--	See Table L-7	--
Silver	0.810	90th percentile	Sample et al. 1998b	0.151	Median	Sample et al. 1998b
Vanadium	0.013	90th percentile	Sample et al. 1998b	0.010	Median	Sample et al. 1998b
Zinc	--	See Table L-7	--	--	See Table L-7	--
Pesticides						
4,4'-DDD	NA	--	See text	NA	--	See text
4,4'-DDE	NA	--	See text	NA	--	See text
4,4'-DDT	NA	--	See text	NA	--	See text
Aldrin	NA	--	See text	NA	--	See text
alpha-BHC	NA	--	See text	NA	--	See text
alpha-Chlordane	NA	--	See text	NA	--	See text
beta-BHC	NA	--	See text	NA	--	See text
delta-BHC	NA	--	See text	NA	--	See text
Dieldrin	NA	--	See text	NA	--	See text
Endosulfan I	NA	--	See text	NA	--	See text
Endosulfan II	NA	--	See text	NA	--	See text
Endrin	NA	--	See text	NA	--	See text
gamma-BHC (Lindane)	NA	--	See text	NA	--	See text
gamma-Chlordane	NA	--	See text	NA	--	See text
Heptachlor	NA	--	See text	NA	--	See text
Heptachlor epoxide	NA	--	See text	NA	--	See text

TABLE L-9
Soil Bioaccumulation Factors for Small Mammals (Dry Weight) - Omnivores
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Methoxychlor	NA	--	See text	NA	--	See text
Toxaphene	NA	--	See text	NA	--	See text
Polychlorinated Biphenyls						
Aroclor-1016	NA	--	See text	NA	--	See text
Aroclor-1221	NA	--	See text	NA	--	See text
Aroclor-1232	NA	--	See text	NA	--	See text
Aroclor-1242	NA	--	See text	NA	--	See text
Aroclor-1248	NA	--	See text	NA	--	See text
Aroclor-1254	NA	--	See text	NA	--	See text
Aroclor-1260	NA	--	See text	NA	--	See text
Volatile and Semivolatile Organic Compounds						
1,1,2,2-Tetrachloroethane	NA	--	See text	NA	--	See text
1,2,4,5-Tetrachlorobenzene	NA	--	See text	NA	--	See text
1,2,4-Trichlorobenzene	NA	--	See text	NA	--	See text
1,2-Dichlorobenzene	NA	--	See text	NA	--	See text
1,3-Dichlorobenzene	NA	--	See text	NA	--	See text
1,4-Dichlorobenzene	NA	--	See text	NA	--	See text
4-Bromophenyl-phenylether	NA	--	See text	NA	--	See text
4-Chlorophenyl-phenylether	NA	--	See text	NA	--	See text
Acenaphthene	0.0	Assumed	EPA 2007j	0.0	Assumed	EPA 2007j
Acenaphthylene	0.0	Assumed	EPA 2007j	0.0	Assumed	EPA 2007j
Anthracene	0.0	Assumed	EPA 2007j	0.0	Assumed	EPA 2007j
Benzo(a)anthracene	0.0	Assumed	EPA 2007j	0.0	Assumed	EPA 2007j
Benzo(a)pyrene	0.0	Assumed	EPA 2007j	0.0	Assumed	EPA 2007j
Benzo(b)fluoranthene	0.0	Assumed	EPA 2007j	0.0	Assumed	EPA 2007j
Benzo(g,h,i)perylene	0.0	Assumed	EPA 2007j	0.0	Assumed	EPA 2007j
Benzo(k)fluoranthene	0.0	Assumed	EPA 2007j	0.0	Assumed	EPA 2007j
Chrysene	0.0	Assumed	EPA 2007j	0.0	Assumed	EPA 2007j
Dibenz(a,h)anthracene	0.0	Assumed	EPA 2007j	0.0	Assumed	EPA 2007j
Fluoranthene	0.0	Assumed	EPA 2007j	0.0	Assumed	EPA 2007j
Fluorene	0.0	Assumed	EPA 2007j	0.0	Assumed	EPA 2007j
Hexachlorobenzene	NA	--	See text	NA	--	See text
Hexachlorobutadiene	NA	--	See text	NA	--	See text
Hexachlorocyclopentadiene	NA	--	See text	NA	--	See text
Hexachloroethane	NA	--	See text	NA	--	See text

TABLE L-9
Soil Bioaccumulation Factors for Small Mammals (Dry Weight) - Omnivores
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Screening (Step 2)			Baseline (Step 3A)		
	Value	Basis	Reference	Value	Basis	Reference
Indeno(1,2,3-cd)pyrene	0.0	Assumed	EPA 2007j	0.0	Assumed	EPA 2007j
Pentachlorophenol	NA	--	See text	NA	--	See text
Phenanthrene	0.0	Assumed	EPA 2007j	0.0	Assumed	EPA 2007j
Pyrene	0.0	Assumed	EPA 2007j	0.0	Assumed	EPA 2007j

NA - Not Available
1 - Eco-SSL equations were not used for these chemicals because they were based on diet-to-biota factors for cattle. Instead, the process discussed in the text was used.

TABLE L-10
Exposure Parameters for Upper Trophic Level Ecological Receptors - Screening
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Receptor	Minimum Body Weight (kg)		Maximum Body Weight (kg)		Water Ingestion Rate (L/day)		Food Ingestion Rate (kg/day - dry)		Dietary Composition (percent)				Soil Ingestion (percent)	
	Value	Reference	Value	Reference	Value	Reference	Value	Reference	Terrestrial Plants	Soil Invertebrates	Small Mammals	Reference	Value	Reference
Birds														
Pearly-eyed thrasher	0.080	Dunning 2008 (minimum for male/female - Puerto Rico)	0.138	Dunning 2008 (maximum for male/female - Puerto Rico)	0.0000	no drinking water source present on site	0.0174	allometric equation (Nagy 2001)[1]	0	95.4	0	Exclusive diet	4.6	Sample and Suter 1994 (value is for American robin)
Red-tailed hawk	0.957	EPA 1993 (lowest of 6 adult values [3 male/3 female])	1.235	EPA 1993 (highest of 6 adult values [3 male/3 female])	0.0000	no drinking water source present on site	0.0395	Sample and Suter 1994	0	0	100	EPA 1993; Sample and Suter 1994	0	Sample and Suter 1994
Common ground dove	0.0224	Dunning 2008 (minimum - Puerto Rico [gender not reported])	0.0412	Dunning 2008 (maximum - Puerto Rico [gender not reported])	0.0000	no drinking water source present on site	0.0081	allometric equation (Nagy 2001)[2]	95.0	0	0	Martin et al. 1951	5.0	Assumed based on diet
Mammals														
Norway rat	0.168	Silva and Downing 1995 (minimum for male/female - Arkansas)	0.485	Silva and Downing 1995 (maximum for male/female - Arkansas)	0.0000	no drinking water source present on site	0.0398	allometric equation (Nagy 2001)[3]	98.0	0	0	Exclusive diet	2.0	Beyer et al. 1994 (value is for deer mouse)
Indian mongoose	0.312	Silva and Downing 1995 (minimum for male/female - Puerto Rico)	0.936	Silva and Downing 1995 (maximum for male/female - Puerto Rico)	0.0000	no drinking water source present on site	0.0460	allometric equation (Nagy 2001)[4]	0	97.2	0	Exclusive diet	2.8	Beyer et al. 1994 (value is for red fox)

1 - Insectivorous birds equation: $(0.54*((BW*1000)^{0.705}))/1000$ (maximum body weight used)
2 - All birds equation: $(0.638*((BW*1000)^{0.685}))/1000$ (maximum body weight used)
3 - Rodent equation: $(0.332*((BW*1000)^{0.774}))/1000$ (maximum body weight used)
4 - Carnivore equation: $(0.153*((BW*1000)^{0.834}))/1000$ (maximum body weight used)

TABLE L-11
Exposure Parameters for Upper Trophic Level Ecological Receptors - Baseline
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Receptor	Body Weight (kg)		Water Ingestion Rate (L/day)		Food Ingestion Rate (kg/day - dry)		Home Range (ha)		Dietary Composition (percent)				Soil Ingestion (percent)	
	Value	Reference	Value	Reference	Value	Reference	Value	Reference	Terrestrial Plants	Soil Invertebrates	Small Mammals	Reference	Value	Reference
Birds														
Pearly-eyed thrasher	0.104	Dunning 2008 (mean for male/female - Puerto Rico)	0.0000	no drinking water source present on site	0.0123	allometric equation (Nagy 2001)[1]	No data	--	20.0	75.4	0	Oberle 2000 (estimated based on description of diet)	4.6	Sample and Suter 1994 (value is for American robin)
Red-tailed hawk	1.134	EPA 1993 (mean of 6 adult values [3 male/3 female])	0.0000	no drinking water source present on site	0.0363	Sample and Suter 1994	859	EPA 1993 (mean for male/female adults)	0	0	100	EPA 1993; Sample and Suter 1994	0	Sample and Suter 1994
Common ground dove	0.0320	Dunning 2008 (mean - Puerto Rico [gender not reported])	0.0000	no drinking water source present on site	0.0069	allometric equation (Nagy 2001)[2]	No data	--	95.0	0	0	Martin et al. 1951	5.0	Assumed based on diet
Mammals														
Norway rat	0.209	Silva and Downing 1995 (mean for male/female - Arkansas)	0.0000	no drinking water source present on site	0.0207	allometric equation (Nagy 2001)[3]	0.24	Stroud 1982	49.0	49.0	0	Linzey 1998 (estimated based on description of diet)	2.0	Beyer et al. 1994 (value is for deer mouse)
Indian mongoose	0.528	Silva and Downing 1995 (mean for male/female - Puerto Rico)	0.0000	no drinking water source present on site	0.0285	allometric equation (Nagy 2001)[4]	3.20	Nellis 1989	11.1	56.4	29.7	Nellis 1989	2.8	Beyer et al. 1994 (value is for red fox)

1 - Omnivorous birds equation: $(0.67*((BW*1000)^{0.627}))/1000$
2 - All birds equation: $(0.638*((BW*1000)^{0.685}))/1000$
3 - Rodent equation: $(0.332*((BW*1000)^{0.774}))/1000$
4 - Carnivore equation: $(0.153*((BW*1000)^{0.834}))/1000$

TABLE L-12
Soil Ecological Screening Values (ESVs) for Plants and Soil Invertebrates
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	ESV	Units	Type/Receptor	Reference	Comments
Inorganics					
Aluminum	pH < 5.5	--	Eco-SSL	EPA 2003a	
Antimony	78.0	mg/kg	Eco-SSL - Invertebrate	EPA 2005a	
Arsenic	18.0	mg/kg	Eco-SSL - Plant	EPA 2005b	
Barium	330	mg/kg	Eco-SSL - Invertebrate	EPA 2005c	
Beryllium	40.0	mg/kg	Eco-SSL - Invertebrate	EPA 2005d	
Cadmium	32.0	mg/kg	Eco-SSL - Plant	EPA 2005e	
Chromium	64.0	mg/kg	Soil Quality Guideline	CCME 2007	
Cobalt	13.0	mg/kg	Eco-SSL - Plant	EPA 2005f	
Copper	70.0	mg/kg	Eco-SSL - Plant	EPA 2007a	
Cyanide	15.8	mg/kg		MHSPE 2000	Geometric mean of target and intervention values (complex)
Iron	5 < pH > 8	--	Eco-SSL	EPA 2003b	
Lead	120	mg/kg	Eco-SSL - Plant	EPA 2005g	
Manganese	220	mg/kg	Eco-SSL - Plant	EPA 2007b	
Mercury	0.10	mg/kg	Invertebrate	Efroymson et al. 1997b	
Nickel	38.0	mg/kg	Eco-SSL - Plant	EPA 2007c	
Selenium	0.52	mg/kg	Eco-SSL - Plant	EPA 2007d	
Silver	560	mg/kg	Eco-SSL - Plant	EPA 2006	
Thallium	1.00	mg/kg	Plant	Efroymson et al. 1997a	
Tin	50.0	mg/kg	Plant	Efroymson et al. 1997a	NOEC
Vanadium	130	mg/kg	Soil Quality Guideline	CCME 2007	
Zinc	120	mg/kg	Eco-SSL - Invertebrate	EPA 2007e	
Pesticides					
4,4'-DDD	583	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
4,4'-DDE	114	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
4,4'-DDT	100	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Aldrin	3.63	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
alpha-BHC	226	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
alpha-Chlordane	11.0	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
beta-BHC	342	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
delta-BHC	226	ug/kg		alpha-BHC value	
Dieldrin	10.5	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Endosulfan I	6.32	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
Endosulfan II	6.32	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
Endosulfan sulfate	6.32	ug/kg		Endosulfan value	
Endrin	1.95	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Endrin aldehyde	1.95	ug/kg		Endrin value	

TABLE L-12
Soil Ecological Screening Values (ESVs) for Plants and Soil Invertebrates
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	ESV	Units	Type/Receptor	Reference	Comments
Endrin ketone	1.95	ug/kg		Endrin value	
gamma-BHC (Lindane)	7.75	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
gamma-Chlordane	11.0	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
Heptachlor	52.9	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
Heptachlor epoxide	52.9	ug/kg		Heptachlor value	
Methoxychlor	500	ug/kg		Beyer 1990	B value ("moderate soil contamination")
Toxaphene	500	ug/kg		Beyer 1990	B value ("moderate soil contamination")
Polychlorinated Biphenyls					
Aroclor-1016	2,510	ug/kg	Invertebrate	EPA 1999	LC50 (251,000); UF of 100
Aroclor-1221	2,510	ug/kg	Invertebrate	EPA 1999	LC50 (251,000); UF of 100
Aroclor-1232	2,510	ug/kg	Invertebrate	EPA 1999	LC50 (251,000); UF of 100
Aroclor-1242	2,510	ug/kg	Invertebrate	EPA 1999	LC50 (251,000); UF of 100
Aroclor-1248	2,510	ug/kg	Invertebrate	EPA 1999	LC50 (251,000); UF of 100
Aroclor-1254	2,510	ug/kg	Invertebrate	EPA 1999	LC50 (251,000); UF of 100
Aroclor-1260	2,510	ug/kg	Invertebrate	EPA 1999	LC50 (251,000); UF of 100
Semivolatile Organic Compounds					
1,1-Biphenyl	13,600	ug/kg	Plant	Efroymson et al. 1997a	EC50 (68,000); UF of 5
1,2,3-Trichlorobenzene	1,150	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 115,000; UF of 100
1,2,4,5-Tetrachlorobenzene	260	ug/kg	Plant	Hulzebos et al. 1993	Lowest EC50 (1,300); UF of 5
1,2,4-Trichlorobenzene	1,270	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 127,000; UF of 100
1,2-Dichlorobenzene	1,000	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
1,3-Dichlorobenzene	1,000	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
1,4-Dichlorobenzene	1,280	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 128,000; UF of 100
1,4-Dioxane	--	--	--	--	
2,2'-Oxybis(1-chloropropane)	--	--	--	--	
2,3,4,6-Tetrachlorophenol	500	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
2,4,5-Trichlorophenol	1,350	ug/kg	Plant	Efroymson et al. 1997a	NOEC
2,4,6-Trichlorophenol	580	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 58,000; UF of 100
2,4-Dichlorophenol	500	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
2,4-Dimethylphenol	1,000	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
2,4-Dinitrophenol	20,000	ug/kg	Plant	Efroymson et al. 1997a	NOEC
2,4-Dinitrotoluene	11,000	ug/kg	Plant/Invertebrate	NRCC 2006	

TABLE L-12
Soil Ecological Screening Values (ESVs) for Plants and Soil Invertebrates
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	ESV	Units	Type/Receptor	Reference	Comments
2,6-Dinitrotoluene	8,500	ug/kg	Plant/Invertebrate	NRCC 2006	
2-Chloronaphthalene	LMW PAHs	--	--	--	
2-Chlorophenol	500	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
2-Methylnaphthalene	LMW PAHs	--	--	--	
2-Methylphenol	1,000	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
2-Nitroaniline	--	--	--	--	
2-Nitrophenol	1,000	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
3- and 4-Methylphenol	1,000	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
3,3'-Dichlorobenzidine	--	--	--	--	
3-Nitroaniline	--	--	--	--	
4,6-Dinitro-2-methylphenol	1,000	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
4-Bromophenyl-phenylether	--	--	--	--	
4-Chloro-3-methylphenol	500	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
4-Chloroaniline	500	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
4-Chlorophenyl-phenylether	--	--	--	--	
4-Methylphenol	1,000	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
4-Nitroaniline	--	--	--	--	
4-Nitrophenol	380	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 38,000; UF of 100
Acenaphthene	LMW PAHs	--	--	--	
Acenaphthylene	LMW PAHs	--	--	--	
Acetophenone	--	--	--	--	
Anthracene	LMW PAHs	--	--	--	
Atrazine	11.9	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Benzaldehyde	58,400	ug/kg	Plant	Hulzebos et al. 1993	EC50 of 292,000; UF of 5
Benzo(a)anthracene	HMW PAHs	--	--	--	
Benzo(a)pyrene	HMW PAHs	--	--	--	
Benzo(b)fluoranthene	HMW PAHs	--	--	--	
Benzo(g,h,i)perylene	HMW PAHs	--	--	--	
Benzo(k)fluoranthene	HMW PAHs	--	--	--	
Benzoic acid	--	--	--	--	

TABLE L-12
Soil Ecological Screening Values (ESVs) for Plants and Soil Invertebrates
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	ESV	Units	Type/Receptor	Reference	Comments
Benzyl alcohol	--	--	--	--	
bis(2-Chloroethoxy)methane	--	--	--	--	
bis(2-Chloroethyl)ether	--	--	--	--	
bis(2-Ethylhexyl)phthalate	30,000	ug/kg	Plant	CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland
Butylbenzylphthalate	30,000	ug/kg	Plant	CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland
Caprolactam	--	--	--	--	
Carbazole	7,000	ug/kg	Invertebrate	Sverdrup 2001; 2002	EC50 of 35,000; UF of 5
Chrysene	HMW PAHs	--	--	--	
Dibenz(a,h)anthracene	HMW PAHs	--	--	--	
Dibenzofuran	4,600	ug/kg	Invertebrate	Sverdrup 2001; 2002	EC50 of 23,000; UF of 5
Diethylphthalate	26,800	ug/kg	Plant	Efroymson et al. 1997a	EC50 (134,000); UF of 5
Dimethyl phthalate	10,640	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 1,064,000; UF of 100
Di-n-butylphthalate	40,000	ug/kg	Plant	Efroymson et al. 1997a	LOEC (200,000); UF of 5
Di-n-octylphthalate	30,000	ug/kg	Plant	CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland
Fluoranthene	LMW PAHs	--	--	--	
Fluorene	LMW PAHs	--	--	--	
Hexachlorobenzene	1,000	ug/kg		Beyer 1990	B value ("moderate soil contamination")
Hexachlorobutadiene	--	--	--	--	
Hexachlorocyclopentadiene	2,000	ug/kg	Plant	Efroymson et al. 1997a	LOEC (10,000); UF of 5
Hexachloroethane	--	--	--	--	
Indeno(1,2,3-cd)pyrene	HMW PAHs	--	--	--	
Isophorone	--	--	--	--	
Naphthalene	LMW PAHs	--	--	--	
Nitrobenzene	2,260	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 226,000; UF of 100
n-Nitroso-di-n-propylamine	--	--	--	--	
n-Nitrosodiphenylamine	1,090	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 109,000; UF of 100
PAH (HMW)	18,000	ug/kg	Eco-SSL - Invertebrate	EPA 2007i	
PAH (LMW)	29,000	ug/kg	Eco-SSL - Invertebrate	EPA 2007i	
Pentachlorophenol	5,000	ug/kg	Eco-SSL - Plant	EPA 2007h	
Phenanthrene	LMW PAHs	--	--	--	
Phenol	1,880	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 188,000; UF of 100
Pyrene	HMW PAHs	--	--	--	
Pyridine	2,240	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Volatile Organic Compounds					
1,1,1-Trichloroethane	1,025	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
1,1,2,2-Tetrachloroethane	5,000	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")

TABLE L-12
Soil Ecological Screening Values (ESVs) for Plants and Soil Invertebrates
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	ESV	Units	Type/Receptor	Reference	Comments
1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	--	--	--	--	
1,1,2-Trichloroethane	2,000	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
1,1-Dichloroethane	548	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
1,1-Dichloroethene	173	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
1,2,3-Trichlorobenzene	1,150	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 115,000; UF of 100
1,2,4-Trichlorobenzene	1,270	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 127,000; UF of 100
1,2-Dibromo-3-chloropropane	--	--	--	--	
1,2-Dibromoethane	300	ug/kg	Plant	CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland
1,2-Dichlorobenzene	1,000	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
1,2-Dichloroethane	2,190	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
1,2-Dichloropropane	38,800	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 3,880,000; UF of 100
1,3-Dichlorobenzene	1,000	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
1,4-Dichlorobenzene	1,280	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 128,000; UF of 100
2-Butanone	--	--	--	--	
2-Hexanone	--	--	--	--	
4-Methyl-2-pentanone	--	--	--	--	
Acetone	--	--	--	--	
Benzene	6.80	ug/kg	Soil Quality Guideline	CCME 2007	
Bromochloromethane	--	--	--	--	
Bromodichloromethane	--	--	--	--	
Bromoform	300	ug/kg	Plant	CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland
Bromomethane	--	--	--	--	
Carbon disulfide	--	--	--	--	
Carbon tetrachloride	3,400	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Chlorobenzene	2,400	ug/kg	Invertebrate	Efroymson et al. 1997b	LC50 of 240,000; UF of 100
Chloroethane	5,000	ug/kg		CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland
Chloroform	1,844	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Chloromethane	5,000	ug/kg		CCME 2007	Interim Remediation Criteria (IRC) for residential/parkland
cis-1,2-Dichloroethene	447	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
cis-1,3-Dichloropropene	5,000	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
Cyclohexane	6,000	ug/kg		Beyer 1990	B value ("moderate soil contamination")
Dibromochloromethane	--	--	--	--	
Dichlorodifluoromethane(Freon-12)	--	--	--	--	

TABLE L-12
Soil Ecological Screening Values (ESVs) for Plants and Soil Invertebrates
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	ESV	Units	Type/Receptor	Reference	Comments
Ethylbenzene	18.0	ug/kg	Soil Quality Guideline	CCME 2007	
Isopropylbenzene (Cumene)	--	--	--	--	
Methyl acetate	--	--	--	--	
Methylcyclohexane	--	--	--	--	
Methylene chloride	1,250	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Methyl-tert-butyl ether (MTBE)	--	--	--	--	
m- and p-Xylene	2,400	ug/kg	Soil Quality Guideline	CCME 2007	Xylenes
o-Xylene	2,400	ug/kg	Soil Quality Guideline	CCME 2007	Xylenes
Styrene	64,000	ug/kg	Plant	Efroymson et al. 1997a	EC50 (320,000); UF of 5
Tetrachloroethene	200	ug/kg	Soil Quality Guideline	CCME 2007	
Toluene	40,000	ug/kg	Plant	Efroymson et al. 1997a	EC50 (200,000); UF of 5
trans-1,2-Dichloroethene	447	ug/kg		MHSPE 2000	Geometric mean of target and intervention values
trans-1,3-Dichloropropene	5,000	ug/kg		CCME 2007; Beyer 1990	Interim Remediation Criteria (IRC) for residential/parkland; B value ("moderate soil contamination")
Trichloroethene	10.0	ug/kg	Soil Quality Guideline	CCME 2007	
Trichlorofluoromethane(Freon-11)	--	--	--	--	
Vinyl chloride	412	ug/kg		MHSPE 2000; 2001	Geometric mean of target and SRC values
Xylene, total	2,400	ug/kg	Soil Quality Guideline	CCME 2007	

TABLE L-13
Secondary Soil Ecological Screening Values (ESVs)
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	ESV	Units	Type/Receptor	Reference	Comments
Volatile Organic Compounds					
Acetone	2,500	ug/kg	Meadow vole	EPA 2003c	Region 5 value
Carbon disulfide	94.1	ug/kg	Masked shrew	EPA 2003c	Region 5 value

TBLE L-14
Uncertainty Factors
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Convert From	Convert To	Uncertainty Factor
Chronic NOAEL or NOEC	Chronic NOAEL or NOEC	1
Chronic LOAEL or LOEC	Chronic NOAEL or NOEC	5
Chronic NOAEL or NOEC	Chronic LOAEL or LOEC	5
Subchronic NOAEL or NOEC	Chronic NOAEL or NOEC	10
Subchronic LOAEL or LOEC	Chronic NOAEL or NOEC	20
Acute NOAEL or NOEC	Chronic NOAEL or NOEC	30
Acute LOAEL or LOEC	Chronic NOAEL or NOEC	50
LD50 or LC50	Chronic NOAEL or NOEC	100

Uncertainty factors from Wentsel et al. (1996)
Durations are defined as follows (EPA 1999; Sample et al. 1996):
- Acute: <3 days (plants, invertebrates) and <14 days (fish, birds, mammals)
- Subchronic: 3 - 6 days (plants, invertebrates) and 14 - 90 days (fish, birds, mammals)
- Chronic: >7 days (plants, invertebrates) and >90 days or during critical life stage (fish, birds, mammals)

TABLE L-15
Eco-SSL Values for Birds and Mammals
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Bird	Mammal	Units	Reference
Metals				
Antimony	--	0.27	mg/kg	EPA 2005a
Arsenic	43.0	46.0	mg/kg	EPA 2005b
Barium	--	2,000	mg/kg	EPA 2005c
Beryllium	--	21.0	mg/kg	EPA 2005d
Cadmium	0.77	0.36	mg/kg	EPA 2005e
Chromium	26.0	34.0	mg/kg	EPA 2008
Cobalt	120	230	mg/kg	EPA 2005f
Copper	28.0	49.0	mg/kg	EPA 2007a
Lead	11.0	56.0	mg/kg	EPA 2005g
Manganese	4,300	4,000	mg/kg	EPA 2007b
Nickel	210	130	mg/kg	EPA 2007c
Selenium	1.20	0.63	mg/kg	EPA 2007d
Silver	4.20	14.0	mg/kg	EPA 2006
Vanadium	7.80	280	mg/kg	EPA 2005h
Zinc	46.0	79.0	mg/kg	EPA 2007e
Organics				
4,4'-DDT (and metabolites)	0.093	0.021	mg/kg	EPA 2007f
Dieldrin	0.022	0.0049	mg/kg	EPA 2007g
Pentachlorophenol	2.10	2.80	mg/kg	EPA 2007h
PAHs - LMW	--	100	mg/kg	EPA 2007i
PAHs - HMW	--	1.10	mg/kg	EPA 2007i

TABLE L-16
Ingestion-Based Toxicity Reference Values (TRVs) for Mammals
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Chemical Form	Test Organism	Body Weight (kg)	Duration	Exposure Route	Effect/Endpoint	LOAEL (mg/kg/d)	Reference	NOAEL (mg/kg/d)	Reference	MATC (mg/kg/d)	Rat	Mongoose
Metals													
Antimony	--	rat	--	31 days	oral in water	survival, growth, reproduction	0.590	EPA 2005a	0.059	EPA 2005a	0.187	X	X
Arsenic	Arsenite (As+3)	mouse	0.03	3 generations	oral in water/food	reproduction	1.26	Sample et al. 1996	0.25 a	--	0.56	X	
	--	dog	--	8 weeks	oral in diet	survival, growth, reproduction	1.66	EPA 2005b	1.04	EPA 2005b	1.31		X
Barium	--	multiple	--	--	oral	survival, growth, reproduction	259 b	--	51.8	EPA 2005c	116	X	X
Beryllium	--	rat	--	4 years	oral in water	survival, growth, reproduction	2.66 b	--	0.53	EPA 2005d	1.19	X	X
Cadmium	--	rat	--	2 weeks	oral in water	survival, growth, reproduction	7.70	EPA 2005e	0.77	EPA 2005e	2.43	X	X
Chromium	Cr+3	multiple	--	--	oral	survival, growth, reproduction	12.0 b	--	2.40	EPA 2008	5.37	X	X
	Cr+6	multiple	--	--	oral	survival, growth, reproduction	46.2 b	--	9.24	EPA 2008	20.7	X	X
Cobalt	--	multiple	--	--	oral	survival, growth, reproduction	36.7 b	--	7.33	EPA 2005f	16.4	X	X
Copper	--	pig	--	4 weeks	oral in diet	survival, growth, reproduction	9.34	EPA 2007a	5.60	EPA 2007a	7.23	X	
	Copper sulfate	mink	1.00	357 days	oral in diet	reproduction	15.1	Sample et al. 1996	11.7	Sample et al. 1996	13.3		X
Lead	--	rat	--	7 weeks	oral in water	survival, growth, reproduction	8.90	EPA 2005g	4.70	EPA 2005g	6.47	X	X
Manganese	--	multiple	--	--	oral	survival, growth, reproduction	258 b	--	51.5	EPA 2007b	115	X	X
Mercury	Methyl mercury chloride	rat	0.35	3 generations	oral in diet	reproduction	0.160	Sample et al. 1996	0.032	Sample et al. 1996	0.072	X	
	Methyl mercury chloride	mink	1.00	93 days	oral in diet	survival/weight loss	0.25 c	Sample et al. 1996	0.15 c	Sample et al. 1996	0.19		X
Nickel	--	mouse	--	35 days	oral	survival, growth, reproduction	3.40	EPA 2007c	1.70	EPA 2007c	2.40	X	X
Selenium	Potassium selenate	rat	0.35	1 year	oral in water	reproduction	0.33	Sample et al. 1996	0.20	Sample et al. 1996	0.26	X	X
Silver	--	pig	--	40 days	oral in diet	survival, growth, reproduction	60.2	EPA 2006	12.0 a	--	26.9	X	X
Vanadium	--	mouse	--	12 days	oral (gavage)	survival, growth, reproduction	8.31	EPA 2005h	4.16	EPA 2005h	5.88	X	X
Zinc	--	multiple	--	--	oral	survival, growth, reproduction	377 b	--	75.4	EPA 2007e	169	X	X
Pesticides													
4,4'-DDD	--	rat	--	15 days	oral (gavage)	survival, growth, reproduction	0.735	EPA 2007f	0.147	EPA 2007f	0.329	X	X
4,4'-DDE	--	rat	--	15 days	oral (gavage)	survival, growth, reproduction	0.735	EPA 2007f	0.147	EPA 2007f	0.329	X	X
4,4'-DDT	--	rat	--	15 days	oral (gavage)	survival, growth, reproduction	0.735	EPA 2007f	0.147	EPA 2007f	0.329	X	X
Aldrin	--	rat	0.35	3 generations	oral in diet	reproduction	1.00	Sample et al. 1996	0.20	Sample et al. 1996	0.45	X	X
alpha-BHC	Mixed isomers	rat	0.35	4 generations	oral in diet	reproduction	3.20	Sample et al. 1996	1.60	Sample et al. 1996	2.26	X	X
alpha-Chlordane	Chlordane	mouse	0.03	6 generations	oral in diet	reproduction	9.16	Sample et al. 1996	4.58	Sample et al. 1996	6.48	X	X
beta-BHC	Mixed isomers	rat	0.35	4 generations	oral in diet	reproduction	3.20	Sample et al. 1996	1.60	Sample et al. 1996	2.26	X	X
delta-BHC	Mixed isomers	rat	0.35	4 generations	oral in diet	reproduction	3.20	Sample et al. 1996	1.60	Sample et al. 1996	2.26	X	X
Dieldrin	--	rat	--	750 days	oral in diet	survival, growth, reproduction	0.030	EPA 2007g	0.015	EPA 2007g	0.021	X	X
Endosulfan I	--	rat	0.35	30 days	oral (gavage)	fertility	0.75 b	--	0.15	Sample et al. 1996	0.34	X	X
Endosulfan II	--	rat	0.35	30 days	oral (gavage)	fertility	0.75 b	--	0.15	Sample et al. 1996	0.34	X	X
Endrin	--	mouse	0.03	120 days	oral in diet	reproduction	0.92	Sample et al. 1996	0.18 a	--	0.41	X	X
gamma-BHC (Lindane)	--	rat	0.35	3 generations	oral in diet	reproduction	40.0 b	--	8.00	Sample et al. 1996	17.9	X	X
gamma-Chlordane	Chlordane	mouse	0.03	6 generations	oral in diet	reproduction	9.16	Sample et al. 1996	4.58	Sample et al. 1996	6.48	X	X
Heptachlor	--	mink	1.00	181 days	oral in diet	reproduction	1.00	Sample et al. 1996	0.20 a	--	0.45	X	X
Heptachlor epoxide	--	mink	1.00	181 days	oral in diet	reproduction	1.00	Heptachlor value	0.20 a	--	0.45	X	X
Methoxychlor	--	rat	0.35	11 months	oral in diet	reproduction	8.00	Sample et al. 1996	4.00	Sample et al. 1996	5.66	X	X
Toxaphene	--	rat	0.35	3 generations	oral in diet	reproduction	40.0 b	--	8.00	Sample et al. 1996	17.9	X	X
Polychlorinated Biphenyls													
Aroclor-1016	--	oldfield mouse	0.014	12 months	oral in diet	reproduction	0.680	Aroclor-1254 value	0.136 a	Aroclor-1254 value	0.304	X	
	--	mink	1.00	18 months	oral in diet	reproduction	3.43	Sample et al. 1996	1.37	Sample et al. 1996	2.17		X
Aroclor-1221	--	oldfield mouse	0.014	12 months	oral in diet	reproduction	0.680	Aroclor-1254 value	0.136 a	Aroclor-1254 value	0.304	X	
	--	mink	1.00	7 months	oral in diet	reproduction	0.690	Aroclor-1242 value	0.138 a	Aroclor-1242 value	0.309		X
Aroclor-1232	--	oldfield mouse	0.014	12 months	oral in diet	reproduction	0.680	Aroclor-1254 value	0.136 a	Aroclor-1254 value	0.304	X	
	--	mink	1.00	7 months	oral in diet	reproduction	0.690	Aroclor-1242 value	0.138 a	Aroclor-1242 value	0.309		X
Aroclor-1242	--	oldfield mouse	0.014	12 months	oral in diet	reproduction	0.680	Aroclor-1254 value	0.136 a	Aroclor-1254 value	0.304	X	
	--	mink	1.00	7 months	oral in diet	reproduction	0.690	Sample et al. 1996	0.138 a	--	0.309		X

TABLE L-16
Ingestion-Based Toxicity Reference Values (TRVs) for Mammals
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Chemical Form	Test Organism	Body Weight (kg)	Duration	Exposure Route	Effect/Endpoint	LOAEL (mg/kg/d)	Reference	NOAEL (mg/kg/d)	Reference	MATC (mg/kg/d)	Rat	Mongoose
Aroclor-1248	--	oldfield mouse	0.014	12 months	oral in diet	reproduction	0.680	Aroclor-1254 value	0.136 a	Aroclor-1254 value	0.304	X	
	--	mink	1.00	4.5 months	oral in diet	reproduction	0.690	Aroclor-1254 value	0.140	Aroclor-1254 value	0.311		X
Aroclor-1254	--	oldfield mouse	0.014	12 months	oral in diet	reproduction	0.680	Sample et al. 1996	0.136 a	--	0.304	X	
	--	mink	1.00	4.5 months	oral in diet	reproduction	0.690	Sample et al. 1996	0.140	Sample et al. 1996	0.311		X
Aroclor-1260	--	oldfield mouse	0.014	12 months	oral in diet	reproduction	0.680	Aroclor-1254 value	0.136 a	Aroclor-1254 value	0.304	X	
	--	mink	1.00	4.5 months	oral in diet	reproduction	0.690	Aroclor-1254 value	0.140	Aroclor-1254 value	0.311		X
Volatile and Semivolatile Organic Compounds													
1,1,2,2-Tetrachloroethane	--	rat	0.35	78 weeks	oral (gavage)	reproduction	380 b	--	76.0	ATSDR 2008	170	X	X
1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	--	NA	--	NA	--	NA	X	X
1,2,4-Trichlorobenzene	--	rat	0.35	3 generations	oral in water	reproduction	106	Coulston and Kolbye 1994	53.0	Coulston and Kolbye 1994	75.0	X	X
1,2-Dichlorobenzene	--	rat	0.35	chronic	oral	liver/kidney	429 b	--	85.7	Coulston and Kolbye 1994	192	X	X
1,3-Dichlorobenzene	--	rat	0.35	chronic	oral	liver/kidney	429 b	--	85.7	Value for 1,2-Dichlorobenzene	192	X	X
1,4-Dichlorobenzene	--	rat	0.35	2 generations	oral (gavage)	developmental	90.0	ATSDR 2006	30.0	ATSDR 2006	52.0	X	X
4-Bromophenyl-phenylether	--	--	--	--	--	--	NA	--	NA	--	NA	X	X
4-Chlorophenyl-phenylether	--	--	--	--	--	--	NA	--	NA	--	NA	X	X
Acenaphthene	--	rat	--	6 weeks	oral in diet	survival, growth, reproduction	328	EPA 2007i	65.6	EPA 2007i	147	X	X
Acenaphthylene	--	rat	--	6 weeks	oral in diet	survival, growth, reproduction	328	EPA 2007i	65.6	EPA 2007i	147	X	X
Anthracene	--	rat	--	6 weeks	oral in diet	survival, growth, reproduction	328	EPA 2007i	65.6	EPA 2007i	147	X	X
Benzo(a)anthracene	--	mouse	--	65 weeks	oral in diet	survival, growth, reproduction	3.07	EPA 2007i	0.62	EPA 2007i	1.37	X	X
Benzo(a)pyrene	--	mouse	--	65 weeks	oral in diet	survival, growth, reproduction	3.07	EPA 2007i	0.62	EPA 2007i	1.37	X	X
Benzo(b)fluoranthene	--	mouse	--	65 weeks	oral in diet	survival, growth, reproduction	3.07	EPA 2007i	0.62	EPA 2007i	1.37	X	X
Benzo(g,h,i)perylene	--	mouse	--	65 weeks	oral in diet	survival, growth, reproduction	3.07	EPA 2007i	0.62	EPA 2007i	1.37	X	X
Benzo(k)fluoranthene	--	mouse	--	65 weeks	oral in diet	survival, growth, reproduction	3.07	EPA 2007i	0.62	EPA 2007i	1.37	X	X
Chrysene	--	mouse	--	65 weeks	oral in diet	survival, growth, reproduction	3.07	EPA 2007i	0.62	EPA 2007i	1.37	X	X
Dibenz(a,h)anthracene	--	mouse	--	65 weeks	oral in diet	survival, growth, reproduction	3.07	EPA 2007i	0.62	EPA 2007i	1.37	X	X
Fluoranthene	--	rat	--	6 weeks	oral in diet	survival, growth, reproduction	328	EPA 2007i	65.6	EPA 2007i	147	X	X
Fluorene	--	rat	--	6 weeks	oral in diet	survival, growth, reproduction	328	EPA 2007i	65.6	EPA 2007i	147	X	X
Hexachlorobenzene	--	rat	0.35	4 generations	oral in diet	reproduction	4.00	ATSDR 2002	2.00	ATSDR 2002	2.83	X	X
Hexachlorobutadiene	--	rat	0.35	GD 1-22; LD 1-21	oral in diet	developmental	20.0	ATSDR 1994	2.00	ATSDR 1994	6.32	X	X
Hexachlorocyclopentadiene	--	mouse	0.03	GD 6-15	oral (gavage)	developmental	375 b	--	75.0	ATSDR 1999	168	X	X
Hexachloroethane	--	rat	0.35	GD 6-16	oral (gavage)	reproduction	500	ATSDR 1997	100	ATSDR 1997	224	X	X
Indeno(1,2,3-cd)pyrene	--	mouse	--	65 weeks	oral in diet	survival, growth, reproduction	3.07	EPA 2007i	0.62	EPA 2007i	1.37	X	X
Pentachlorophenol	--	multiple	--	--	oral	survival, growth, reproduction	42.1 b	--	8.42	EPA 2007h	18.8	X	X
Phenanthrene	--	rat	--	6 weeks	oral in diet	survival, growth, reproduction	328	EPA 2007i	65.6	EPA 2007i	147	X	X
Pyrene	--	mouse	--	65 weeks	oral in diet	survival, growth, reproduction	3.07	EPA 2007i	0.62	EPA 2007i	1.37	X	X

NA - Not Available
[a] Uncertainty factor of 5 applied to LOAEL
[b] Uncertainty factor of 5 applied to NOAEL
[c] Does not include subchronic uncertainty factor of 10 applied by Sample et al (1996) since the study duration meets the criteria for a chronic study in Table L-14

TABLE L-17
Ingestion-Based Toxicity Reference Values (TRVs) for Birds
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Chemical Form	Test Organism	Body Weight (kg)	Duration	Exposure Route	Effect/Endpoint	LOAEL (mg/kg/d)	Reference	NOAEL (mg/kg/d)	Reference	MATC (mg/kg/d)	Thrasher	Hawk	Dove
Metals														
Antimony	--	--	--	--	--	--	NA	--	NA	--	NA	X	X	X
Arsenic	--	chicken	--	19 days	oral in diet	survival, growth,reproduction	11.2 b	--	2.24	EPA 2005b	5.01	X	X	X
Barium	Barium hydroxide	chicken (chicks)	0.121	4 weeks	oral in diet	survival	41.7 c	Sample et al. 1996	20.8 c	Sample et al. 1996	29.5	X	X	X
Beryllium	--	--	--	--	--	--	NA	--	NA	--	NA	X	X	X
Cadmium	--	multiple	--	--	oral in diet	survival, growth,reproduction	7.35 b	--	1.47	EPA 2005e	3.29	X	X	X
Chromium	Cr+3	multiple	--	--	oral in diet	survival, growth,reproduction	13.3 b	--	2.66	EPA 2008	5.95	X	X	X
Cobalt	--	multiple	--	--	oral in diet	survival, growth,reproduction	38.1 b	--	7.61	EPA 2005f	17.0	X	X	X
Copper	--	chicken	--	84 days	oral in diet	survival, growth,reproduction	12.1	EPA 2007a	4.05	EPA 2007a	7.00	X	X	X
Lead	--	chicken	--	4 weeks	oral in diet	survival, growth,reproduction	3.26	EPA 2005g	1.63	EPA 2005g	2.31			X
	Metallic	American kestrel	0.13	7 months	oral in diet	reproduction	19.3 b	--	3.85	Sample et al. 1996	8.61	X	X	
Manganese	--	multiple	--	--	oral	survival, growth,reproduction	895 b	--	179	EPA 2007b	400	X	X	X
Mercury	Mercury chloride	Japanese quail	0.15	1 year	oral in diet	reproduction	0.90	Sample et al. 1996	0.45	Sample et al. 1996	0.64			X
	--	red-tailed hawk	1.10	12 weeks	oral in diet	survival/neurological	1.20	EPA 1995b	0.49	EPA 1995b	0.77	X	X	
Nickel	--	multiple	--	--	oral in diet	survival, growth,reproduction	33.6 b	--	6.71	EPA 2007c	15.0	X	X	X
Selenium	Selanomethionine	screech owl	0.20	13.7 weeks	oral in diet	reproduction	1.50	Sample et al. 1996	0.44	Sample et al. 1996	0.81	X	X	
	--	chicken	--	2 weeks	oral in diet	survival, growth,reproduction	0.58	EPA 2007d	0.29	EPA 2007d	0.41			X
Silver	--	turkey	--	5 weeks	oral in diet	survival, growth	20.2	EPA 2006	4.04 a	--	9.03	X	X	X
Vanadium	--	chicken	--	5 weeks	oral in diet	survival, growth,reproduction	0.688	EPA 2005h	0.344	EPA 2005h	0.486	X	X	X
Zinc	--	multiple	--	--	oral in diet	survival, growth,reproduction	331 b	--	66.1	EPA 2007e	148	X	X	X
Pesticides														
4,4'-DDD	--	Japanese quail	0.11	3 generations	oral in diet	reproduction	5.00	DDT value	0.50	DDT value	1.58	X		X
	--	barn owl	0.47	2 years	oral in diet	reproduction	0.40 b	DDE value	0.08	DDE value	0.18		X	
4,4'-DDE	--	Japanese quail	0.11	3 generations	oral in diet	reproduction	5.00	DDT value	0.50	DDT value	1.58	X		X
	--	barn owl	0.47	2 years	oral in diet	reproduction	0.40 b	--	0.08	Blus 1996	0.18		X	
4,4'-DDT	--	Japanese quail	0.11	3 generations	oral in diet	reproduction	5.00	EPA 1995b	0.50	EPA 1995b	1.58	X		X
	--	barn owl	0.47	2 years	oral in diet	reproduction	0.40 b	DDE value	0.08	DDE value	0.18		X	
Aldrin	--	ring-necked pheasant	1.14	5 days	oral in diet	survival	0.351 b	--	0.070 e	Hill et al. 1975	0.157	X	X	X
alpha-BHC	Mixed isomers	Japanese quail	0.15	90 days	oral in diet	reproduction	2.25	Sample et al. 1996	0.56	Sample et al. 1996	1.13	X	X	X
alpha-Chlordane	Chlordane	red-winged blackbird	0.06	84 days	oral in diet	survival	10.7	Sample et al. 1996	2.14	Sample et al. 1996	4.79	X	X	
	--	northern bobwhite	0.19	not specified	oral in diet	reproduction	5.95 b	--	1.19	Wiemeyer 1996	2.66			X
beta-BHC	Mixed isomers	Japanese quail	0.15	90 days	oral in diet	reproduction	2.25	Sample et al. 1996	0.56	Sample et al. 1996	1.13	X	X	X
delta-BHC	Mixed isomers	Japanese quail	0.15	90 days	oral in diet	reproduction	2.25	Sample et al. 1996	0.56	Sample et al. 1996	1.13	X	X	X
Dieldrin	--	mallard	--	24 days	oral in diet	survival, growth,reproduction	3.78	EPA 2007g	0.071	EPA 2007g	0.52	X	X	X
Endosulfan I	--	gray partridge	0.40	4 weeks	oral in diet	reproduction	50.0 b	--	10.0	Sample et al. 1996	22.4	X	X	X
Endosulfan II	--	gray partridge	0.40	4 weeks	oral in diet	reproduction	50.0 b	--	10.0	Sample et al. 1996	22.4	X	X	X
Endrin	--	screech owl	0.18	>83 days	oral in diet	reproduction	0.104	Sample et al. 1996	0.021 a	--	0.046	X	X	X
gamma-BHC (Lindane)	--	mallard	1.00	8 weeks	oral (intubation)	reproduction	20.0	Sample et al. 1996	4.00 a	--	8.94	X	X	X
gamma-Chlordane	Chlordane	red-winged blackbird	0.06	84 days	oral in diet	survival	10.7	Sample et al. 1996	2.14	Sample et al. 1996	4.79	X	X	
	--	northern bobwhite	0.19	not specified	oral in diet	reproduction	5.95 b	--	1.19	Wiemeyer 1996	2.66			X
Heptachlor	--	ring-necked pheasant	1.14	5 days	oral in diet	survival	1.38 b	--	0.28 e	Hill et al. 1975	0.62			X
	--	American woodcock	0.20	76 days	oral in diet	survival	2.17	Stickel et al. 1965	0.49	Stickel et al. 1965	1.03	X	X	
Heptachlor epoxide	--	ring-necked pheasant	1.14	5 days	oral in diet	survival	1.38 b	--	0.28 e	Heptachlor value	0.62			X
	--	American woodcock	0.20	76 days	oral in diet	survival	2.17	Stickel et al. 1965	0.49	Stickel et al. 1965	1.03	X	X	
Methoxychlor	--	chicken	1.50	16 weeks	oral in diet	reproduction	1,775 b	--	355	Wiemeyer 1996	794	X	X	X
Toxaphene	--	American black duck	1.00	2 seasons	oral in diet	reproduction	5.00	Wiemeyer 1996	1.00	Wiemeyer 1996	2.24	X	X	X
Polychlorinated Biphenyls														
Aroclor-1016	--	ring-necked pheasant	1.00	17 weeks	oral	reproduction	1.80	Aroclor-1254 value	0.36 a	Aroclor-1254 value	0.80			X
	--	screech owl	0.18	2 generations	oral in diet	reproduction	2.05 b	Aroclor-1242 value	0.41	Aroclor-1242 value	0.92	X	X	

TABLE L-17
Ingestion-Based Toxicity Reference Values (TRVs) for Birds
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Chemical Form	Test Organism	Body Weight (kg)	Duration	Exposure Route	Effect/Endpoint	LOAEL (mg/kg/d)	Reference	NOAEL (mg/kg/d)	Reference	MATC (mg/kg/d)	Thrasher	Hawk	Dove
Aroclor-1221	--	ring-necked pheasant	1.00	17 weeks	oral	reproduction	1.80	Aroclor-1254 value	0.36 a	Aroclor-1254 value	0.80			X
	--	screech owl	0.18	2 generations	oral in diet	reproduction	2.05 b	Aroclor-1242 value	0.41	Aroclor-1242 value	0.92	X	X	
Aroclor-1232	--	ring-necked pheasant	1.00	17 weeks	oral	reproduction	1.80	Aroclor-1254 value	0.36 a	Aroclor-1254 value	0.80			X
	--	screech owl	0.18	2 generations	oral in diet	reproduction	2.05 b	Aroclor-1242 value	0.41	Aroclor-1242 value	0.92	X	X	
Aroclor-1242	--	ring-necked pheasant	1.00	17 weeks	oral	reproduction	1.80	Aroclor-1254 value	0.36 a	Aroclor-1254 value	0.80			X
	--	screech owl	0.18	2 generations	oral in diet	reproduction	2.05 b	--	0.41	Sample et al. 1996	0.92	X	X	
Aroclor-1248	--	ring-necked pheasant	1.00	17 weeks	oral	reproduction	1.80	Aroclor-1254 value	0.36 a	Aroclor-1254 value	0.80			X
	--	screech owl	0.18	2 generations	oral in diet	reproduction	2.05 b	Aroclor-1242 value	0.41	Aroclor-1242 value	0.92	X	X	
Aroclor-1254	--	ring-necked pheasant	1.00	17 weeks	oral	reproduction	1.80	Sample et al. 1996	0.36 a	--	0.80			X
	--	screech owl	0.18	2 generations	oral in diet	reproduction	2.05 b	Aroclor-1242 value	0.41	Aroclor-1242 value	0.92	X	X	
Aroclor-1260	--	ring-necked pheasant	1.00	17 weeks	oral	reproduction	1.80	Aroclor-1254 value	0.36 a	Aroclor-1254 value	0.80			X
	--	screech owl	0.18	2 generations	oral in diet	reproduction	2.05 b	Aroclor-1242 value	0.41	Aroclor-1242 value	0.92	X	X	
Volatile and Semivolatile Organic Compounds														
1,1,2,2-Tetrachloroethane	--	--	--	--	--	--	NA	--	NA	--	NA	X	X	X
1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	--	NA	--	NA	--	NA	X	X	X
1,2,4-Trichlorobenzene	--	northern bobwhite	0.19	14 days	oral	survival	161 b	1,4-Dichlorobenzene value	32.2 d	1,4-Dichlorobenzene value	71.9	X	X	X
1,2-Dichlorobenzene	--	northern bobwhite	0.19	14 days	oral	survival	161 b	1,4-Dichlorobenzene value	32.2 d	1,4-Dichlorobenzene value	71.9	X	X	X
1,3-Dichlorobenzene	--	northern bobwhite	0.19	14 days	oral	survival	161 b	1,4-Dichlorobenzene value	32.2 d	1,4-Dichlorobenzene value	71.9	X	X	X
1,4-Dichlorobenzene	--	northern bobwhite	0.19	14 days	oral	survival	161 b	--	32.2 d	TERRETOX 2002	71.9	X	X	X
4-Bromophenyl-phenylether	--	--	--	--	--	--	NA	--	NA	--	NA	X	X	X
4-Chlorophenyl-phenylether	--	--	--	--	--	--	NA	--	NA	--	NA	X	X	X
Acenaphthene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9	X	X	X
Acenaphthylene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9	X	X	X
Anthracene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9	X	X	X
Benzo(a)anthracene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9	X	X	X
Benzo(a)pyrene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Rigdon and Neal 1963	15.9	X	X	X
Benzo(b)fluoranthene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9	X	X	X
Benzo(g,h,i)perylene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9	X	X	X
Benzo(k)fluoranthene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9	X	X	X
Chrysene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9	X	X	X
Dibenz(a,h)anthracene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9	X	X	X
Fluoranthene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9	X	X	X
Fluorene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9	X	X	X
Hexachlorobenzene	--	Japanese quail	0.15	90 days	oral in diet	reproduction	0.57	Coulston and Kolbye 1994; TERRETOX 2002	0.11	Coulston and Kolbye 1994; TERRETOX 2002	0.25	X	X	X
Hexachlorobutadiene	--	Japanese quail	0.15	90 days	oral in diet	reproduction	17.0 b	--	3.39	Coulston and Kolbye 1994; TERRETOX 2002	7.58	X	X	X
Hexachlorocyclopentadiene	--	--	--	--	--	--	NA	--	NA	--	NA	X	X	X
Hexachloroethane	--	--	--	--	--	--	NA	--	NA	--	NA	X	X	X
Indeno(1,2,3-cd)pyrene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9	X	X	X
Pentachlorophenol	--	chicken	--	1 week	oral in diet	survival, growth	67.3	EPA 2007h	6.73	EPA 2007h	21.3	X	X	X
Phenanthrene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9	X	X	X
Pyrene	--	chicken	1.50	35 days	oral in diet	reproduction	35.5 b	--	7.10 c	Benzo(a)pyrene value	15.9	X	X	X

NA - Not Available
[a] Uncertainty factor of 5 applied to LOAEL
[b] Uncertainty factor of 5 applied to NOAEL
[c] Subchronic to chronic uncertainty factor of 10 applied
[d] Acute to chronic uncertainty factor of 50 applied
[e] Uncertainty factor of 100 applied to LD50

TABLE L-18
Background Data and Upper Tolerance Limits (UTLs) - Surface Soil
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	KTd			Combined Set		
	Maximum	Mean	UTL	Maximum	Mean	UTL
Inorganics (mg/kg)						
Aluminum	24,200	9,771	35,000	41,500	13,100	35,000
Antimony[1]	5.80	--	5.80	5.80	--	5.80
Arsenic	0.64	0.64	1.60	9.60	1.54	9.20
Barium	121	85.1	147	344	76.6	212
Beryllium	--	--	0.27	0.95	0.31	0.95
Cadmium	1.80	0.61	2.20	3.10	0.92	2.40
Chromium	72.0	11.0	72.0	72.0	16.7	72.0
Cobalt	19.4	7.60	16.0	24.0	8.05	26.0
Copper	61.4	38.3	66.0	102	28.1	94.0
Cyanide	NR	NR	0.33	0.45	1.19	0.45
Iron	32,400	14,417	38,100	39,500	17,122	43,200
Lead	4.50	2.50	5.40	10.6	3.26	16.0
Manganese	1,630	639	1,630	1,630	533	1,630
Mercury	0.053	0.053	0.057	0.31	0.073	0.31
Nickel	31.2	5.10	22.0	40.0	7.06	41.0
Selenium	--	--	0.51	1.30	1.79	1.30
Silver	0.091	0.091	0.22	0.22	0.51	0.22
Thallium	0.061	0.03	0.13	0.13	0.12	0.13
Vanadium	142	49.0	144	142	49.8	144
Zinc	35.0	19.0	32.0	35.0	17.9	32.0
Pesticides (ug/kg)[2]						
4,4'-DDD	--	--	--	26.0	--	--
4,4'-DDE	--	--	--	1,200	--	--
4,4'-DDT	--	--	--	990	--	--
Aldrin	--	--	--	--	--	--
alpha-BHC	--	--	--	--	--	--
alpha-Chlordane	--	--	--	--	--	--
beta-BHC	--	--	--	1.90	--	--
Chlordane	--	--	--	14.0	--	--
delta-BHC	--	--	--	0.84	--	--
Dieldrin	--	--	--	0.74	--	--
Endosulfan I	--	--	--	0.44	--	--
Endosulfan II	--	--	--	--	--	--

TABLE L-18
Background Data and Upper Tolerance Limits (UTLs) - Surface Soil
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	KTd			Combined Set		
	Maximum	Mean	UTL	Maximum	Mean	UTL
Endosulfan sulfate	--	--	--	--	--	--
Endrin	--	--	--	2.40	--	--
Endrin aldehyde	--	--	--	--	--	--
Endrin ketone	--	--	--	1.30	--	--
gamma-BHC (Lindane)	--	--	--	--	--	--
gamma-Chlordane	--	--	--	1.90	--	--
Heptachlor	--	--	--	0.76	--	--
Heptachlor epoxide	--	--	--	--	--	--
Methoxychlor	--	--	--	--	--	--
Toxaphene	--	--	--	--	--	--

NR - Not Reported
1 - Maximum value from EPA split samples
2 - Maximum detected concentrations at East Vieques sites considered representative of normal pesticide application and not CERCLA releases (CH2M HILL, 2009)

TABLE L-19
Ecological Screening Statistics - SWMU 20 Surface Soil
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL	Ecological Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	95% UCL Hazard Quotient	Mean Hazard Quotient	COPC for Risk Evaluation?
Volatile Organic Compounds (UG/KG)																		
1,1,1-Trichloroethane	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	1,025	-- / --	0.01	NO	--	-- / --	--	--	--	NO
1,1,2,2-Tetrachloroethane	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	5,000	-- / --	0.003	NO	--	-- / --	--	--	--	NO
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
1,1,2-Trichloroethane	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	2,000	-- / --	0.01	NO	--	-- / --	--	--	--	NO
1,1-Dichloroethane	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	548	-- / --	0.03	NO	--	-- / --	--	--	--	NO
1,1-Dichloroethene	2.49 - 14.0	0 / 22	--	--	--	4.31	2.12	--	173	-- / --	0.08	NO	--	-- / --	--	--	--	NO
1,2,4-Trichlorobenzene	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	1,270	-- / --	0.01	NO	--	-- / --	--	--	--	NO
1,2-Dibromo-3-chloropropane	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
1,2-Dibromoethane	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	300	-- / --	0.05	NO	--	-- / --	--	--	--	NO
1,2-Dichlorobenzene	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	1,000	-- / --	0.01	NO	--	-- / --	--	--	--	NO
1,2-Dichloroethane	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	2,190	-- / --	0.01	NO	--	-- / --	--	--	--	NO
1,2-Dichloropropane	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	38,800	-- / --	0.0004	NO	--	-- / --	--	--	--	NO
1,3-Dichlorobenzene	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	1,000	-- / --	0.01	NO	--	-- / --	--	--	--	NO
1,4-Dichlorobenzene	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	1,280	-- / --	0.01	NO	--	-- / --	--	--	--	NO
2-Butanone	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
2-Hexanone	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
4-Methyl-2-pentanone	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
Acetone	10.0 - 14.0	1 / 15	28.0	28.0	EPI04-SS03-0001	7.13	5.82	--	2,500	0 / 15	0.01	NO	--	-- / --	--	--	--	NO
Benzene	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	6.80	-- / --	2.06	**YES**	--	-- / --	--	--	0.83	NO
Bromodichloromethane	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
Bromoform	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	300	-- / --	0.05	NO	--	-- / --	--	--	--	NO
Bromomethane	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
Carbon disulfide	10.0 - 14.0	1 / 15	10.0	10.0	EPI04-SS03-0001	5.93	1.33	--	94.1	0 / 15	0.11	NO	--	-- / --	--	--	--	NO
Carbon tetrachloride	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	3,400	-- / --	0.004	NO	--	-- / --	--	--	--	NO
Chlorobenzene	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	2,400	-- / --	0.01	NO	--	-- / --	--	--	--	NO
Chloroethane	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	5,000	-- / --	0.003	NO	--	-- / --	--	--	--	NO
Chloroform	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	1,844	-- / --	0.01	NO	--	-- / --	--	--	--	NO
Chloromethane	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	5,000	-- / --	0.003	NO	--	-- / --	--	--	--	NO
cis-1,2-Dichloroethene	2.49 - 14.0	0 / 22	--	--	--	4.31	2.12	--	447	-- / --	0.03	NO	--	-- / --	--	--	--	NO
cis-1,3-Dichloropropene	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	5,000	-- / --	0.003	NO	--	-- / --	--	--	--	NO
Cyclohexane	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	6,000	-- / --	0.002	NO	--	-- / --	--	--	--	NO
Dibromochloromethane	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
Dichlorodifluoromethane (Freon-12)	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
Ethylbenzene	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	18.0	-- / --	0.78	NO	--	-- / --	--	--	--	NO
Isopropylbenzene	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
Methyl acetate	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
Methylcyclohexane	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
Methylene chloride	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	1,250	-- / --	0.01	NO	--	-- / --	--	--	--	NO
Methyl-tert-butyl ether (MTBE)	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
Styrene	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	64,000	-- / --	0.0002	NO	--	-- / --	--	--	--	NO
Tetrachloroethene	2.49 - 14.0	0 / 22	--	--	--	4.31	2.12	--	200	-- / --	0.07	NO	--	-- / --	--	--	--	NO
Toluene	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	40,000	-- / --	0.0004	NO	--	-- / --	--	--	--	NO
trans-1,2-Dichloroethene	2.49 - 14.0	0 / 22	--	--	--	4.31	2.12	--	447	-- / --	0.03	NO	--	-- / --	--	--	--	NO
trans-1,3-Dichloropropene	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	5,000	-- / --	0.003	NO	--	-- / --	--	--	--	NO
Trichloroethene	2.49 - 14.0	0 / 22	--	--	--	4.31	2.12	--	10.0	-- / --	1.40	**YES**	--	-- / --	--	--	0.43	NO
Trichlorofluoromethane (Freon-11)	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
Vinyl chloride	2.49 - 14.0	0 / 22	--	--	--	4.31	2.12	--	412	-- / --	0.03	NO	--	-- / --	--	--	--	NO
Xylene, total	10.0 - 14.0	0 / 15	--	--	--	5.67	0.72	--	2,400	-- / --	0.01	NO	--	-- / --	--	--	--	NO

TABLE L-19
Ecological Screening Statistics - SWMU 20 Surface Soil
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL	Ecological Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	95% UCL Hazard Quotient	Mean Hazard Quotient	COPC for Risk Evaluation?
Semivolatile Organic Compounds (UG/KG)																		
1,1-Biphenyl	350 - 370	0 / 15	--	--	--	180	3.78	--	13,600	-- / --	0.03	NO	--	-- / --	--	--	--	NO
1,4-Dioxane	34.8 - 379	0 / 2	--	--	--	103	122	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
2,2'-Oxybis(1-chloropropane)	350 - 370	0 / 15	--	--	--	180	3.78	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
2,4,5-Trichlorophenol	880 - 930	0 / 15	--	--	--	451	8.28	--	1,350	-- / --	0.69	NO	--	-- / --	--	--	--	NO
2,4,6-Trichlorophenol	350 - 370	0 / 15	--	--	--	180	3.78	--	580	-- / --	0.64	NO	--	-- / --	--	--	--	NO
2,4-Dichlorophenol	350 - 370	0 / 15	--	--	--	180	3.78	--	500	-- / --	0.74	NO	--	-- / --	--	--	--	NO
2,4-Dimethylphenol	350 - 370	0 / 15	--	--	--	180	3.78	--	1,000	-- / --	0.37	NO	--	-- / --	--	--	--	NO
2,4-Dinitrophenol	880 - 930	0 / 9	--	--	--	453	7.50	--	20,000	-- / --	0.05	NO	--	-- / --	--	--	--	NO
2,4-Dinitrotoluene	350 - 370	0 / 15	--	--	--	180	3.78	--	11,000	-- / --	0.03	NO	--	-- / --	--	--	--	NO
2,6-Dinitrotoluene	350 - 370	0 / 15	--	--	--	180	3.78	--	8,500	-- / --	0.04	NO	--	-- / --	--	--	--	NO
2-Chloronaphthalene	350 - 370	0 / 15	--	--	--	180	3.78	--	LMW PAH	-- / --	--	NO	--	-- / --	--	--	--	NO
2-Chlorophenol	350 - 370	0 / 15	--	--	--	180	3.78	--	500	-- / --	0.74	NO	--	-- / --	--	--	--	NO
2-Methylnaphthalene	350 - 370	0 / 15	--	--	--	180	3.78	--	LMW PAH	-- / --	--	NO	--	-- / --	--	--	--	NO
2-Methylphenol	350 - 370	0 / 15	--	--	--	180	3.78	--	1,000	-- / --	0.37	NO	--	-- / --	--	--	--	NO
2-Nitroaniline	880 - 930	0 / 15	--	--	--	451	8.28	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
2-Nitrophenol	350 - 370	0 / 15	--	--	--	180	3.78	--	1,000	-- / --	0.37	NO	--	-- / --	--	--	--	NO
3,3'-Dichlorobenzidine	350 - 370	0 / 15	--	--	--	180	3.78	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
3-Nitroaniline	880 - 930	0 / 15	--	--	--	451	8.28	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
4,6-Dinitro-2-methylphenol	880 - 930	0 / 15	--	--	--	451	8.28	--	1,000	-- / --	0.93	NO	--	-- / --	--	--	--	NO
4-Bromophenyl-phenylether	350 - 370	0 / 15	--	--	--	180	3.78	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
4-Chloro-3-methylphenol	350 - 370	0 / 15	--	--	--	180	3.78	--	500	-- / --	0.74	NO	--	-- / --	--	--	--	NO
4-Chloroaniline	350 - 370	0 / 15	--	--	--	180	3.78	--	500	-- / --	0.74	NO	--	-- / --	--	--	--	NO
4-Chlorophenyl-phenylether	350 - 370	0 / 15	--	--	--	180	3.78	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
4-Methylphenol	350 - 370	0 / 15	--	--	--	180	3.78	--	1,000	-- / --	0.37	NO	--	-- / --	--	--	--	NO
4-Nitroaniline	880 - 930	0 / 15	--	--	--	451	8.28	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
4-Nitrophenol	880 - 930	0 / 15	--	--	--	451	8.28	--	380	-- / --	2.45	**YES**	--	-- / --	--	--	1.19	NO[4]
Acenaphthene	350 - 370	0 / 15	--	--	--	180	3.78	--	LMW PAH	-- / --	--	NO	--	-- / --	--	--	--	NO
Acenaphthylene	350 - 370	0 / 15	--	--	--	180	3.78	--	LMW PAH	-- / --	--	NO	--	-- / --	--	--	--	NO
Acetophenone	350 - 370	0 / 15	--	--	--	180	3.78	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
Anthracene	350 - 370	0 / 15	--	--	--	180	3.78	--	LMW PAH	-- / --	--	NO	--	-- / --	--	--	--	NO
Atrazine	350 - 370	0 / 15	--	--	--	180	3.78	--	11.9	-- / --	31.1	**YES**	--	-- / --	--	--	15.1	NO[4]
Benzaldehyde	350 - 370	0 / 15	--	--	--	180	3.78	--	58,400	-- / --	0.01	NO	--	-- / --	--	--	--	NO
Benzo(a)anthracene	350 - 370	0 / 15	--	--	--	180	3.78	--	HMW PAH	-- / --	--	NO	--	-- / --	--	--	--	NO
Benzo(a)pyrene	350 - 370	0 / 14	--	--	--	180	3.65	--	HMW PAH	-- / --	--	NO	--	-- / --	--	--	--	NO
Benzo(b)fluoranthene	350 - 370	0 / 14	--	--	--	180	3.65	--	HMW PAH	-- / --	--	NO	--	-- / --	--	--	--	NO
Benzo(g,h,i)perylene	350 - 370	0 / 14	--	--	--	180	3.65	--	HMW PAH	-- / --	--	NO	--	-- / --	--	--	--	NO
Benzo(k)fluoranthene	350 - 370	0 / 14	--	--	--	180	3.65	--	HMW PAH	-- / --	--	NO	--	-- / --	--	--	--	NO
bis(2-Chloroethoxy)methane	350 - 370	0 / 15	--	--	--	180	3.78	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
bis(2-Chloroethyl)ether	350 - 370	0 / 15	--	--	--	180	3.78	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
bis(2-Ethylhexyl)phthalate	350 - 370	1 / 15	130	130	EPI04-SS14-0006	177	13.5	--	30,000	0 / 15	0.004	NO	--	-- / --	--	--	--	NO
Butylbenzylphthalate	350 - 370	0 / 15	--	--	--	180	3.78	--	30,000	-- / --	0.01	NO	--	-- / --	--	--	--	NO
Caprolactam	350 - 370	0 / 15	--	--	--	180	3.78	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
Carbazole	350 - 370	0 / 15	--	--	--	180	3.78	--	7,000	-- / --	0.05	NO	--	-- / --	--	--	--	NO
Chrysene	350 - 370	0 / 15	--	--	--	180	3.78	--	HMW PAH	-- / --	--	NO	--	-- / --	--	--	--	NO
Dibenz(a,h)anthracene	350 - 370	0 / 14	--	--	--	180	3.65	--	HMW PAH	-- / --	--	NO	--	-- / --	--	--	--	NO
Dibenzofuran	350 - 370	0 / 15	--	--	--	180	3.78	--	4,600	-- / --	0.08	NO	--	-- / --	--	--	--	NO
Diethylphthalate	350 - 370	0 / 15	--	--	--	180	3.78	--	26,800	-- / --	0.01	NO	--	-- / --	--	--	--	NO

TABLE L-19
Ecological Screening Statistics - SWMU 20 Surface Soil
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL	Ecological Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	95% UCL Hazard Quotient	Mean Hazard Quotient	COPC for Risk Evaluation?
Dimethyl phthalate	350 - 370	0 / 15	--	--	--	180	3.78	--	10,640	-- / --	0.03	NO	--	-- / --	--	--	--	NO
Di-n-butylphthalate	350 - 370	0 / 15	--	--	--	180	3.78	--	40,000	-- / --	0.01	NO	--	-- / --	--	--	--	NO
Di-n-octylphthalate	350 - 370	0 / 14	--	--	--	180	3.65	--	30,000	-- / --	0.01	NO	--	-- / --	--	--	--	NO
Fluoranthene	350 - 370	0 / 15	--	--	--	180	3.78	--	LMW PAH	-- / --	--	NO	--	-- / --	--	--	--	NO
Fluorene	350 - 370	0 / 15	--	--	--	180	3.78	--	LMW PAH	-- / --	--	NO	--	-- / --	--	--	--	NO
Hexachlorobenzene	350 - 370	0 / 15	--	--	--	180	3.78	--	1,000	-- / --	0.37	NO	--	-- / --	--	--	--	NO
Hexachlorobutadiene	350 - 370	0 / 15	--	--	--	180	3.78	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
Hexachlorocyclopentadiene	350 - 370	0 / 15	--	--	--	180	3.78	--	2,000	-- / --	0.19	NO	--	-- / --	--	--	--	NO
Hexachloroethane	350 - 370	0 / 15	--	--	--	180	3.78	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
Indeno(1,2,3-cd)pyrene	350 - 370	0 / 14	--	--	--	180	3.65	--	HMW PAH	-- / --	--	NO	--	-- / --	--	--	--	NO
Isophorone	350 - 370	0 / 15	--	--	--	180	3.78	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
Naphthalene	350 - 370	0 / 15	--	--	--	180	3.78	--	LMW PAH	-- / --	--	NO	--	-- / --	--	--	--	NO
n-Nitroso-di-n-propylamine	350 - 370	0 / 15	--	--	--	180	3.78	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
n-Nitrosodiphenylamine	350 - 370	0 / 15	--	--	--	180	3.78	--	1,090	-- / --	0.34	NO	--	-- / --	--	--	--	NO
Nitrobenzene	350 - 370	0 / 15	--	--	--	180	3.78	--	2,260	-- / --	0.16	NO	--	-- / --	--	--	--	NO
PAH (HMW)	555 - 1,665	0 / 15	--	--	--	773	138	--	18,000	-- / --	0.09	NO	--	-- / --	--	--	--	NO
PAH (LMW)	1,575 - 1,665	0 / 15	--	--	--	810	17.0	--	29,000	-- / --	0.06	NO	--	-- / --	--	--	--	NO
Pentachlorophenol	880 - 930	0 / 15	--	--	--	451	8.28	--	5,000	-- / --	0.19	NO	--	-- / --	--	--	--	NO
Phenanthrene	350 - 370	0 / 15	--	--	--	180	3.78	--	LMW PAH	-- / --	--	NO	--	-- / --	--	--	--	NO
Phenol	350 - 370	0 / 15	--	--	--	180	3.78	--	1,880	-- / --	0.20	NO	--	-- / --	--	--	--	NO
Pyrene	350 - 370	0 / 15	--	--	--	180	3.78	--	HMW PAH	-- / --	--	NO	--	-- / --	--	--	--	NO
Pesticides (UG/KG)																		
4,4'-DDD	3.50 - 3.70	2 / 13	2.10	3.10	EPI04-SS07-0001	1.92	0.37	--	583	0 / 13	0.01	NO	--	-- / --	--	--	--	NO
4,4'-DDE	-- - --	13 / 13	1.20	620	EPI04-SS06-0001	78.0	170	232	114	2 / 13	5.44	**YES**	1,200	0 / 13	0.52	--	--	NO
4,4'-DDT	3.50 - 3.70	10 / 13	1.40	100	EPI04-SS06-0001	13.8	27.2	48.7	100	1 / 13	1.00	**YES**	990	0 / 13	0.10	--	--	NO
Aldrin	1.80 - 3.70	0 / 13	--	--	--	0.99	0.26	--	3.63	-- / --	1.02	**YES**	--	-- / --	--	--	0.27	NO
alpha-BHC	1.80 - 3.70	0 / 13	--	--	--	0.99	0.26	--	226	-- / --	0.02	NO	--	-- / --	--	--	--	NO
alpha-Chlordane	1.80 - 3.70	0 / 13	--	--	--	0.99	0.26	--	11.0	-- / --	0.34	NO	--	-- / --	--	--	--	NO
beta-BHC	1.80 - 3.70	0 / 13	--	--	--	0.99	0.26	--	342	-- / --	0.01	NO	--	-- / --	--	--	--	NO
delta-BHC	1.80 - 1.90	1 / 13	0.75	0.75	EPI04-SS06-0001	0.90	0.052	--	226	0 / 13	0.003	NO	--	-- / --	--	--	--	NO
Dieldrin	3.50 - 7.30	0 / 13	--	--	--	1.94	0.51	--	10.5	-- / --	0.70	NO	--	-- / --	--	--	--	NO
Endosulfan I	1.80 - 3.70	1 / 13	0.44	0.44	EPI04-SS10-0001	0.95	0.30	--	6.32	0 / 13	0.07	NO	--	-- / --	--	--	--	NO
Endosulfan II	3.50 - 7.30	0 / 13	--	--	--	1.94	0.51	--	6.32	-- / --	1.16	**YES**	--	-- / --	--	--	0.31	NO
Endosulfan sulfate	3.50 - 7.30	0 / 13	--	--	--	1.94	0.51	--	6.32	-- / --	1.16	**YES**	--	-- / --	--	--	0.31	NO
Endrin	3.50 - 7.30	0 / 13	--	--	--	1.94	0.51	--	1.95	-- / --	3.74	**YES**	--	-- / --	--	--	0.996	NO
Endrin aldehyde	3.50 - 7.30	0 / 13	--	--	--	1.94	0.51	--	1.95	-- / --	3.74	**YES**	--	-- / --	--	--	0.996	NO
Endrin ketone	3.50 - 7.30	0 / 13	--	--	--	1.94	0.51	--	1.95	-- / --	3.74	**YES**	--	-- / --	--	--	0.996	NO
gamma-BHC (Lindane)	1.80 - 3.70	0 / 13	--	--	--	0.99	0.26	--	7.75	-- / --	0.48	NO	--	-- / --	--	--	--	NO
gamma-Chlordane	1.80 - 1.90	4 / 13	0.57	1.00	EPI04-SS06-0001	0.86	0.11	--	11.0	0 / 13	0.09	NO	--	-- / --	--	--	--	NO
Heptachlor	1.80 - 3.70	0 / 13	--	--	--	0.99	0.26	--	52.9	-- / --	0.07	NO	--	-- / --	--	--	--	NO
Heptachlor epoxide	1.80 - 3.70	0 / 13	--	--	--	0.99	0.26	--	52.9	-- / --	0.07	NO	--	-- / --	--	--	--	NO
Methoxychlor	18.0 - 37.0	0 / 13	--	--	--	9.88	2.60	--	500	-- / --	0.07	NO	--	-- / --	--	--	--	NO
Toxaphene	180 - 370	0 / 13	--	--	--	98.8	26.0	--	500	-- / --	0.74	NO	--	-- / --	--	--	--	NO
Polychlorinated Biphenyls (UG/KG)																		
Aroclor-1016	35.0 - 37.0	0 / 7	--	--	--	18.0	0.41	--	2,510	-- / --	0.01	NO	--	-- / --	--	--	--	NO
Aroclor-1221	71.0 - 75.0	0 / 7	--	--	--	36.4	0.73	--	2,510	-- / --	0.03	NO	--	-- / --	--	--	--	NO
Aroclor-1232	35.0 - 37.0	0 / 7	--	--	--	18.0	0.41	--	2,510	-- / --	0.01	NO	--	-- / --	--	--	--	NO
Aroclor-1242	35.0 - 37.0	0 / 7	--	--	--	18.0	0.41	--	2,510	-- / --	0.01	NO	--	-- / --	--	--	--	NO
Aroclor-1248	35.0 - 37.0	0 / 7	--	--	--	18.0	0.41	--	2,510	-- / --	0.01	NO	--	-- / --	--	--	--	NO

TABLE L-19
Ecological Screening Statistics - SWMU 20 Surface Soil
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Range of Non-Detect Values	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Sample ID of Maximum Detected Concentration	Arithmetic Mean	Standard Deviation of Mean	95% UCL	Ecological Screening Value	Frequency of Exceedance[1]	Maximum Hazard Quotient[2]	Step 2 COPC?	Background UTL	Frequency of UTL Exceedance	Maximum Ratio	95% UCL Hazard Quotient	Mean Hazard Quotient	COPC for Risk Evaluation?
Aroclor-1254	35.0 - 37.0	0 / 7	--	--	--	18.0	0.41	--	2,510	-- / --	0.01	NO	--	-- / --	--	--	--	NO
Aroclor-1260	35.0 - 37.0	1 / 7	28.0	28.0	EPI04-SS12-0001	19.4	3.80	--	2,510	0 / 7	0.01	NO	--	-- / --	--	--	--	NO
Inorganics (MG/KG)																		
Aluminum	-- - --	15 / 15	5,720	14,400	EPI04-SS15-0006	9,231	2,526	--	pH < 5.5	-- / --	--	**YES**	35,000	0 / 15	0.41	--	--	NO
Antimony	6.40 - 6.80	3 / 15	0.58	0.82	EPI04-SS11-0001	2.77	1.07	--	78.0	0 / 15	0.01	NO	--	-- / --	--	--	--	NO
Arsenic	1.10 - 1.10	5 / 15	0.35	3.20	EPI04-SS01-0001	0.75	0.69	--	18.0	0 / 15	0.18	NO	--	-- / --	--	--	--	NO
Barium	-- - --	15 / 15	33.0	168	EPI04-SS14-0006	66.4	31.9	--	330	0 / 15	0.51	NO	--	-- / --	--	--	--	NO
Beryllium	0.53 - 0.56	2 / 15	0.039	0.070	EPI04-SS12-0001	0.24	0.077	--	40.0	0 / 15	0.002	NO	--	-- / --	--	--	--	NO
Cadmium	0.53 - 0.56	2 / 15	0.11	0.15	EPI04-SS08-0001	0.25	0.051	--	32.0	0 / 15	0.005	NO	--	-- / --	--	--	--	NO
Calcium [3]	-- - --	15 / 15	2,770	171,000	EPI04-SS01-0001	20,057	42,036	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
Chromium	-- - --	15 / 15	8.30	14.3	EPI04-SS14-0006	11.4	2.01	--	64.0	0 / 15	0.22	NO	--	-- / --	--	--	--	NO
Cobalt	5.60 - 5.60	14 / 15	8.30	14.9	EPI04-SS14-0006	9.74	2.66	--	13.0	2 / 15	1.15	**YES**	16.0	0 / 15	0.93	--	--	NO
Copper	-- - --	15 / 15	19.9	52.8	EPI04-SS14-0006	37.9	8.17	41.6	70.0	0 / 15	0.75	NO	--	-- / --	--	--	--	NO
Cyanide	2.70 - 2.80	3 / 15	0.23	0.72	EPI04-SS04-0001	1.19	0.37	--	15.8	0 / 15	0.05	NO	--	-- / --	--	--	--	NO
Iron	-- - --	15 / 15	13,600	24,700	EPI04-SS08-0001	16,913	3,002	--	5 < pH > 8	-- / --	--	**YES**	38,100	0 / 15	0.65	--	--	NO
Lead	-- - --	15 / 15	2.00	28.8	EPI04-SS01-0001	6.00	6.58	--	120	0 / 15	0.24	NO	--	-- / --	--	--	--	NO
Magnesium [3]	-- - --	15 / 15	1,380	27,000	EPI04-SS01-0001	4,963	6,388	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
Manganese	-- - --	15 / 15	265	968	EPI04-SS14-0006	538	162	--	220	15 / 15	4.40	**YES**	1,630	0 / 15	0.59	--	--	NO
Mercury	0.11 - 0.11	0 / 15	--	--	--	0.055	0.0	--	0.10	-- / --	1.10	**YES**	--	-- / --	--	--	0.55	NO
Nickel	4.30 - 4.50	10 / 15	4.60	8.20	EPI04-SS14-0006	4.61	2.04	--	38.0	0 / 15	0.22	NO	--	-- / --	--	--	--	NO
Potassium [3]	-- - --	15 / 15	753	2,420	EPI04-SS14-0006	1,189	441	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
Selenium	3.70 - 7.80	9 / 15	0.44	0.78	EPI04-SS14-0006	1.24	0.98	0.64	0.52	7 / 15	1.50	**YES**	0.51	7 / 15	1.53	1.23	--	**YES**
Silver	1.10 - 2.20	0 / 15	--	--	--	0.59	0.14	--	560	-- / --	0.004	NO	--	-- / --	--	--	--	NO
Sodium [3]	532 - 564	0 / 15	--	--	--	272	4.95	--	NSV	-- / --	NSV	NO	--	-- / --	--	--	--	NO
Thallium	0.53 - 0.56	0 / 15	--	--	--	0.27	0.006	--	1.00	-- / --	0.56	NO	--	-- / --	--	--	--	NO
Vanadium	-- - --	15 / 15	37.9	86.1	EPI04-SS14-0006	60.5	12.4	66.2	130	0 / 15	0.66	NO	--	-- / --	--	--	--	NO
Zinc	-- - --	15 / 15	13.8	38.7	EPI04-SS06-0001	23.0	6.23	--	120	0 / 15	0.32	NO	--	-- / --	--	--	--	NO
Other Parameters																		
Total organic carbon (MG/KG)	-- - --	7 / 7	8,330	30,400	VEP4-SS22-0001	17,234	9,747	--	--	-- / --	--	--	--	-- / --	--	--	--	--

NSV - No Screening Value
1 - Count of detected samples exceeding or equaling Ecological Screening Value
2 - Shaded cells indicate hazard quotient based on reporting limits
3 - Macronutrient - Not considered to be a COPC
4 - See uncertainty section

TABLE L-20
Exceedances - SWMU 20 Surface Soil
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Soil ESV	Background UTL - KTd	EPI04-SO01	EPI04-SO02	EPI04-SO03	EPI04-SO04	EPI04-SO05		EPI04-SO06	EPI04-SO07	EPI04-SO08	
			EPI04-SS01-0001	EPI04-SS02-0001	EPI04-SS03-0001	EPI04-SS04-0001	EPI04-SS05-0001	EPI04-SS05P-0001	EPI04-SS06-0001	EPI04-SS07-0001	EPI04-SS08-0001	EPI04-SS08P-0001
			01/26/06	01/26/06	01/26/06	01/26/06	01/26/06	01/26/06	01/26/06	01/25/06	01/25/06	01/25/06
Volatile Organic Compounds (UG/KG)												
Acetone	2,500	--	13 U	10 U	**28 J**	12 U	11 U	11 U	10 U	10 U	10 U	11 U
Carbon disulfide	94.1	--	13 U	10 U	**10 J**	12 U	11 U	11 U	10 U	10 U	10 U	11 U
Semivolatile Organic Compounds (UG/KG)												
bis(2-Ethylhexyl)phthalate	30,000	--	370 UJ	360 U	350 U	350 U	350 U	350 U	360 U	370 U	350 U	350 U
Pesticides (UG/KG)												
4,4'-DDD	583	26.0	3.7 U	3.6 U	3.5 U	3.5 U	3.5 U	3.5 U	**2.1 J**	**3.1 J**	3.5 U	3.5 U
4,4'-DDE	114	1,200	**3.8**	**2.2 J**	**12**	**1.2 J**	**2.7 J**	**4.7**	**620**	**36**	**29**	**27**
4,4'-DDT	100	990	**1.4 J**	3.6 U	**3.1 J**	3.5 U	**1.4 J**	**27**	**100**	**7.8**	**3.1 J**	**5.3**
delta-BHC	226	0.84	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	**0.75 J**	1.9 U	1.8 U	1.8 U
Endosulfan I	6.32	0.44	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	3.7 U	1.9 U	1.8 U	1.8 U
gamma-Chlordane	11.0	1.90	**0.69 J**	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	**1 J**	1.9 U	1.8 U	1.8 U
Polychlorinated Biphenyls (UG/KG)												
Aroclor-1260	2,510	--	NA	NA	NA	35 U	NA	NA	NA	NA	35 U	35 U
Inorganics (MG/KG)												
Aluminum	pH < 5.5	35,000	**5,720 J**	**9,040 J**	**7,450 J**	**8,220**	**6,770 J**	**6,930 J**	**6,100 J**	**8,540 J**	**12,200**	**12,300**
Antimony	78.0	5.80	6.7 U	6.5 U	6.4 U	6.4 U	6.4 U	6.4 U	6.6 U	6.7 U	**0.62 J**	**0.75 J**
Arsenic	18.0	1.60	**3.2 J**	1.1 U	1.1 U	**0.35 J**	1.1 U	1.1 U	1.1 U	1.1 U	**0.58 J**	**0.39 J**
Barium	330	147	**33 J**	**45.4 J**	**52.1 J**	**55.7**	**52.7 J**	**53.3 J**	**52.1 J**	**50.9 J**	**57.4**	**58.3**
Beryllium	40.0	0.27	0.55 U	0.54 U	0.53 U	0.53 U	0.53 U	0.53 U	0.55 U	0.56 U	**0.039 J**	0.53 U
Cadmium	32.0	2.20	0.55 U	0.54 U	0.53 U	0.53 U	0.53 U	0.53 U	0.55 U	0.56 U	**0.15 J**	0.53 U
Chromium	64.0	72.0	**14.1 J**	**12.7 J**	**10.1 J**	**9.1**	**9 J**	**8.8 J**	**10.2 J**	**10 J**	**7.2**	**8.3**
Cobalt	13.0	16.0	5.6 U	**8.3 J**	**9 J**	**9.7**	**9.1 J**	**9.8 J**	**8.3 J**	**9.1 J**	**13.2**	**12.5**
Copper	70.0	66.0	**19.9 J**	**43.5 J**	**32.1 J**	**33.2**	**37.1 J**	**37.6 J**	**39.3 J**	**38.8 J**	**34.9**	**36.2**
Cyanide	15.8	0.33	**0.54 J**	2.7 U	2.7 U	**0.72 J**	2.7 U	2.7 U	2.7 U	2.8 U	2.6 U	2.7 U
Iron	5 < pH > 8	38,100	**14,200 J**	**16,100 J**	**15,000 J**	**13,600**	**14,100 J**	**14,200 J**	**14,400 J**	**16,000 J**	**24,700**	**24,100**
Lead	120	5.40	**28.8 J**	**7.3 J**	**4.1 J**	**2.7 J**	**3.2 J**	**2.7 J**	**7.6 J**	**6.8 J**	**5**	**2.9**
Manganese	220	1,630	**265 J**	**444 J**	**567 J**	**584**	**572 J**	**573 J**	**514 J**	**365 J**	**549**	**540**
Nickel	38.0	22.0	**5.3 J**	**7.2 J**	4.3 U	4.3 U	4.3 U	4.2 U	4.4 U	4.5 U	**4.3 J**	**4.7 J**
Selenium	0.52	0.51	7.8 U	3.8 UJ	**0.55 J**	3.7 U	**0.38 J**	**0.45 J**	**0.54 J**	**0.44 J**	**0.59 J**	3.7 U
Vanadium	130	144	**37.9 J**	**49.7 J**	**56.1 J**	**49.5**	**51 J**	**50.7 J**	**55.5 J**	**57.5 J**	**64.7**	**63.8**
Zinc	120	32.0	**23.9 J**	**27.3 J**	**16.7 J**	**16.7 J**	**19.5 J**	**18 J**	**38.7 J**	**22.7 J**	**28.6**	**28.6**
Other Parameters												
Total organic carbon (MG/KG)	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

TABLE L-20
Exceedances - SWMU 20 Surface Soil
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Soil ESV	Background UTL - KTd	EPI04-SO09	EPI04-SO10	EPI04-SO11	EPI04-SO12	EPI04-SO13	EPI04-SO14	EPI04-SO15	EPI04-MW13D	EPI04-MW17D	
			EPI04-SS09-0001	EPI04-SS10-0001	EPI04-SS11-0001	EPI04-SS12-0001	EPI04-SS13-0001	EPI04-SS14-0006	EPI04-SS15-0006	VEP4-SS16-0001	VEP4-SS17-0001	VEP4-SS17P-0001
			01/24/06	01/24/06	01/25/06	01/24/06	01/25/06	01/31/06	01/31/06	05/30/13	06/05/13	06/05/13
Volatile Organic Compounds (UG/KG)												
Acetone	2,500	--	10 U	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA
Carbon disulfide	94.1	--	10 U	10 U	11 U	10 U	12 U	14 U	14 U	NA	NA	NA
Semivolatile Organic Compounds (UG/KG)												
bis(2-Ethylhexyl)phthalate	30,000	--	370 U	360 U	360 U	360 U	370 U	**130 J**	360 U	NA	NA	NA
Pesticides (UG/KG)												
4,4'-DDD	583	26.0	3.7 U	3.6 U	3.6 U	3.6 U	3.7 U	NA	NA	NA	NA	NA
4,4'-DDE	114	1,200	**9.1**	**84**	**26**	**180**	**5.9**	NA	NA	NA	NA	NA
4,4'-DDT	100	990	**1.4 J**	**2.8 J**	**3.6**	**22**	3.7 U	NA	NA	NA	NA	NA
delta-BHC	226	0.84	1.9 U	1.8 U	1.8 U	1.8 U	1.9 U	NA	NA	NA	NA	NA
Endosulfan I	6.32	0.44	1.9 U	**0.44 J**	1.8 U	1.8 U	1.9 U	NA	NA	NA	NA	NA
gamma-Chlordane	11.0	1.90	**0.79 J**	1.8 U	1.8 U	1.8 U	**0.57 J**	NA	NA	NA	NA	NA
Polychlorinated Biphenyls (UG/KG)												
Aroclor-1260	2,510	--	37 U	36 U	36 U	**28 J**	37 U	NA	NA	NA	NA	NA
Inorganics (MG/KG)												
Aluminum	pH < 5.5	35,000	**9,970 J**	**8,820 J**	**10,800**	**8,290**	**8,590 J**	**13,300**	**14,400**	NA	NA	NA
Antimony	78.0	5.80	6.8 U	6.5 U	**0.82 J**	**0.58 J**	6.6 U	6.6 U	6.6 U	NA	NA	NA
Arsenic	18.0	1.60	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	**0.83 J**	**0.86 J**	NA	NA	NA
Barium	330	147	**64.9 J**	**57.3 J**	**80.5**	**62.9**	**63.1 J**	**168**	**99.1**	NA	NA	NA
Beryllium	40.0	0.27	0.56 U	0.54 U	0.54 U	**0.07 J**	0.55 U	0.55 U	0.55 U	NA	NA	NA
Cadmium	32.0	2.20	0.56 U	0.54 U	0.54 U	**0.11 J**	0.55 U	0.55 U	0.55 U	NA	NA	NA
Chromium	64.0	72.0	**11.8 J**	**11.9 J**	**13**	**9.6**	**13 J**	**14.3**	**13.6**	NA	NA	NA
Cobalt	13.0	16.0	**9.6 J**	**9.2 J**	**11.4**	**9.1**	**11.7 J**	**14.9**	**10**	NA	NA	NA
Copper	70.0	66.0	**43 J**	**34 J**	**42.1**	**32.4**	**31.9 J**	**52.8**	**51**	NA	NA	NA
Cyanide	15.8	0.33	2.8 U	2.7 U	2.7 U	2.7 U	2.8 U	**0.23 J**	2.7 U	NA	NA	NA
Iron	5 < pH > 8	38,100	**17,300 J**	**15,900 J**	**19,200**	**15,900**	**16,900 J**	**20,100**	**20,200**	NA	NA	NA
Lead	120	5.40	**3.5 J**	**3.9 J**	**6.6**	**2.8**	**3.4 J**	**2.3 J**	**2 J**	NA	NA	NA
Manganese	220	1,630	**432 J**	**501 J**	**638**	**536**	**707 J**	**968**	**427**	NA	NA	NA
Nickel	38.0	22.0	**5.6 J**	**4.7 J**	**5.7 J**	**4.6 J**	**5.2 J**	**8.2**	**7.1**	NA	NA	NA
Selenium	0.52	0.51	4 UJ	3.8 U	**0.56 J**	**0.68 J**	**0.61 J**	**0.78 J**	3.8 U	NA	NA	NA
Vanadium	130	144	**63.8 J**	**62.3 J**	**73**	**54.2**	**68.5 J**	**86.1**	**78.4**	NA	NA	NA
Zinc	120	32.0	**18.7 J**	**19.4 J**	**27**	**20.4**	**13.8 J**	**24.8 J**	**26.5 J**	NA	NA	NA
Other Parameters												
Total organic carbon (MG/KG)	--	--	NA	NA	NA	NA	NA	NA	NA	**8,600**	**8,330**	NA

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

TABLE L-20
Exceedances - SWMU 20 Surface Soil
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Soil ESV	Background UTL - KTd	EPI04-SO21		EPI04-SO22	EPI04-SO23	EPI04-SO24	EPI04-SO25
			VEP4-SS21-0001	VEP4-SS21P-0001	VEP4-SS22-0001	VEP4-SS23-0001	VEP4-SS24-0001	VEP4-SS25-0001
			09/17/14	09/17/14	09/16/14	09/22/14	09/18/14	09/22/14
Volatile Organic Compounds (UG/KG)								
Acetone	2,500	--	NA	NA	NA	NA	NA	NA
Carbon disulfide	94.1	--	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (UG/KG)								
bis(2-Ethylhexyl)phthalate	30,000	--	NA	NA	NA	NA	NA	NA
Pesticides (UG/KG)								
4,4'-DDD	583	26.0	NA	NA	NA	NA	NA	NA
4,4'-DDE	114	1,200	NA	NA	NA	NA	NA	NA
4,4'-DDT	100	990	NA	NA	NA	NA	NA	NA
delta-BHC	226	0.84	NA	NA	NA	NA	NA	NA
Endosulfan I	6.32	0.44	NA	NA	NA	NA	NA	NA
gamma-Chlordane	11.0	1.90	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyls (UG/KG)								
Aroclor-1260	2,510	--	NA	NA	NA	NA	NA	NA
Inorganics (MG/KG)								
Aluminum	pH < 5.5	35,000	NA	NA	NA	NA	NA	NA
Antimony	78.0	5.80	NA	NA	NA	NA	NA	NA
Arsenic	18.0	1.60	NA	NA	NA	NA	NA	NA
Barium	330	147	NA	NA	NA	NA	NA	NA
Beryllium	40.0	0.27	NA	NA	NA	NA	NA	NA
Cadmium	32.0	2.20	NA	NA	NA	NA	NA	NA
Chromium	64.0	72.0	NA	NA	NA	NA	NA	NA
Cobalt	13.0	16.0	NA	NA	NA	NA	NA	NA
Copper	70.0	66.0	NA	NA	NA	NA	NA	NA
Cyanide	15.8	0.33	NA	NA	NA	NA	NA	NA
Iron	5 < pH > 8	38,100	NA	NA	NA	NA	NA	NA
Lead	120	5.40	NA	NA	NA	NA	NA	NA
Manganese	220	1,630	NA	NA	NA	NA	NA	NA
Nickel	38.0	22.0	NA	NA	NA	NA	NA	NA
Selenium	0.52	0.51	NA	NA	NA	NA	NA	NA
Vanadium	130	144	NA	NA	NA	NA	NA	NA
Zinc	120	32.0	NA	NA	NA	NA	NA	NA
Other Parameters								
Total organic carbon (MG/KG)	--	--	**9,910**	NA	**30,400 NZ-01**	**27,800**	**11,600**	**24,000**

Notes:
Grey highlighting indicates value greater than ESV
Yellow highlighting indicates value equal to ESV
Red highlighting indicates value ≥ ESV and ≥ background UTL; ≥ ESV and no UTL; ≥ background UTL and no ESV; or detected and no ESV and UTL
Bold indicates detections
NSV - No Screening Value
NA - Not analyzed

TABLE L-21

Screening Statistics - SWMU 20 Surface Soil - Mammal/Bird Eco-SSLs

SWMU 20 Remedial Investigation

Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Range of Non-Detect Values	Frequency of Detection	Maximum Concentration Detected	Mammal Eco-SSL	Frequency of Exceedance	Maximum Hazard Quotient	Bird Eco-SSL	Frequency of Exceedance	Maximum Hazard Quotient
Metals (MG/KG)									
Antimony	6.40 - 6.80	3 / 15	0.82	0.27	3 / 15	3.04	--	-- - --	--
Arsenic	1.10 - 1.10	5 / 15	3.20	46.0	0 / 15	0.07	43.0	0 / 15	0.07
Barium	-- - --	15 / 15	168	2,000	0 / 15	0.08	--	-- - --	--
Beryllium	0.53 - 0.56	2 / 15	0.070	21.0	0 / 15	0.003	--	-- - --	--
Cadmium	0.53 - 0.56	2 / 15	0.15	0.36	0 / 15	0.42	0.77	0 / 15	0.19
Chromium	-- - --	15 / 15	14.3	34.0	0 / 15	0.42	26.0	0 / 15	0.55
Cobalt	5.60 - 5.60	14 / 15	14.9	230	0 / 15	0.06	120	0 / 15	0.12
Copper	-- - --	15 / 15	52.8	49.0	2 / 15	1.08	28.0	14 / 15	1.89
Lead	-- - --	15 / 15	28.8	56.0	0 / 15	0.51	11.0	1 / 15	2.62
Manganese	-- - --	15 / 15	968	4,000	0 / 15	0.24	4,300	0 / 15	0.23
Nickel	4.30 - 4.50	10 / 15	8.20	130	0 / 15	0.06	210	0 / 15	0.04
Selenium	3.70 - 7.80	9 / 15	0.78	0.63	2 / 15	1.24	1.20	0 / 15	0.65
Silver[1]	1.10 - 2.20	0 / 15	--	14.0	-- / --	0.16	4.20	-- / --	0.52
Vanadium	-- - --	15 / 15	86.1	280	0 / 15	0.31	7.80	15 / 15	11.0
Zinc	-- - --	15 / 15	38.7	79.0	0 / 15	0.49	46.0	0 / 15	0.84
Pesticides (UG/KG)									
4,4'-DDD	3.50 - 3.70	2 / 13	3.10	21.0	0 / 13	0.15	93.0	0 / 13	0.03
4,4'-DDE	-- - --	13 / 13	620	21.0	6 / 13	29.5	93.0	2 / 13	6.67
4,4'-DDT	3.50 - 3.70	10 / 13	100	21.0	3 / 13	4.76	93.0	1 / 13	1.08
Dieldrin[1]	3.50 - 7.30	0 / 13	--	4.90	-- / --	1.49	22.0	-- / --	0.33
Semivolatile Organic Compounds (UG/KG)									
PAH (HMW)[1]	555 - 1,665	0 / 15	--	1,100	-- / --	1.51	--	-- - --	--
PAH (LMW)[1]	1,575 - 1,665	0 / 15	--	100,000	-- / --	0.02	--	-- - --	--
Pentachlorophenol[1]	880 - 930	0 / 15	--	2,800	-- / --	0.33	2,100	-- / --	0.44

Shaded cells indicate HQ ≥ 1

1 - HQs based on reporting limits

TABLE L-22
Summary of Hazard Quotients for Terrestrial Food Web Exposures - Screening (Step 2) - Maximum
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Norway Rat			Indian Mongoose			Pearly-eyed Thrasher			Red-tailed Hawk			Common Ground Dove		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals															
Antimony	1.95E-01	6.16E-02	1.95E-02	**2.05E+00**	6.48E-01	2.05E-01	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	4.31E-01	3.34E-01	2.58E-01	2.05E-01	1.80E-01	1.59E-01	9.11E-01	5.27E-01	3.05E-01	1.27E-01	7.35E-02	4.25E-02	**1.03E+00**	5.97E-01	3.45E-01
Lead	1.15E-01	8.38E-02	6.09E-02	3.94E-01	2.87E-01	2.08E-01	7.28E-01	3.26E-01	1.46E-01	5.11E-02	2.29E-02	1.02E-02	6.91E-01	4.89E-01	3.46E-01
Mercury	8.23E-01	3.68E-01	1.65E-01	**2.17E+00**	**1.68E+00**	**1.30E+00**	9.64E-01	6.16E-01	3.94E-01	1.21E-03	7.70E-04	4.92E-04	8.98E-02	6.35E-02	4.49E-02
Selenium	4.66E-01	3.63E-01	2.83E-01	5.70E-01	4.44E-01	3.46E-01	3.83E-01	2.07E-01	1.12E-01	5.64E-02	3.05E-02	1.65E-02	5.09E-01	3.60E-01	2.55E-01
Vanadium	1.45E-01	1.02E-01	7.24E-02	3.46E-01	2.45E-01	1.73E-01	**7.08E+00**	**5.01E+00**	**3.54E+00**	1.36E-01	9.58E-02	6.78E-02	**5.39E+00**	**3.81E+00**	**2.70E+00**
Polychlorinated Biphenyls															
Aroclor-1016	2.17E-02	9.70E-03	4.34E-03	4.93E-03	3.12E-03	1.97E-03	2.43E-02	1.08E-02	4.85E-03	1.25E-03	5.61E-04	2.51E-04	1.33E-02	5.96E-03	2.67E-03
Aroclor-1221	9.85E-02	4.40E-02	1.97E-02	1.27E-01	5.70E-02	2.55E-02	6.29E-02	2.81E-02	1.26E-02	5.69E-03	2.55E-03	1.14E-03	5.77E-02	2.58E-02	1.15E-02
Aroclor-1232	3.38E-02	1.51E-02	6.77E-03	4.90E-02	2.19E-02	9.79E-03	2.43E-02	1.08E-02	4.85E-03	1.96E-03	8.75E-04	3.91E-04	2.02E-02	9.02E-03	4.03E-03
Aroclor-1242	2.17E-02	9.70E-03	4.34E-03	4.90E-02	2.19E-02	9.79E-03	2.43E-02	1.08E-02	4.85E-03	1.25E-03	5.61E-04	2.51E-04	1.33E-02	5.96E-03	2.67E-03
Aroclor-1248	1.29E-02	5.78E-03	2.59E-03	4.83E-02	2.17E-02	9.79E-03	2.43E-02	1.08E-02	4.85E-03	7.48E-04	3.34E-04	1.50E-04	8.42E-03	3.76E-03	1.68E-03
Aroclor-1254	1.01E-02	4.51E-03	2.02E-03	4.83E-02	2.17E-02	9.79E-03	2.43E-02	1.08E-02	4.85E-03	5.83E-04	2.61E-04	1.17E-04	6.82E-03	3.05E-03	1.36E-03
Aroclor-1260	6.01E-03	2.69E-03	1.20E-03	3.31E-02	1.49E-02	6.72E-03	1.67E-02	7.45E-03	3.33E-03	3.47E-04	1.55E-04	6.95E-05	4.24E-03	1.90E-03	8.49E-04
Pesticides															
4,4'-DDE	1.09E-01	4.89E-02	2.19E-02	**7.64E+00**	**3.42E+00**	**1.53E+00**	**3.26E+00**	**1.03E+00**	3.26E-01	3.50E-02	1.57E-02	7.01E-03	6.17E-02	1.95E-02	6.17E-03
4,4'-DDT	2.59E-02	1.16E-02	5.18E-03	**1.11E+00**	4.95E-01	2.21E-01	4.72E-01	1.49E-01	4.72E-02	8.29E-03	3.71E-03	1.66E-03	1.36E-02	4.29E-03	1.36E-03
Aldrin	6.86E-04	3.07E-04	1.37E-04	8.82E-03	3.95E-03	1.76E-03	3.67E-02	1.64E-02	7.34E-03	3.41E-04	1.53E-04	6.82E-05	3.50E-03	1.57E-03	7.00E-04
alpha-BHC	9.43E-04	6.67E-04	4.71E-04	3.41E-04	2.41E-04	1.70E-04	1.44E-03	7.18E-04	3.58E-04	4.69E-04	2.34E-04	1.17E-04	4.08E-03	2.04E-03	1.02E-03
alpha-Chlordane	3.47E-05	2.46E-05	1.74E-05	4.66E-04	3.30E-04	2.33E-04	1.45E-03	6.50E-04	2.91E-04	1.30E-05	5.80E-06	2.59E-06	2.34E-04	1.04E-04	4.67E-05
beta-BHC	9.34E-04	6.60E-04	4.67E-04	3.41E-04	2.41E-04	1.70E-04	1.44E-03	7.18E-04	3.58E-04	4.65E-04	2.32E-04	1.16E-04	4.04E-03	2.02E-03	1.01E-03
delta-BHC	1.45E-04	1.02E-04	7.25E-05	6.91E-05	4.89E-05	3.46E-05	2.92E-04	1.45E-04	7.26E-05	7.22E-05	3.60E-05	1.80E-05	6.31E-04	3.15E-04	1.57E-04
Dieldrin	4.86E-02	3.44E-02	2.43E-02	**1.03E+00**	7.26E-01	5.14E-01	3.15E-01	4.32E-02	5.92E-03	1.79E-03	2.46E-04	3.36E-05	1.65E-02	2.25E-03	3.09E-04
Endosulfan I	1.16E-03	5.20E-04	2.33E-04	4.32E-04	1.93E-04	8.65E-05	9.58E-06	4.28E-06	1.92E-06	3.04E-06	1.36E-06	6.08E-07	2.65E-05	1.18E-05	5.29E-06
Endosulfan II	1.02E-02	4.58E-03	2.05E-03	7.17E-03	3.21E-03	1.43E-03	1.59E-04	7.11E-05	3.18E-05	2.68E-05	1.20E-05	5.35E-06	2.37E-04	1.06E-04	4.73E-05
Endrin	5.11E-03	2.29E-03	1.02E-03	2.06E-02	9.23E-03	4.13E-03	2.66E-01	1.19E-01	5.32E-02	7.89E-03	3.53E-03	1.58E-03	7.12E-02	3.19E-02	1.42E-02
gamma-BHC (Lindane)	2.01E-04	8.99E-05	4.02E-05	1.76E-03	7.89E-04	3.53E-04	5.12E-03	2.29E-03	1.02E-03	7.01E-05	3.14E-05	1.40E-05	6.09E-04	2.72E-04	1.22E-04
gamma-Chlordane	9.39E-06	6.64E-06	4.69E-06	1.26E-04	8.91E-05	6.30E-05	3.93E-04	1.76E-04	7.86E-05	3.50E-06	1.57E-06	7.01E-07	6.31E-05	2.82E-05	1.26E-05
Heptachlor	8.36E-04	3.74E-04	1.67E-04	8.03E-03	3.59E-03	1.61E-03	8.51E-03	3.81E-03	1.70E-03	1.06E-04	4.74E-05	2.12E-05	1.05E-03	4.71E-04	2.11E-04
Heptachlor epoxide	2.52E-03	1.13E-03	5.03E-04	2.66E-02	1.19E-02	5.32E-03	2.81E-02	1.25E-02	5.61E-03	3.19E-04	1.43E-04	6.37E-05	2.87E-03	1.28E-03	5.74E-04
Methoxychlor	1.17E-03	8.28E-04	5.86E-04	1.36E-03	9.64E-04	6.82E-04	2.27E-05	1.01E-05	4.54E-06	2.30E-06	1.03E-06	4.60E-07	2.08E-05	9.30E-06	4.16E-06
Toxaphene	4.03E-03	1.80E-03	8.05E-04	6.82E-03	3.05E-03	1.36E-03	8.06E-02	3.60E-02	1.61E-02	5.61E-03	2.51E-03	1.12E-03	5.21E-02	2.33E-02	1.04E-02
Volatile/Semivolatile Organics															
1,1,2,2-Tetrachloroethane	4.36E-05	1.95E-05	8.73E-06	2.72E-05	1.21E-05	5.43E-06	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	8.87E-05	6.27E-05	4.44E-05	2.23E-05	1.58E-05	1.11E-05	5.50E-05	2.46E-05	1.10E-05	2.55E-05	1.14E-05	5.10E-06	2.22E-04	9.95E-05	4.45E-05
1,2-Dichlorobenzene	9.38E-05	4.19E-05	1.88E-05	2.41E-05	1.08E-05	4.82E-06	9.48E-05	4.24E-05	1.90E-05	4.36E-05	1.95E-05	8.71E-06	3.77E-04	1.68E-04	7.53E-05
1,3-Dichlorobenzene	8.79E-05	3.93E-05	1.76E-05	2.41E-05	1.08E-05	4.82E-06	9.48E-05	4.24E-05	1.90E-05	4.08E-05	1.83E-05	8.16E-06	3.53E-04	1.58E-04	7.07E-05
1,4-Dichlorobenzene	2.70E-04	1.56E-04	9.01E-05	6.88E-05	3.97E-05	2.29E-05	9.48E-05	4.24E-05	1.90E-05	4.40E-05	1.97E-05	8.79E-06	3.80E-04	1.70E-04	7.60E-05
4-Bromophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	1.68E-02	7.52E-03	3.36E-03	1.40E-01	6.25E-02	2.80E-02	1.77E-02	7.93E-03	3.55E-03	0.00E+00	0.00E+00	0.00E+00	2.74E-03	1.23E-03	5.49E-04
Benzo(a)pyrene	2.11E-02	9.43E-03	4.22E-03	1.17E-01	5.24E-02	2.35E-02	1.49E-02	6.67E-03	2.98E-03	0.00E+00	0.00E+00	0.00E+00	3.30E-03	1.47E-03	6.59E-04
Benzo(b)fluoranthene	4.62E-02	2.07E-02	9.25E-03	2.27E-01	1.01E-01	4.54E-02	2.87E-02	1.28E-02	5.73E-03	0.00E+00	0.00E+00	0.00E+00	6.53E-03	2.92E-03	1.31E-03
Benzo(g,h,i)perylene	4.87E-02	2.18E-02	9.76E-03	2.56E-01	1.15E-01	5.13E-02	3.23E-02	1.45E-02	6.47E-03	0.00E+00	0.00E+00	0.00E+00	6.86E-03	3.07E-03	1.37E-03
Benzo(k)fluoranthene	2.14E-02	9.58E-03	4.29E-03	2.27E-01	1.01E-01	4.54E-02	2.87E-02	1.28E-02	5.73E-03	0.00E+00	0.00E+00	0.00E+00	3.34E-03	1.49E-03	6.68E-04
Chrysene	1.68E-02	7.52E-03	3.36E-03	2.00E-01	8.95E-02	4.00E-02	2.53E-02	1.13E-02	5.06E-03	0.00E+00	0.00E+00	0.00E+00	2.74E-03	1.23E-03	5.49E-04
Dibenz(a,h)anthracene	2.10E-02	9.40E-03	4.21E-03	2.02E-01	9.02E-02	4.04E-02	2.55E-02	1.14E-02	5.11E-03	0.00E+00	0.00E+00	0.00E+00	3.29E-03	1.47E-03	6.58E-04
Hexachlorobenzene	1.15E-02	8.10E-03	5.73E-03	4.56E-02	3.22E-02	2.28E-02	**1.18E+00**	5.29E-01	2.36E-01	3.53E-02	1.58E-02	7.07E-03	3.38E-01	1.51E-01	6.76E-02

TABLE L-22
Summary of Hazard Quotients for Terrestrial Food Web Exposures - Screening (Step 2) - Maximum
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Norway Rat			Indian Mongoose			Pearly-eyed Thrasher			Red-tailed Hawk			Common Ground Dove		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Hexachlorobutadiene	2.99E-02	9.45E-03	2.99E-03	2.73E-02	8.62E-03	2.73E-03	2.38E-02	1.06E-02	4.75E-03	3.07E-03	1.37E-03	6.15E-04	2.75E-02	1.23E-02	5.49E-03
Hexachlorocyclopentadiene	4.73E-04	2.12E-04	9.47E-05	7.27E-04	3.25E-04	1.45E-04	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloroethane	1.25E-03	5.61E-04	2.51E-04	5.45E-04	2.44E-04	1.09E-04	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	1.82E-02	8.15E-03	3.65E-03	2.49E-01	1.11E-01	4.99E-02	3.15E-02	1.41E-02	6.30E-03	0.00E+00	0.00E+00	0.00E+00	2.93E-03	1.31E-03	5.86E-04
Pyrene	1.03E-01	4.63E-02	2.07E-02	1.53E-01	6.86E-02	3.07E-02	1.95E-02	8.70E-03	3.89E-03	0.00E+00	0.00E+00	0.00E+00	1.39E-02	6.22E-03	2.78E-03

Shaded cells indicate HQ ≥ 1

TABLE L-23

Summary of Hazard Quotients for Terrestrial Food Web Exposures - Baseline (Step 3A) - 95% UCL

SWMU 20 Remedial Investigation

Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Norway Rat			Indian Mongoose			Pearly-eyed Thrasher			Common Ground Dove		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals												
Antimony	--	--	--	5.66E-01	1.79E-01	5.66E-02	--	--	--	--	--	--
Copper	--	--	--	--	--	--	--	--	--	5.36E-01	3.10E-01	1.79E-01
Mercury	--	--	--	3.27E-02	2.53E-02	1.96E-02	--	--	--	--	--	--
Vanadium	--	--	--	--	--	--	**1.74E+00**	**1.23E+00**	8.71E-01	**2.25E+00**	**1.59E+00**	**1.12E+00**
Pesticides												
4,4'-DDE	**1.10E+00**	4.91E-01	2.20E-01	8.62E-01	3.86E-01	1.72E-01	5.91E-01	1.87E-01	5.91E-02	--	--	--
4,4'-DDT	--	--	--	1.59E-01	7.13E-02	3.19E-02	--	--	--	--	--	--
Dieldrin	--	--	--	2.78E-01	1.97E-01	1.39E-01	--	--	--	--	--	--
Volatile/Semivolatile Organics												
Hexachlorobenzene	--	--	--	--	--	--	5.31E-01	2.38E-01	1.06E-01	--	--	--

Shaded cells indicate HQ ≥ 1

TABLE L-24

Summary of Hazard Quotients for Terrestrial Food Web Exposures - Baseline (Step 3A) - Mean

SWMU 20 Remedial Investigation

Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Norway Rat			Indian Mongoose			Pearly-eyed Thrasher			Common Ground Dove		
	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL	NOAEL	MATC	LOAEL
Metals												
Antimony	--	--	--	5.66E-01	1.79E-01	5.66E-02	--	--	--	--	--	--
Copper	--	--	--	--	--	--	--	--	--	5.11E-01	2.95E-01	1.71E-01
Mercury	--	--	--	1.72E-02	1.33E-02	1.03E-02	--	--	--	--	--	--
Vanadium	--	--	--	--	--	--	**1.59E+00**	**1.13E+00**	7.96E-01	**2.06E+00**	**1.45E+00**	**1.03E+00**
Pesticides												
4,4'-DDE	4.22E-01	1.89E-01	8.44E-02	3.31E-01	1.48E-01	6.62E-02	2.27E-01	7.16E-02	2.27E-02	--	--	--
4,4'-DDT	--	--	--	5.34E-02	2.39E-02	1.07E-02	--	--	--	--	--	--
Dieldrin	--	--	--	7.40E-02	5.23E-02	3.70E-02	--	--	--	--	--	--
Volatile/Semivolatile Organics												
Hexachlorobenzene	--	--	--	--	--	--	2.59E-01	1.16E-01	5.17E-02	--	--	--

Shaded cells indicate HQ ≥ 1

TABLE L-25
Reporting Limit to Screening Value Comparison
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Units	Frequency of Detection	Minimum Reporting Limit	Maximum Reporting Limit	Mean Concentration	Screening Value	Minimum Ratio	Maximum Ratio	Mean Ratio
Surface Soil									
Benzene	UG/KG	0 / 15	10.0	14.0	5.67	6.80	1.47	2.06	0.83
Trichloroethene	UG/KG	0 / 22	2.49	14.0	4.31	10.0	0.25	1.40	0.43
4-Nitrophenol	UG/KG	0 / 15	880	930	451	380	2.32	2.45	1.19
Atrazine	UG/KG	0 / 15	350	370	180	11.9	29.4	31.1	15.1
Aldrin	UG/KG	0 / 13	1.80	3.70	0.99	3.63	0.50	1.02	0.27
Endosulfan II	UG/KG	0 / 13	3.50	7.30	1.94	6.32	0.55	1.16	0.31
Endosulfan sulfate	UG/KG	0 / 13	3.50	7.30	1.94	6.32	0.55	1.16	0.31
Endrin	UG/KG	0 / 13	3.50	7.30	1.94	1.95	1.79	3.74	0.996
Endrin aldehyde	UG/KG	0 / 13	3.50	7.30	1.94	1.95	1.79	3.74	0.996
Endrin ketone	UG/KG	0 / 13	3.50	7.30	1.94	1.95	1.79	3.74	0.996
Mercury	MG/KG	0 / 15	0.11	0.11	0.06	0.10	1.10	1.10	0.55

Shaded cells indicate ratio ≥ 1

Figures

R:\USNAVFACENGCOM405450\VIEQUES\MAPFILES\PI-4_WELL_SURVEY\INTERNAL_FIGURES\FIGURE L-1 - SURFACE SOIL SAMPLE LOCATIONS.MXD JCARR CH2MHILLENVGIS 3/14/2016 1:41:18 PM

Legend

- PA/SI Surface and Subsurface Soil Sample Location
- Supplemental ESI Subsurface Soil Sample Location
- RI Surface and Subsurface Soil Sample Location

ERI Aerial Photographic Analysis (February 2003)

- Disturbed Ground/Possible Fill Area 1964
- Trench Scars 1959
- Trench/Possible Debris 1959
- Estimated Location of Bermed Area used for Fuel Bladder Storage
- Disturbed Areas (1962)

1962 Aerial Photo

N
W E
S

0 85 170
Feet

Figure L-1
Surface Soil Sample Locations
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range
Vieques, Puerto Rico

ch2m

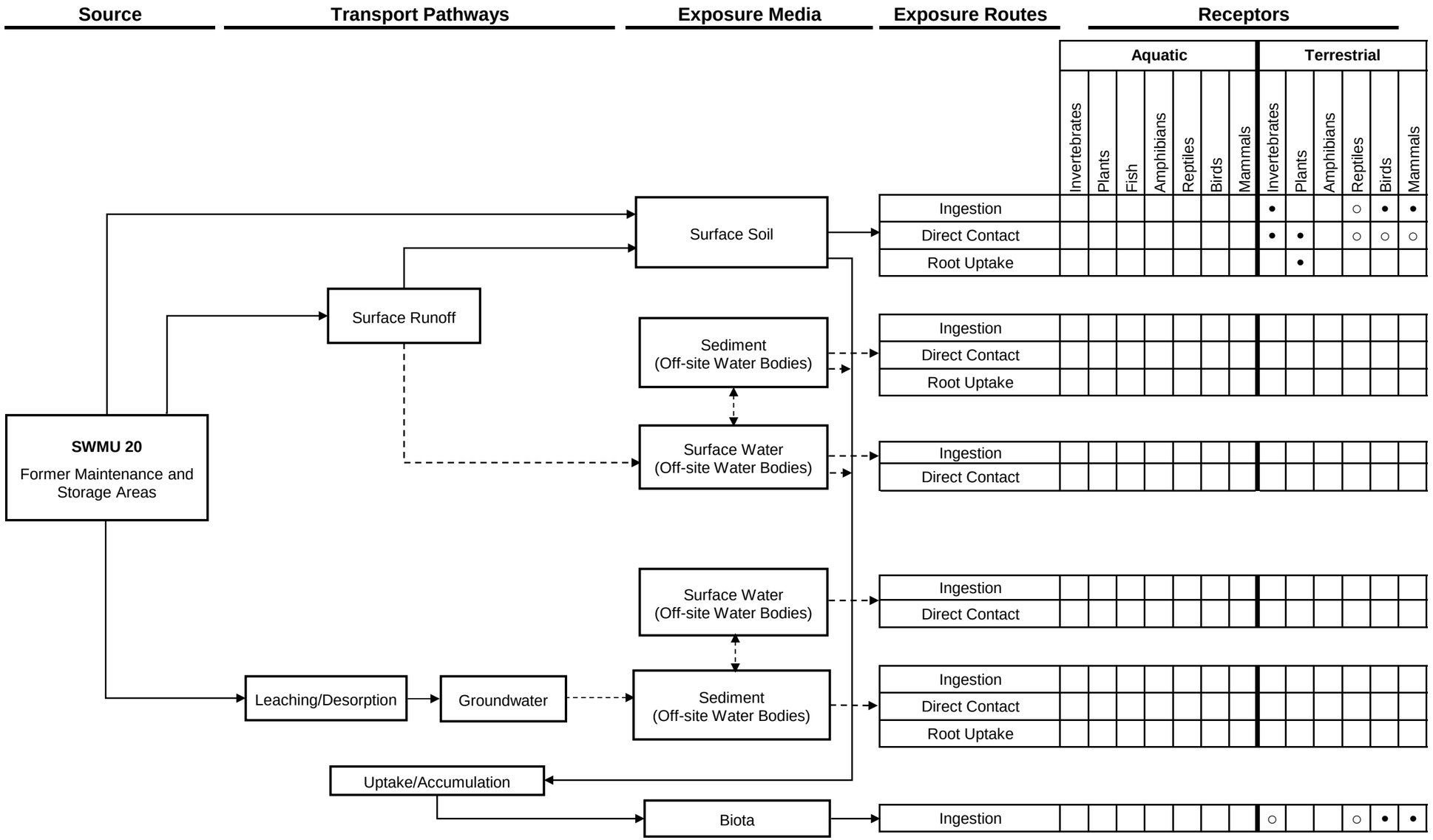

FIGURE L-2
Ecological Conceptual Site Model
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Attachment L-1
Terrestrial Food Web Calculations

Attachment Table L-1-1
Summary of Norway Rat Exposure Doses - Screening (Step 2)
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals											
Antimony	8.20E-01	Regression	3.27E-02	0.00E+00	1.15E-02	0.059	0.19	0.59	1.95E-01	6.16E-02	1.95E-02
Copper	5.28E+01	Regression	9.32E+00	0.00E+00	2.41E+00	5.60	7.23	9.34	4.31E-01	3.34E-01	2.58E-01
Lead	2.88E+01	Regression	1.75E+00	0.00E+00	5.42E-01	4.70	6.47	8.90	1.15E-01	8.38E-02	6.09E-02
Mercury	1.10E-01	Regression	1.11E-01	0.00E+00	2.63E-02	0.032	0.072	0.160	8.23E-01	3.68E-01	1.65E-01
Selenium	7.80E-01	Regression	3.86E-01	0.00E+00	9.33E-02	0.20	0.26	0.33	4.66E-01	3.63E-01	2.83E-01
Vanadium	8.61E+01	0.010	8.35E-01	0.00E+00	6.02E-01	4.16	5.88	8.31	1.45E-01	1.02E-01	7.24E-02
Polychlorinated Biphenyls											
Aroclor-1016	3.70E-02	0.323	1.19E-02	0.00E+00	2.95E-03	0.136	0.30	0.68	2.17E-02	9.70E-03	4.34E-03
Aroclor-1221	7.50E-02	0.749	5.61E-02	0.00E+00	1.34E-02	0.136	0.30	0.68	9.85E-02	4.40E-02	1.97E-02
Aroclor-1232	3.70E-02	0.515	1.91E-02	0.00E+00	4.60E-03	0.136	0.30	0.68	3.38E-02	1.51E-02	6.77E-03
Aroclor-1242	3.70E-02	0.323	1.19E-02	0.00E+00	2.95E-03	0.136	0.30	0.68	2.17E-02	9.70E-03	4.34E-03
Aroclor-1248	3.70E-02	0.184	6.82E-03	0.00E+00	1.76E-03	0.136	0.30	0.68	1.29E-02	5.78E-03	2.59E-03
Aroclor-1254	3.70E-02	0.139	5.15E-03	0.00E+00	1.37E-03	0.136	0.30	0.68	1.01E-02	4.51E-03	2.02E-03
Aroclor-1260	2.80E-02	0.105	2.95E-03	0.00E+00	8.17E-04	0.136	0.30	0.68	6.01E-03	2.69E-03	1.20E-03
Pesticides											
4,4'-DDE	6.20E-01	Regression	5.66E-02	0.00E+00	1.61E-02	0.147	0.329	0.735	1.09E-01	4.89E-02	2.19E-02
4,4'-DDT	1.00E-01	Regression	1.43E-02	0.00E+00	3.80E-03	0.147	0.329	0.735	2.59E-02	1.16E-02	5.18E-03
Aldrin	3.70E-03	0.139	5.15E-04	0.00E+00	1.37E-04	0.20	0.45	1.00	6.86E-04	3.07E-04	1.37E-04
alpha-BHC	3.70E-03	1.735	6.42E-03	0.00E+00	1.51E-03	1.60	2.26	3.20	9.43E-04	6.67E-04	4.71E-04
alpha-Chlordane	3.70E-03	0.165	6.10E-04	0.00E+00	1.59E-04	4.58	6.48	9.16	3.47E-05	2.46E-05	1.74E-05
beta-BHC	3.70E-03	1.719	6.36E-03	0.00E+00	1.49E-03	1.60	2.26	3.20	9.34E-04	6.60E-04	4.67E-04
delta-BHC	7.50E-04	1.311	9.83E-04	0.00E+00	2.32E-04	1.60	2.26	3.20	1.45E-04	1.02E-04	7.25E-05
Dieldrin	7.30E-03	0.410	2.99E-03	0.00E+00	7.29E-04	0.015	0.021	0.030	4.86E-02	3.44E-02	2.43E-02
Endosulfan I	4.40E-04	1.687	7.42E-04	0.00E+00	1.74E-04	0.15	0.34	0.75	1.16E-03	5.20E-04	2.33E-04
Endosulfan II	7.30E-03	0.886	6.46E-03	0.00E+00	1.54E-03	0.15	0.34	0.75	1.02E-02	4.58E-03	2.05E-03
Endrin	7.30E-03	0.535	3.90E-03	0.00E+00	9.41E-04	0.18	0.41	0.92	5.11E-03	2.29E-03	1.02E-03
gamma-BHC (Lindane)	3.70E-03	1.852	6.85E-03	0.00E+00	1.61E-03	8.00	17.9	40.0	2.01E-04	8.99E-05	4.02E-05
gamma-Chlordane	1.00E-03	0.165	1.65E-04	0.00E+00	4.30E-05	4.58	6.48	9.16	9.39E-06	6.64E-06	4.69E-06
Heptachlor	3.70E-03	0.174	6.45E-04	0.00E+00	1.67E-04	0.20	0.45	1.00	8.36E-04	3.74E-04	1.67E-04
Heptachlor epoxide	3.70E-03	0.566	2.09E-03	0.00E+00	5.03E-04	0.20	0.45	1.00	2.52E-03	1.13E-03	5.03E-04
Methoxychlor	3.70E-02	0.525	1.94E-02	0.00E+00	4.68E-03	4.00	5.66	8.00	1.17E-03	8.28E-04	5.86E-04
Toxaphene	3.70E-01	0.355	1.31E-01	0.00E+00	3.22E-02	8.00	17.9	40.0	4.03E-03	1.80E-03	8.05E-04
Volatile/Semivolatile Organics											
1,1,2,2-Tetrachloroethane	1.40E-02	1.000	1.40E-02	0.00E+00	3.32E-03	76.0	170	380	4.36E-05	1.95E-05	8.73E-06
1,2,4-Trichlorobenzene	1.40E-02	1.426	2.00E-02	0.00E+00	4.70E-03	53.0	75.0	106	8.87E-05	6.27E-05	4.44E-05
1,2-Dichlorobenzene	1.40E-02	2.452	3.43E-02	0.00E+00	8.04E-03	85.7	192	429	9.38E-05	4.19E-05	1.88E-05
1,3-Dichlorobenzene	1.40E-02	2.296	3.21E-02	0.00E+00	7.53E-03	85.7	192	429	8.79E-05	3.93E-05	1.76E-05
1,4-Dichlorobenzene	1.40E-02	2.475	3.46E-02	0.00E+00	8.11E-03	30.0	52.0	90.0	2.70E-04	1.56E-04	9.01E-05
4-Bromophenyl-phenylether	3.70E-01	0.566	2.09E-01	0.00E+00	5.03E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.70E-01	0.593	2.19E-01	0.00E+00	5.27E-02	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	3.70E-01	Regression	3.69E-02	0.00E+00	1.03E-02	0.62	1.37	3.07	1.68E-02	7.52E-03	3.36E-03
Benzo(a)pyrene	3.70E-01	Regression	4.83E-02	0.00E+00	1.30E-02	0.62	1.37	3.07	2.11E-02	9.43E-03	4.22E-03
Benzo(b)fluoranthene	3.70E-01	0.310	1.15E-01	0.00E+00	2.84E-02	0.62	1.37	3.07	4.62E-02	2.07E-02	9.25E-03
Benzo(g,h,i)perylene	3.70E-01	Regression	1.22E-01	0.00E+00	3.00E-02	0.62	1.37	3.07	4.87E-02	2.18E-02	9.76E-03
Benzo(k)fluoranthene	3.70E-01	Regression	4.92E-02	0.00E+00	1.32E-02	0.62	1.37	3.07	2.14E-02	9.58E-03	4.29E-03
Chrysene	3.70E-01	Regression	3.69E-02	0.00E+00	1.03E-02	0.62	1.37	3.07	1.68E-02	7.52E-03	3.36E-03
Dibenz(a,h)anthracene	3.70E-01	0.130	4.81E-02	0.00E+00	1.29E-02	0.62	1.37	3.07	2.10E-02	9.40E-03	4.21E-03
Hexachlorobenzene	3.70E-01	0.246	9.11E-02	0.00E+00	2.29E-02	2.00	2.83	4.00	1.15E-02	8.10E-03	5.73E-03
Hexachlorobutadiene	3.70E-01	0.675	2.50E-01	0.00E+00	5.98E-02	2.00	6.32	20.0	2.99E-02	9.45E-03	2.99E-03
Hexachlorocyclopentadiene	3.70E-01	0.393	1.45E-01	0.00E+00	3.55E-02	75.0	168	375	4.73E-04	2.12E-04	9.47E-05
Hexachloroethane	3.70E-01	1.439	5.33E-01	0.00E+00	1.25E-01	100	224	500	1.25E-03	5.61E-04	2.51E-04
Indeno(1,2,3-cd)pyrene	3.70E-01	0.110	4.07E-02	0.00E+00	1.12E-02	0.62	1.37	3.07	1.82E-02	8.15E-03	3.65E-03
Pyrene	3.70E-01	0.720	2.66E-01	0.00E+00	6.36E-02	0.62	1.37	3.07	1.03E-01	4.63E-02	2.07E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0398 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.980 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.020 = Proportion of diet composed of soil
WIR = 0.0000 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.168 = Body weight (kg)

Attachment Table L-1-2
Summary of Indian Mongoose Exposure Doses - Screening (Step 2)
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals											
Antimony	8.20E-01	1.000	8.20E-01	0.00E+00	1.21E-01	0.059	0.19	0.59	**2.05E+00**	6.48E-01	2.05E-01
Copper	5.28E+01	Regression	1.52E+01	0.00E+00	2.40E+00	11.7	13.3	15.1	2.05E-01	1.80E-01	1.59E-01
Lead	2.88E+01	Regression	1.21E+01	0.00E+00	1.85E+00	4.70	6.47	8.90	3.94E-01	2.87E-01	2.08E-01
Mercury	1.10E-01	20.63	2.27E+00	0.00E+00	3.26E-01	0.15	0.19	0.25	**2.17E+00**	**1.68E+00**	**1.30E+00**
Selenium	7.80E-01	Regression	7.73E-01	0.00E+00	1.14E-01	0.20	0.26	0.33	5.70E-01	4.44E-01	3.46E-01
Vanadium	8.61E+01	0.088	7.58E+00	0.00E+00	1.44E+00	4.16	5.88	8.31	3.46E-01	2.45E-01	1.73E-01
Polychlorinated Biphenyls											
Aroclor-1016	3.70E-02	Regression	4.61E-02	0.00E+00	6.76E-03	1.37	2.17	3.43	4.93E-03	3.12E-03	1.97E-03
Aroclor-1221	7.50E-02	Regression	1.21E-01	0.00E+00	1.76E-02	0.138	0.31	0.69	1.27E-01	5.70E-02	2.55E-02
Aroclor-1232	3.70E-02	Regression	4.61E-02	0.00E+00	6.76E-03	0.138	0.31	0.69	4.90E-02	2.19E-02	9.79E-03
Aroclor-1242	3.70E-02	Regression	4.61E-02	0.00E+00	6.76E-03	0.138	0.31	0.69	4.90E-02	2.19E-02	9.79E-03
Aroclor-1248	3.70E-02	Regression	4.61E-02	0.00E+00	6.76E-03	0.140	0.31	0.69	4.83E-02	2.17E-02	9.79E-03
Aroclor-1254	3.70E-02	Regression	4.61E-02	0.00E+00	6.76E-03	0.140	0.31	0.69	4.83E-02	2.17E-02	9.79E-03
Aroclor-1260	2.80E-02	Regression	3.15E-02	0.00E+00	4.64E-03	0.140	0.31	0.69	3.31E-02	1.49E-02	6.72E-03
Pesticides											
4,4'-DDE	6.20E-01	Regression	7.82E+00	0.00E+00	1.12E+00	0.147	0.329	0.735	**7.64E+00**	**3.42E+00**	**1.53E+00**
4,4'-DDT	1.00E-01	Regression	1.13E+00	0.00E+00	1.63E-01	0.147	0.329	0.735	**1.11E+00**	4.95E-01	2.21E-01
Aldrin	3.70E-03	3.300	1.22E-02	0.00E+00	1.76E-03	0.20	0.45	1.00	8.82E-03	3.95E-03	1.76E-03
alpha-BHC	3.70E-03	1.000	3.70E-03	0.00E+00	5.45E-04	1.60	2.26	3.20	3.41E-04	2.41E-04	1.70E-04
alpha-Chlordane	3.70E-03	4.000	1.48E-02	0.00E+00	2.14E-03	4.58	6.48	9.16	4.66E-04	3.30E-04	2.33E-04
beta-BHC	3.70E-03	1.000	3.70E-03	0.00E+00	5.45E-04	1.60	2.26	3.20	3.41E-04	2.41E-04	1.70E-04
delta-BHC	7.50E-04	1.000	7.50E-04	0.00E+00	1.11E-04	1.60	2.26	3.20	6.91E-05	4.89E-05	3.46E-05
Dieldrin	7.30E-03	14.70	1.07E-01	0.00E+00	1.54E-02	0.015	0.021	0.030	**1.03E+00**	7.26E-01	5.14E-01
Endosulfan I	4.40E-04	1.000	4.40E-04	0.00E+00	6.49E-05	0.15	0.34	0.75	4.32E-04	1.93E-04	8.65E-05
Endosulfan II	7.30E-03	1.000	7.30E-03	0.00E+00	1.08E-03	0.15	0.34	0.75	7.17E-03	3.21E-03	1.43E-03
Endrin	7.30E-03	3.600	2.63E-02	0.00E+00	3.80E-03	0.18	0.41	0.92	2.06E-02	9.23E-03	4.13E-03
gamma-BHC (Lindane)	3.70E-03	26.60	9.84E-02	0.00E+00	1.41E-02	8.00	17.9	40.0	1.76E-03	7.89E-04	3.53E-04
gamma-Chlordane	1.00E-03	4.000	4.00E-03	0.00E+00	5.77E-04	4.58	6.48	9.16	1.26E-04	8.91E-05	6.30E-05
Heptachlor	3.70E-03	3.000	1.11E-02	0.00E+00	1.61E-03	0.20	0.45	1.00	8.03E-03	3.59E-03	1.61E-03
Heptachlor epoxide	3.70E-03	10.00	3.70E-02	0.00E+00	5.32E-03	0.20	0.45	1.00	2.66E-02	1.19E-02	5.32E-03
Methoxychlor	3.70E-02	1.000	3.70E-02	0.00E+00	5.45E-03	4.00	5.66	8.00	1.36E-03	9.64E-04	6.82E-04
Toxaphene	3.70E-01	1.000	3.70E-01	0.00E+00	5.45E-02	8.00	17.9	40.0	6.82E-03	3.05E-03	1.36E-03
Volatile/Semivolatile Organics											
1,1,2,2-Tetrachloroethane	1.40E-02	1.000	1.40E-02	0.00E+00	2.06E-03	76.0	170	380	2.72E-05	1.21E-05	5.43E-06
1,2,4-Trichlorobenzene	1.40E-02	0.560	7.84E-03	0.00E+00	1.18E-03	53.0	75.0	106	2.23E-05	1.58E-05	1.11E-05
1,2-Dichlorobenzene	1.40E-02	1.000	1.40E-02	0.00E+00	2.06E-03	85.7	192	429	2.41E-05	1.08E-05	4.82E-06
1,3-Dichlorobenzene	1.40E-02	1.000	1.40E-02	0.00E+00	2.06E-03	85.7	192	429	2.41E-05	1.08E-05	4.82E-06
1,4-Dichlorobenzene	1.40E-02	1.000	1.40E-02	0.00E+00	2.06E-03	30.0	52.0	90.0	6.88E-05	3.97E-05	2.29E-05
4-Bromophenyl-phenylether	3.70E-01	1.000	3.70E-01	0.00E+00	5.45E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.70E-01	1.000	3.70E-01	0.00E+00	5.45E-02	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	3.70E-01	1.590	5.88E-01	0.00E+00	8.58E-02	0.62	1.37	3.07	1.40E-01	6.25E-02	2.80E-02
Benzo(a)pyrene	3.70E-01	1.330	4.92E-01	0.00E+00	7.20E-02	0.62	1.37	3.07	1.17E-01	5.24E-02	2.35E-02
Benzo(b)fluoranthene	3.70E-01	2.600	9.62E-01	0.00E+00	1.39E-01	0.62	1.37	3.07	2.27E-01	1.01E-01	4.54E-02
Benzo(g,h,i)perylene	3.70E-01	2.940	1.09E+00	0.00E+00	1.57E-01	0.62	1.37	3.07	2.56E-01	1.15E-01	5.13E-02
Benzo(k)fluoranthene	3.70E-01	2.600	9.62E-01	0.00E+00	1.39E-01	0.62	1.37	3.07	2.27E-01	1.01E-01	4.54E-02
Chrysene	3.70E-01	2.290	8.47E-01	0.00E+00	1.23E-01	0.62	1.37	3.07	2.00E-01	8.95E-02	4.00E-02
Dibenz(a,h)anthracene	3.70E-01	2.310	8.55E-01	0.00E+00	1.24E-01	0.62	1.37	3.07	2.02E-01	9.02E-02	4.04E-02
Hexachlorobenzene	3.70E-01	1.690	6.25E-01	0.00E+00	9.11E-02	2.00	2.83	4.00	4.56E-02	3.22E-02	2.28E-02
Hexachlorobutadiene	3.70E-01	1.000	3.70E-01	0.00E+00	5.45E-02	2.00	6.32	20.0	2.73E-02	8.62E-03	2.73E-03
Hexachlorocyclopentadiene	3.70E-01	1.000	3.70E-01	0.00E+00	5.45E-02	75.0	168	375	7.27E-04	3.25E-04	1.45E-04
Hexachloroethane	3.70E-01	1.000	3.70E-01	0.00E+00	5.45E-02	100	224	500	5.45E-04	2.44E-04	1.09E-04
Indeno(1,2,3-cd)pyrene	3.70E-01	2.860	1.06E+00	0.00E+00	1.53E-01	0.62	1.37	3.07	2.49E-01	1.11E-01	4.99E-02
Pyrene	3.70E-01	1.750	6.48E-01	0.00E+00	9.43E-02	0.62	1.37	3.07	1.53E-01	6.86E-02	3.07E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0460 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.972 = Proportion of diet composed of food item (soil invertebrates)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.028 = Proportion of diet composed of soil
WIR = 0.0000 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.312 = Body weight (kg)

Attachment Table L-1-3
Summary of Pearly-eyed Thrasher Exposure Doses - Screening (Step 2)
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals											
Antimony	8.20E-01	1.000	8.20E-01	0.00E+00	1.79E-01	NA	NA	NA	NA	NA	NA
Copper	5.28E+01	Regression	1.52E+01	0.00E+00	3.69E+00	4.05	7.00	12.1	9.11E-01	5.27E-01	3.05E-01
Lead	2.88E+01	Regression	1.21E+01	0.00E+00	2.80E+00	3.85	8.61	19.3	7.28E-01	3.26E-01	1.46E-01
Mercury	1.10E-01	20.63	2.27E+00	0.00E+00	4.72E-01	0.49	0.77	1.20	9.64E-01	6.16E-01	3.94E-01
Selenium	7.80E-01	Regression	7.73E-01	0.00E+00	1.68E-01	0.44	0.81	1.50	3.83E-01	2.07E-01	1.12E-01
Vanadium	8.61E+01	0.088	7.58E+00	0.00E+00	2.44E+00	0.344	0.486	0.688	**7.08E+00**	**5.01E+00**	**3.54E+00**
Polychlorinated Biphenyls											
Aroclor-1016	3.70E-02	Regression	4.61E-02	0.00E+00	9.95E-03	0.41	0.92	2.05	2.43E-02	1.08E-02	4.85E-03
Aroclor-1221	7.50E-02	Regression	1.21E-01	0.00E+00	2.58E-02	0.41	0.92	2.05	6.29E-02	2.81E-02	1.26E-02
Aroclor-1232	3.70E-02	Regression	4.61E-02	0.00E+00	9.95E-03	0.41	0.92	2.05	2.43E-02	1.08E-02	4.85E-03
Aroclor-1242	3.70E-02	Regression	4.61E-02	0.00E+00	9.95E-03	0.41	0.92	2.05	2.43E-02	1.08E-02	4.85E-03
Aroclor-1248	3.70E-02	Regression	4.61E-02	0.00E+00	9.95E-03	0.41	0.92	2.05	2.43E-02	1.08E-02	4.85E-03
Aroclor-1254	3.70E-02	Regression	4.61E-02	0.00E+00	9.95E-03	0.41	0.92	2.05	2.43E-02	1.08E-02	4.85E-03
Aroclor-1260	2.80E-02	Regression	3.15E-02	0.00E+00	6.83E-03	0.41	0.92	2.05	1.67E-02	7.45E-03	3.33E-03
Pesticides											
4,4'-DDE	6.20E-01	Regression	7.82E+00	0.00E+00	1.63E+00	0.50	1.58	5.00	**3.26E+00**	**1.03E+00**	3.26E-01
4,4'-DDT	1.00E-01	Regression	1.13E+00	0.00E+00	2.36E-01	0.50	1.58	5.00	4.72E-01	1.49E-01	4.72E-02
Aldrin	3.70E-03	3.300	1.22E-02	0.00E+00	2.57E-03	0.070	0.157	0.351	3.67E-02	1.64E-02	7.34E-03
alpha-BHC	3.70E-03	1.000	3.70E-03	0.00E+00	8.06E-04	0.56	1.12	2.25	1.44E-03	7.18E-04	3.58E-04
alpha-Chlordane	3.70E-03	4.000	1.48E-02	0.00E+00	3.11E-03	2.14	4.79	10.7	1.45E-03	6.50E-04	2.91E-04
beta-BHC	3.70E-03	1.000	3.70E-03	0.00E+00	8.06E-04	0.56	1.12	2.25	1.44E-03	7.18E-04	3.58E-04
delta-BHC	7.50E-04	1.000	7.50E-04	0.00E+00	1.63E-04	0.56	1.12	2.25	2.92E-04	1.45E-04	7.26E-05
Dieldrin	7.30E-03	14.70	1.07E-01	0.00E+00	2.24E-02	0.071	0.52	3.78	3.15E-01	4.32E-02	5.92E-03
Endosulfan I	4.40E-04	1.000	4.40E-04	0.00E+00	9.58E-05	10.0	22.4	50.0	9.58E-06	4.28E-06	1.92E-06
Endosulfan II	7.30E-03	1.000	7.30E-03	0.00E+00	1.59E-03	10.0	22.4	50.0	1.59E-04	7.11E-05	3.18E-05
Endrin	7.30E-03	3.600	2.63E-02	0.00E+00	5.53E-03	0.021	0.047	0.104	2.66E-01	1.19E-01	5.32E-02
gamma-BHC (Lindane)	3.70E-03	26.60	9.84E-02	0.00E+00	2.05E-02	4.00	8.94	20.0	5.12E-03	2.29E-03	1.02E-03
gamma-Chlordane	1.00E-03	4.000	4.00E-03	0.00E+00	8.41E-04	2.14	4.79	10.7	3.93E-04	1.76E-04	7.86E-05
Heptachlor	3.70E-03	3.000	1.11E-02	0.00E+00	2.34E-03	0.28	0.62	1.38	8.51E-03	3.81E-03	1.70E-03
Heptachlor epoxide	3.70E-03	10.00	3.70E-02	0.00E+00	7.72E-03	0.28	0.62	1.38	2.81E-02	1.25E-02	5.61E-03
Methoxychlor	3.70E-02	1.000	3.70E-02	0.00E+00	8.06E-03	355	794	1,775	2.27E-05	1.01E-05	4.54E-06
Toxaphene	3.70E-01	1.000	3.70E-01	0.00E+00	8.06E-02	1.00	2.24	5.00	8.06E-02	3.60E-02	1.61E-02
Volatile/Semivolatile Organics											
1,1,2,2-Tetrachloroethane	1.40E-02	1.000	1.40E-02	0.00E+00	3.05E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.40E-02	0.560	7.84E-03	0.00E+00	1.77E-03	32.2	71.9	161	5.50E-05	2.46E-05	1.10E-05
1,2-Dichlorobenzene	1.40E-02	1.000	1.40E-02	0.00E+00	3.05E-03	32.2	71.9	161	9.48E-05	4.24E-05	1.90E-05
1,3-Dichlorobenzene	1.40E-02	1.000	1.40E-02	0.00E+00	3.05E-03	32.2	71.9	161	9.48E-05	4.24E-05	1.90E-05
1,4-Dichlorobenzene	1.40E-02	1.000	1.40E-02	0.00E+00	3.05E-03	32.2	71.9	161	9.48E-05	4.24E-05	1.90E-05
4-Bromophenyl-phenylether	3.70E-01	1.000	3.70E-01	0.00E+00	8.06E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.70E-01	1.000	3.70E-01	0.00E+00	8.06E-02	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	3.70E-01	1.590	5.88E-01	0.00E+00	1.26E-01	7.10	15.9	35.5	1.77E-02	7.93E-03	3.55E-03
Benzo(a)pyrene	3.70E-01	1.330	4.92E-01	0.00E+00	1.06E-01	7.10	15.9	35.5	1.49E-02	6.67E-03	2.98E-03
Benzo(b)fluoranthene	3.70E-01	2.600	9.62E-01	0.00E+00	2.04E-01	7.10	15.9	35.5	2.87E-02	1.28E-02	5.73E-03
Benzo(g,h,i)perylene	3.70E-01	2.940	1.09E+00	0.00E+00	2.30E-01	7.10	15.9	35.5	3.23E-02	1.45E-02	6.47E-03
Benzo(k)fluoranthene	3.70E-01	2.600	9.62E-01	0.00E+00	2.04E-01	7.10	15.9	35.5	2.87E-02	1.28E-02	5.73E-03
Chrysene	3.70E-01	2.290	8.47E-01	0.00E+00	1.80E-01	7.10	15.9	35.5	2.53E-02	1.13E-02	5.06E-03
Dibenz(a,h)anthracene	3.70E-01	2.310	8.55E-01	0.00E+00	1.81E-01	7.10	15.9	35.5	2.55E-02	1.14E-02	5.11E-03
Hexachlorobenzene	3.70E-01	1.690	6.25E-01	0.00E+00	1.34E-01	0.113	0.253	0.565	**1.18E+00**	5.29E-01	2.36E-01
Hexachlorobutadiene	3.70E-01	1.000	3.70E-01	0.00E+00	8.06E-02	3.39	7.58	17.0	2.38E-02	1.06E-02	4.75E-03
Hexachlorocyclopentadiene	3.70E-01	1.000	3.70E-01	0.00E+00	8.06E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	3.70E-01	1.000	3.70E-01	0.00E+00	8.06E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	3.70E-01	2.860	1.06E+00	0.00E+00	2.24E-01	7.10	15.9	35.5	3.15E-02	1.41E-02	6.30E-03
Pyrene	3.70E-01	1.750	6.48E-01	0.00E+00	1.38E-01	7.10	15.9	35.5	1.95E-02	8.70E-03	3.89E-03

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI =	Chemical-specific	= Dietary intake for chemical (mg chemical/kg body weight/day)
FIR =	0.0174	= Food ingestion rate (kg/day dry weight)
FCxi =	Chemical-specific	= Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi =	0.954	= Proportion of diet composed of food item (soil invertebrates)
SCx =	Chemical-specific	= Concentration of chemical in soil (mg/kg, dry weight)
PDS =	0.046	= Proportion of diet composed of soil
WIR =	0.0000	= Water ingestion rate (L/day)
WC =	Chemical-specific	= Concentration of chemical in water (mg/L)
BW =	0.080	= Body weight (kg)

Attachment Table L-1-4
Summary of Red-tailed Hawk Exposure Doses - Screening (Step 2)
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Mammal BAF	Small Mammal Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals											
Antimony	8.20E-01	See footnote	4.85E-02	0.00E+00	2.00E-03	NA	NA	NA	NA	NA	NA
Copper	5.28E+01	Regression	1.25E+01	0.00E+00	5.15E-01	4.05	7.00	12.1	1.27E-01	7.35E-02	4.25E-02
Lead	2.88E+01	Regression	4.77E+00	0.00E+00	1.97E-01	3.85	8.61	19.3	5.11E-02	2.29E-02	1.02E-02
Mercury	1.10E-01	0.130	1.43E-02	0.00E+00	5.91E-04	0.49	0.77	1.20	1.21E-03	7.70E-04	4.92E-04
Selenium	7.80E-01	Regression	6.01E-01	0.00E+00	2.48E-02	0.44	0.81	1.50	5.64E-02	3.05E-02	1.65E-02
Vanadium	8.61E+01	0.013	1.13E+00	0.00E+00	4.66E-02	0.344	0.486	0.688	1.36E-01	9.58E-02	6.78E-02
Polychlorinated Biphenyls											
Aroclor-1016	3.70E-02	See footnote	1.24E-02	0.00E+00	5.14E-04	0.41	0.92	2.05	1.25E-03	5.61E-04	2.51E-04
Aroclor-1221	7.50E-02	See footnote	5.65E-02	0.00E+00	2.33E-03	0.41	0.92	2.05	5.69E-03	2.55E-03	1.14E-03
Aroclor-1232	3.70E-02	See footnote	1.94E-02	0.00E+00	8.02E-04	0.41	0.92	2.05	1.96E-03	8.75E-04	3.91E-04
Aroclor-1242	3.70E-02	See footnote	1.24E-02	0.00E+00	5.14E-04	0.41	0.92	2.05	1.25E-03	5.61E-04	2.51E-04
Aroclor-1248	3.70E-02	See footnote	7.42E-03	0.00E+00	3.07E-04	0.41	0.92	2.05	7.48E-04	3.34E-04	1.50E-04
Aroclor-1254	3.70E-02	See footnote	5.79E-03	0.00E+00	2.39E-04	0.41	0.92	2.05	5.83E-04	2.61E-04	1.17E-04
Aroclor-1260	2.80E-02	See footnote	3.45E-03	0.00E+00	1.42E-04	0.41	0.92	2.05	3.47E-04	1.55E-04	6.95E-05
Pesticides											
4,4'-DDE	6.20E-01	See footnote	6.79E-02	0.00E+00	2.80E-03	0.08	0.18	0.40	3.50E-02	1.57E-02	7.01E-03
4,4'-DDT	1.00E-01	See footnote	1.61E-02	0.00E+00	6.63E-04	0.08	0.18	0.40	8.29E-03	3.71E-03	1.66E-03
Aldrin	3.70E-03	See footnote	5.79E-04	0.00E+00	2.39E-05	0.070	0.157	0.351	3.41E-04	1.53E-04	6.82E-05
alpha-BHC	3.70E-03	See footnote	6.37E-03	0.00E+00	2.63E-04	0.56	1.12	2.25	4.69E-04	2.34E-04	1.17E-04
alpha-Chlordane	3.70E-03	See footnote	6.72E-04	0.00E+00	2.77E-05	2.14	4.79	10.7	1.30E-05	5.80E-06	2.59E-06
beta-BHC	3.70E-03	See footnote	6.31E-03	0.00E+00	2.60E-04	0.56	1.12	2.25	4.65E-04	2.32E-04	1.16E-04
delta-BHC	7.50E-04	See footnote	9.79E-04	0.00E+00	4.04E-05	0.56	1.12	2.25	7.22E-05	3.60E-05	1.80E-05
Dieldrin	7.30E-03	See footnote	3.08E-03	0.00E+00	1.27E-04	0.071	0.52	3.78	1.79E-03	2.46E-04	3.36E-05
Endosulfan I	4.40E-04	See footnote	7.36E-04	0.00E+00	3.04E-05	10.0	22.4	50.0	3.04E-06	1.36E-06	6.08E-07
Endosulfan II	7.30E-03	See footnote	6.48E-03	0.00E+00	2.68E-04	10.0	22.4	50.0	2.68E-05	1.20E-05	5.35E-06
Endrin	7.30E-03	See footnote	3.97E-03	0.00E+00	1.64E-04	0.021	0.047	0.104	7.89E-03	3.53E-03	1.58E-03
gamma-BHC (Lindane)	3.70E-03	See footnote	6.79E-03	0.00E+00	2.80E-04	4.00	8.9	20.0	7.01E-05	3.14E-05	1.40E-05
gamma-Chlordane	1.00E-03	See footnote	1.82E-04	0.00E+00	7.50E-06	2.14	4.79	10.7	3.50E-06	1.57E-06	7.01E-07
Heptachlor	3.70E-03	See footnote	7.06E-04	0.00E+00	2.92E-05	0.28	0.62	1.38	1.06E-04	4.74E-05	2.12E-05
Heptachlor epoxide	3.70E-03	See footnote	2.12E-03	0.00E+00	8.77E-05	0.28	0.62	1.38	3.19E-04	1.43E-04	6.37E-05
Methoxychlor	3.70E-02	See footnote	1.98E-02	0.00E+00	8.16E-04	355	794	1,775	2.30E-06	1.03E-06	4.60E-07
Toxaphene	3.70E-01	See footnote	1.36E-01	0.00E+00	5.61E-03	1.00	2.24	5.00	5.61E-03	2.51E-03	1.12E-03
Volatile/Semivolatile Organics											
1,1,2,2-Tetrachloroethane	1.40E-02	See footnote	1.40E-02	0.00E+00	5.78E-04	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.40E-02	See footnote	1.98E-02	0.00E+00	8.20E-04	32.2	71.9	161	2.55E-05	1.14E-05	5.10E-06
1,2-Dichlorobenzene	1.40E-02	See footnote	3.39E-02	0.00E+00	1.40E-03	32.2	71.9	161	4.36E-05	1.95E-05	8.71E-06
1,3-Dichlorobenzene	1.40E-02	See footnote	3.18E-02	0.00E+00	1.31E-03	32.2	71.9	161	4.08E-05	1.83E-05	8.16E-06
1,4-Dichlorobenzene	1.40E-02	See footnote	3.42E-02	0.00E+00	1.41E-03	32.2	71.9	161	4.40E-05	1.97E-05	8.79E-06
4-Bromophenyl-phenylether	3.70E-01	See footnote	2.12E-01	0.00E+00	8.77E-03	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.70E-01	See footnote	2.22E-01	0.00E+00	9.18E-03	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	3.70E-01	0.000	0.00E+00	0.00E+00	0.00E+00	7.10	15.9	35.5	0.00E+00	0.00E+00	0.00E+00
Benzo(a)pyrene	3.70E-01	0.000	0.00E+00	0.00E+00	0.00E+00	7.10	15.9	35.5	0.00E+00	0.00E+00	0.00E+00
Benzo(b)fluoranthene	3.70E-01	0.000	0.00E+00	0.00E+00	0.00E+00	7.10	15.9	35.5	0.00E+00	0.00E+00	0.00E+00
Benzo(g,h,i)perylene	3.70E-01	0.000	0.00E+00	0.00E+00	0.00E+00	7.10	15.9	35.5	0.00E+00	0.00E+00	0.00E+00
Benzo(k)fluoranthene	3.70E-01	0.000	0.00E+00	0.00E+00	0.00E+00	7.10	15.9	35.5	0.00E+00	0.00E+00	0.00E+00
Chrysene	3.70E-01	0.000	0.00E+00	0.00E+00	0.00E+00	7.10	15.9	35.5	0.00E+00	0.00E+00	0.00E+00
Dibenz(a,h)anthracene	3.70E-01	0.000	0.00E+00	0.00E+00	0.00E+00	7.10	15.9	35.5	0.00E+00	0.00E+00	0.00E+00
Hexachlorobenzene	3.70E-01	See footnote	9.67E-02	0.00E+00	3.99E-03	0.113	0.253	0.565	3.53E-02	1.58E-02	7.07E-03
Hexachlorobutadiene	3.70E-01	See footnote	2.52E-01	0.00E+00	1.04E-02	3.39	7.58	17.0	3.07E-03	1.37E-03	6.15E-04
Hexachlorocyclopentadiene	3.70E-01	See footnote	1.50E-01	0.00E+00	6.19E-03	NA	NA	NA	NA	NA	NA
Hexachloroethane	3.70E-01	See footnote	5.29E-01	0.00E+00	2.19E-02	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	3.70E-01	0.000	0.00E+00	0.00E+00	0.00E+00	7.10	15.9	35.5	0.00E+00	0.00E+00	0.00E+00
Pyrene	3.70E-01	0.000	0.00E+00	0.00E+00	0.00E+00	7.10	15.9	35.5	0.00E+00	0.00E+00	0.00E+00

It was assumed that the concentration of each chemical in the small mammal's tissues was equal to the chemical concentration in its diet, that is, a diet to whole-body BAF of 1.0 was assumed

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0395 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (small mammals, dry weight basis)
PDFi = 1.000 = Proportion of diet composed of food item (small mammals)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.000 = Proportion of diet composed of soil
WIR = 0.0000 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.957 = Body weight (kg)

Attachment Table L-1-5
Summary of Common Ground Dove Exposure Doses - Screening (Step 2)
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Maximum Surface Soil Concentration (mg/kg)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Maximum Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals											
Antimony	8.20E-01	Regression	3.27E-02	0.00E+00	2.62E-02	NA	NA	NA	NA	NA	NA
Copper	5.28E+01	Regression	9.32E+00	0.00E+00	4.18E+00	4.05	7.00	12.1	**1.03E+00**	5.97E-01	3.45E-01
Lead	2.88E+01	Regression	1.75E+00	0.00E+00	1.13E+00	1.63	2.31	3.26	6.91E-01	4.89E-01	3.46E-01
Mercury	1.10E-01	Regression	1.11E-01	0.00E+00	4.04E-02	0.45	0.64	0.90	8.98E-02	6.35E-02	4.49E-02
Selenium	7.80E-01	Regression	3.86E-01	0.00E+00	1.48E-01	0.29	0.41	0.58	5.09E-01	3.60E-01	2.55E-01
Vanadium	8.61E+01	0.010	8.35E-01	0.00E+00	1.85E+00	0.344	0.486	0.688	**5.39E+00**	**3.81E+00**	**2.70E+00**
Polychlorinated Biphenyls											
Aroclor-1016	3.70E-02	0.323	1.19E-02	0.00E+00	4.80E-03	0.36	0.80	1.80	1.33E-02	5.96E-03	2.67E-03
Aroclor-1221	7.50E-02	0.749	5.61E-02	0.00E+00	2.08E-02	0.36	0.80	1.80	5.77E-02	2.58E-02	1.15E-02
Aroclor-1232	3.70E-02	0.515	1.91E-02	0.00E+00	7.26E-03	0.36	0.80	1.80	2.02E-02	9.02E-03	4.03E-03
Aroclor-1242	3.70E-02	0.323	1.19E-02	0.00E+00	4.80E-03	0.36	0.80	1.80	1.33E-02	5.96E-03	2.67E-03
Aroclor-1248	3.70E-02	0.184	6.82E-03	0.00E+00	3.03E-03	0.36	0.80	1.80	8.42E-03	3.76E-03	1.68E-03
Aroclor-1254	3.70E-02	0.139	5.15E-03	0.00E+00	2.45E-03	0.36	0.80	1.80	6.82E-03	3.05E-03	1.36E-03
Aroclor-1260	2.80E-02	0.105	2.95E-03	0.00E+00	1.53E-03	0.36	0.80	1.80	4.24E-03	1.90E-03	8.49E-04
Pesticides											
4,4'-DDE	6.20E-01	Regression	5.66E-02	0.00E+00	3.08E-02	0.50	1.58	5.00	6.17E-02	1.95E-02	6.17E-03
4,4'-DDT	1.00E-01	Regression	1.43E-02	0.00E+00	6.78E-03	0.50	1.58	5.00	1.36E-02	4.29E-03	1.36E-03
Aldrin	3.70E-03	0.139	5.15E-04	0.00E+00	2.45E-04	0.070	0.157	0.351	3.50E-03	1.57E-03	7.00E-04
alpha-BHC	3.70E-03	1.735	6.42E-03	0.00E+00	2.29E-03	0.56	1.12	2.25	4.08E-03	2.04E-03	1.02E-03
alpha-Chlordane	3.70E-03	0.165	6.10E-04	0.00E+00	2.78E-04	1.19	2.66	5.95	2.34E-04	1.04E-04	4.67E-05
beta-BHC	3.70E-03	1.719	6.36E-03	0.00E+00	2.27E-03	0.56	1.12	2.25	4.04E-03	2.02E-03	1.01E-03
delta-BHC	7.50E-04	1.311	9.83E-04	0.00E+00	3.53E-04	0.56	1.12	2.25	6.31E-04	3.15E-04	1.57E-04
Dieldrin	7.30E-03	0.410	2.99E-03	0.00E+00	1.17E-03	0.071	0.52	3.78	1.65E-02	2.25E-03	3.09E-04
Endosulfan I	4.40E-04	1.687	7.42E-04	0.00E+00	2.65E-04	10.0	22.4	50.0	2.65E-05	1.18E-05	5.29E-06
Endosulfan II	7.30E-03	0.886	6.46E-03	0.00E+00	2.37E-03	10.0	22.4	50.0	2.37E-04	1.06E-04	4.73E-05
Endrin	7.30E-03	0.535	3.90E-03	0.00E+00	1.48E-03	0.021	0.047	0.104	7.12E-02	3.19E-02	1.42E-02
gamma-BHC (Lindane)	3.70E-03	1.852	6.85E-03	0.00E+00	2.44E-03	4.00	8.94	20.0	6.09E-04	2.72E-04	1.22E-04
gamma-Chlordane	1.00E-03	0.165	1.65E-04	0.00E+00	7.51E-05	1.19	2.66	5.95	6.31E-05	2.82E-05	1.26E-05
Heptachlor	3.70E-03	0.174	6.45E-04	0.00E+00	2.90E-04	0.28	0.62	1.38	1.05E-03	4.71E-04	2.11E-04
Heptachlor epoxide	3.70E-03	0.566	2.09E-03	0.00E+00	7.90E-04	0.28	0.62	1.38	2.87E-03	1.28E-03	5.74E-04
Methoxychlor	3.70E-02	0.525	1.94E-02	0.00E+00	7.38E-03	355	794	1,775	2.08E-05	9.30E-06	4.16E-06
Toxaphene	3.70E-01	0.355	1.31E-01	0.00E+00	5.21E-02	1.00	2.24	5.00	5.21E-02	2.33E-02	1.04E-02
Volatile/Semivolatile Organics											
1,1,2,2-Tetrachloroethane	1.40E-02	1.000	1.40E-02	0.00E+00	5.09E-03	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	1.40E-02	1.426	2.00E-02	0.00E+00	7.15E-03	32.2	71.9	161	2.22E-04	9.95E-05	4.45E-05
1,2-Dichlorobenzene	1.40E-02	2.452	3.43E-02	0.00E+00	1.21E-02	32.2	71.9	161	3.77E-04	1.68E-04	7.53E-05
1,3-Dichlorobenzene	1.40E-02	2.296	3.21E-02	0.00E+00	1.14E-02	32.2	71.9	161	3.53E-04	1.58E-04	7.07E-05
1,4-Dichlorobenzene	1.40E-02	2.475	3.46E-02	0.00E+00	1.22E-02	32.2	71.9	161	3.80E-04	1.70E-04	7.60E-05
4-Bromophenyl-phenylether	3.70E-01	0.566	2.09E-01	0.00E+00	7.90E-02	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	3.70E-01	0.593	2.19E-01	0.00E+00	8.25E-02	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	3.70E-01	Regression	3.69E-02	0.00E+00	1.95E-02	7.10	15.9	35.5	2.74E-03	1.23E-03	5.49E-04
Benzo(a)pyrene	3.70E-01	Regression	4.83E-02	0.00E+00	2.34E-02	7.10	15.9	35.5	3.30E-03	1.47E-03	6.59E-04
Benzo(b)fluoranthene	3.70E-01	0.310	1.15E-01	0.00E+00	4.64E-02	7.10	15.9	35.5	6.53E-03	2.92E-03	1.31E-03
Benzo(g,h,i)perylene	3.70E-01	Regression	1.22E-01	0.00E+00	4.87E-02	7.10	15.9	35.5	6.86E-03	3.07E-03	1.37E-03
Benzo(k)fluoranthene	3.70E-01	Regression	4.92E-02	0.00E+00	2.37E-02	7.10	15.9	35.5	3.34E-03	1.49E-03	6.68E-04
Chrysene	3.70E-01	Regression	3.69E-02	0.00E+00	1.95E-02	7.10	15.9	35.5	2.74E-03	1.23E-03	5.49E-04
Dibenz(a,h)anthracene	3.70E-01	0.130	4.81E-02	0.00E+00	2.33E-02	7.10	15.9	35.5	3.29E-03	1.47E-03	6.58E-04
Hexachlorobenzene	3.70E-01	0.246	9.11E-02	0.00E+00	3.82E-02	0.113	0.253	0.565	3.38E-01	1.51E-01	6.76E-02
Hexachlorobutadiene	3.70E-01	0.675	2.50E-01	0.00E+00	9.31E-02	3.39	7.58	17.0	2.75E-02	1.23E-02	5.49E-03
Hexachlorocyclopentadiene	3.70E-01	0.393	1.45E-01	0.00E+00	5.70E-02	NA	NA	NA	NA	NA	NA
Hexachloroethane	3.70E-01	1.439	5.33E-01	0.00E+00	1.91E-01	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	3.70E-01	0.110	4.07E-02	0.00E+00	2.08E-02	7.10	15.9	35.5	2.93E-03	1.31E-03	5.86E-04
Pyrene	3.70E-01	0.720	2.66E-01	0.00E+00	9.88E-02	7.10	15.9	35.5	1.39E-02	6.22E-03	2.78E-03

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI =	Chemical-specific	= Dietary intake for chemical (mg chemical/kg body weight/day)
FIR =	0.0081	= Food ingestion rate (kg/day dry weight)
FCxi =	Chemical-specific	= Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi =	0.950	= Proportion of diet composed of food item (terrestrial plants)
SCx =	Chemical-specific	= Concentration of chemical in soil (mg/kg, dry weight)
PDS =	0.050	= Proportion of diet composed of soil
WIR =	0.0000	= Water ingestion rate (L/day)
WC =	Chemical-specific	= Concentration of chemical in water (mg/L)
BW =	0.0224	= Body weight (kg)

Attachment Table L-1-6
Summary of Norway Rat Exposure Doses - Baseline (Step 3A) - 95% UCL
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Pesticides													
4,4'-DDE	2.32E-01	Regression	3.28E+00	Regression	2.70E-02	0.00E+00	1.62E-01	0.147	0.329	0.735	**1.10E+00**	4.91E-01	2.20E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0207 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.490 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.490 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.020 = Proportion of diet composed of soil
WIR = 0.0000 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.209 = Body weight (kg)

Attachment Table L-1-7
Summary of Indian Mongoose Exposure Doses - Baseline (Step 3A) - 95% UCL
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Soil-Mammal BAF	Small Mammal Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Antimony	8.20E-01	1.000	8.20E-01	Regression	3.27E-02	See footnote	4.34E-01	0.00E+00	3.34E-02	0.059	0.19	0.59	5.66E-01	1.79E-01	5.66E-02
Mercury	1.10E-01	1.186	1.31E-01	Regression	1.11E-01	0.054	5.97E-03	0.00E+00	4.91E-03	0.15	0.19	0.25	3.27E-02	2.53E-02	1.96E-02
Pesticides															
4,4'-DDE	2.32E-01	Regression	3.28E+00	Regression	2.70E-02	See footnote	1.63E+00	0.00E+00	1.27E-01	0.147	0.329	0.735	8.62E-01	3.86E-01	1.72E-01
4,4'-DDT	4.87E-02	Regression	6.06E-01	Regression	8.35E-03	See footnote	3.02E-01	0.00E+00	2.34E-02	0.147	0.329	0.735	1.59E-01	7.13E-02	3.19E-02
Dieldrin	7.30E-03	14.70	1.07E-01	0.410	2.99E-03	See footnote	5.42E-02	0.00E+00	4.17E-03	0.015	0.021	0.030	2.78E-01	1.97E-01	1.39E-01

It was assumed that the concentration of each chemical in the small mammal's tissues was equal to the chemical concentration in its diet, that is, a diet to whole-body BAF of 1.0 was assumed

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0285 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.564 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.111 = Proportion of diet composed of food item (terrestrial plants)
FCxi = Chemical-specific = Concentration of chemical in food item (small mammals, dry weight basis)
PDFi = 0.297 = Proportion of diet composed of food item (small mammals)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.028 = Proportion of diet composed of soil
WIR = 0.0000 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.528 = Body weight (kg)

Attachment Table L-1-8
Summary of Pearly-eyed Thrasher Exposure Doses - Baseline (Step 3A) - 95% UCL
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Vanadium	6.62E+01	0.039	2.58E+00	0.005	3.17E-01	0.00E+00	5.99E-01	0.344	0.486	0.688	**1.74E+00**	**1.23E+00**	8.71E-01
Pesticides													
4,4'-DDE	2.32E-01	Regression	3.28E+00	Regression	2.70E-02	0.00E+00	2.95E-01	0.50	1.58	5.00	5.91E-01	1.87E-01	5.91E-02
Volatile/Semivolatile Organics													
Hexachlorobenzene	3.70E-01	1.690	6.25E-01	0.246	9.11E-02	0.00E+00	6.00E-02	0.113	0.253	0.565	5.31E-01	2.38E-01	1.06E-01

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0123 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.754 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.200 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.046 = Proportion of diet composed of soil
WIR = 0.0000 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.104 = Body weight (kg)

Attachment Table L-1-9
Summary of Common Ground Dove Exposure Doses - Baseline (Step 3A) - 95% UCL
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	95% UCL Surface Soil Concentration (mg/kg)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	95% UCL Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals											
Copper	4.16E+01	Regression	8.48E+00	0.00E+00	2.17E+00	4.05	7.00	12.1	5.36E-01	3.10E-01	1.79E-01
Vanadium	6.62E+01	0.005	3.17E-01	0.00E+00	7.73E-01	0.344	0.486	0.688	**2.25E+00**	**1.59E+00**	**1.12E+00**

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0069 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.950 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.050 = Proportion of diet composed of soil
WIR = 0.0000 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.0320 = Body weight (kg)

Attachment Table L-1-10
Summary of Norway Rat Exposure Doses - Baseline (Step 3A) - Arithmetic Mean
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Pesticides													
4,4'-DDE	7.80E-02	Regression	1.26E+00	Regression	1.19E-02	0.00E+00	6.20E-02	0.147	0.329	0.735	4.22E-01	1.89E-01	8.44E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0207 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.490 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.490 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.020 = Proportion of diet composed of soil
WIR = 0.0000 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.209 = Body weight (kg)

Attachment Table L-1-11
Summary of Indian Mongoose Exposure Doses - Baseline (Step 3A) - Arithmetic Mean
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Soil-Mammal BAF	Small Mammal Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals															
Antimony	8.20E-01	1.000	8.20E-01	Regression	3.27E-02	See footnote	4.34E-01	0.00E+00	3.34E-02	0.059	0.19	0.59	5.66E-01	1.79E-01	5.66E-02
Mercury	5.50E-02	1.186	6.53E-02	Regression	7.62E-02	0.054	2.99E-03	0.00E+00	2.58E-03	0.15	0.19	0.25	1.72E-02	1.33E-02	1.03E-02
Pesticides															
4,4'-DDE	7.80E-02	Regression	1.26E+00	Regression	1.19E-02	See footnote	6.25E-01	0.00E+00	4.86E-02	0.147	0.329	0.735	3.31E-01	1.48E-01	6.62E-02
4,4'-DDT	1.38E-02	Regression	2.03E-01	Regression	3.24E-03	See footnote	1.01E-01	0.00E+00	7.85E-03	0.147	0.329	0.735	5.34E-02	2.39E-02	1.07E-02
Dieldrin	1.94E-03	14.70	2.86E-02	0.410	7.96E-04	See footnote	1.44E-02	0.00E+00	1.11E-03	0.015	0.021	0.030	7.40E-02	5.23E-02	3.70E-02

It was assumed that the concentration of each chemical in the small mammal's tissues was equal to the chemical concentration in its diet, that is, a diet to whole-body BAF of 1.0 was assumed

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0285 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.564 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.111 = Proportion of diet composed of food item (terrestrial plants)
FCxi = Chemical-specific = Concentration of chemical in food item (small mammals, dry weight basis)
PDFi = 0.297 = Proportion of diet composed of food item (small mammals)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.028 = Proportion of diet composed of soil
WIR = 0.0000 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.528 = Body weight (kg)

Attachment Table L-1-12
Summary of Pearly-eyed Thrasher Exposure Doses - Baseline (Step 3A) - Arithmetic Mean
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Worm BAF	Terrestrial Invertebrate Concentration (mg/kg dw)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals													
Vanadium	6.05E+01	0.039	2.36E+00	0.005	2.90E-01	0.00E+00	5.48E-01	0.344	0.486	0.688	**1.59E+00**	**1.13E+00**	7.96E-01
Pesticides													
4,4'-DDE	7.80E-02	Regression	1.26E+00	Regression	1.19E-02	0.00E+00	1.13E-01	0.50	1.58	5.00	2.27E-01	7.16E-02	2.27E-02
Volatile/Semivolatile Organics													
Hexachlorobenzene	1.80E-01	1.690	3.04E-01	0.246	4.43E-02	0.00E+00	2.92E-02	0.113	0.253	0.565	2.59E-01	1.16E-01	5.17E-02

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0123 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (soil invertebrates, dry weight basis)
PDFi = 0.754 = Proportion of diet composed of food item (soil invertebrates)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.200 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.046 = Proportion of diet composed of soil
WIR = 0.0000 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.104 = Body weight (kg)

Attachment Table L-1-13
Summary of Common Ground Dove Exposure Doses - Baseline (Step 3A) - Arithmetic Mean
SWMU 20 Remedial Investigation
Former Vieques Naval Training Range, Vieques, Puerto Rico

Chemical	Mean Surface Soil Concentration (mg/kg)	Soil-Plant BAF	Terrestrial Plant Concentration (mg/kg dw)	Mean Surface Water Concentration (mg/L)	Dietary Intake (mg/kg/day)	NOAEL TRV (mg/kg/d)	MATC TRV (mg/kg/d)	LOAEL TRV (mg/kg/d)	NOAEL HQ	MATC HQ	LOAEL HQ
Metals											
Copper	3.79E+01	Regression	8.17E+00	0.00E+00	2.07E+00	4.05	7.00	12.1	5.11E-01	2.95E-01	1.71E-01
Vanadium	6.05E+01	0.005	2.90E-01	0.00E+00	7.07E-01	0.344	0.486	0.688	**2.06E+00**	**1.45E+00**	**1.03E+00**

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

DI = Chemical-specific = Dietary intake for chemical (mg chemical/kg body weight/day)
FIR = 0.0069 = Food ingestion rate (kg/day dry weight)
FCxi = Chemical-specific = Concentration of chemical in food item (terrestrial plants, dry weight basis)
PDFi = 0.950 = Proportion of diet composed of food item (terrestrial plants)
SCx = Chemical-specific = Concentration of chemical in soil (mg/kg, dry weight)
PDS = 0.050 = Proportion of diet composed of soil
WIR = 0.0000 = Water ingestion rate (L/day)
WC = Chemical-specific = Concentration of chemical in water (mg/L)
BW = 0.0320 = Body weight (kg)

Appendix M
Final Responses to Regulatory Agency Comments

Final Responses to EPA Comments on the Draft SWMU 20 Remedial Investigation Report

GENERAL COMMENTS

1. The RI Report references photo documentation of soil and groundwater sampling activities as presented in Appendix D, Photo Documentation of Site, but Appendix D includes additional activities that are not discussed in detail in the RI Report. For example, photographs 17 through 20 show three areas that were excavated, and photograph 16 shows a pile of perforated steel plates found at the site. It appears that these photographs may correspond to man-made surface depressions identified in Section 3.1.4, Remedial Investigation, as well as several figures, though no reference is made to the apparent excavation activities depicted in the photographs. The RI Report should discuss the three excavations referenced above and any similar excavations, including where, when, and why they were performed, and if soil samples were collected at these locations. In addition, the locations and descriptions of the debris found at the site should be provided, including if soil contamination from the debris was investigated. Further, the direction in which each photograph was taken should be provided. Revise the RI Report to discuss the excavation activities performed and the debris found at SWMU 20, and include the direction in which each photograph taken at the site.

   Navy Response: The following paragraph has been added as the last paragraph of Section 2. "During the course of the Supplemental ESI, several small depressions were identified east of the "disturbed area" identified in the 1962 aerial photograph (**Figure 2-3**). Excavation of several of these areas was subsequently performed to determine the nature of the material within the depressions (see photographs 15 through 20 in Appendix D). As shown in the photographs, perforated steel plates were the only items found in the depressions. The depressions were further evaluated during the RI, in accordance with the approach concurred upon by the Navy and regulatory agencies and included in the RI SAP, as described in Section 3.1.4. The associated data evaluation is discussed in Section 4, which includes reference to a figure showing all sample locations relative to the depressions (i.e., **Figure 4-1**)."

2. Section 2.3, SWMU 20 Timeline, Page 2-5, references Figure 2-3, Site Features, when discussing features identified in a 1962 aerial photograph and the Environmental Baseline Survey (EBS). However, Figure 2-3 includes 1959 and 1964 aerial photographs and does not include the 1962 photograph discussed in the text. Revise the RI Report to present the 1962 aerial photograph.

   Navy Response: The base aerial in **Figure 2-3** is the 1962 aerial. The date "1962" has been added to the upper right corner of the figure to clarify this.

3. Groundwater figures and other general comments:
   - The RI Report does not include a figure showing the most recent groundwater elevations for the entire groundwater contaminant plume.

     Navy Response: Please see the first paragraph of Section 2.2.5, which provides the rationale for not providing a figure with every round of groundwater elevation measurements. In geologic settings such as SWMU 20, with as many wells spaced as far apart as they are, in fractured bedrock, at varying distances from the ocean, it is common for there to be localized, short-duration pressure influences that are observed in some wells but not in others (or at different times or to different degrees), which is why presenting the data as a synoptic water level measurement can be misleading. Overall, groundwater will flow toward the lowest head, which is the ocean, which is why the plume best represents the direction of groundwater flow.

- Figure 2-11, Groundwater Elevation Contours 07/01/13, shows the groundwater elevations and potentiometric contours from July 2013 though it does not include data for monitoring wells MW-25 through MW-33. However, Table 2-1, Summary of Monitoring Well Groundwater Elevations, reports groundwater elevation measurements collected November 13, 2014 for all site monitoring wells. This information is important for assessing the direction of potential plume migration. Revise Figure 2-11 to include the most recent groundwater elevation data for all site monitoring wells and update the potentiometric contours as necessary. Alternatively, revise the RI Report to include an additional figure presenting the most recent groundwater elevation data for all of the site monitoring wells.

  Navy Response: Please see the previous response. In addition, the best way to assess the direction of plume migration is to map the plume, which shows the plume is moving toward the ocean. This direction is consistent with what would be predicted based on fundamental geologic and hydrogeologic principles.

- Figure 2-11 includes groundwater elevations from both shallow and deep wells. Shallow and deep elevations should be mapped separately. Water levels from well pairs should be used to discuss vertical flow directions. Provide two separate figures mapping the shallow and deep elevations separately.

  Navy Response: The piezometric surface in Figure 2-11 is based on the water levels from only the shallow wells. The water-level measurements in the two deep wells shown (MW-13D and MW-17D) were not used in the contouring, but are helpful for assessing vertical gradient. Because this is useful information, those two water levels will be retained in the figure, but they will be denoted as not used for contouring.

- Provide a cross section of the contaminant plume to demonstrate that the vertical extent of contamination has been identified.

  Navy Response: Figures 2-9 and 2-10 cross-sections have been edited to show the horizontal and vertical plume extent.

  Evaluation of the Response to General Comment (GC) 3:
  Please provide the following modified figures:
  a) Figures 2-9 and 2-10 cross-sections which have been edited to show the horizontal and vertical plume extent.

  Navy Response to Follow up Comment: Figures 2-9 and 2-10 are included with these responses.

- The natural attenuation discussion should include figures mapping the various parameters (i.e., electron donors/acceptors, daughter products) to illustrate different geochemical conditions throughout the plume.

  Navy Response: Figure 4-6 has been created to show the natural attenuation parameters and the following sentence has been added to the end of the third paragraph in Section 4.2.1: "**Figure 4-6** displays the indicator parameters measured in various wells that can be used to help evaluate natural attenuation processes in groundwater at the site (Section 5.2)."

  Evaluation of the Response to General Comment (GC) 3:
  Please provide the following modified figures:
  b) Figure 4-6 created to show the natural attenuation parameters. The following sentence should have been incorporated on the third paragraph in Section 4.2.1: "Figure 4-6 displays the indicator parameters measured in various wells that can be used to help evaluate natural attenuation processes in groundwater at the site (Section 5.2)."

Navy Response to Follow up Comment: Figure 4-6 is included with these responses. The above mentioned text has been added to Section 4.2.1.

- A recommendation is made to perform slug testing to evaluate hydraulic characteristics of the bedrock during the pilot study (or prior to the FS). Slug tests are not the most effective way to determine hydraulic characteristics, especially in bedrock. Consideration should be given to conducting cross hole testing.

  Navy Response: While it is recognized slug testing is not optimal for determining hydraulic properties in bedrock/saprolite, the method is conducive to a remote site like SWMU 20 and the data collected will provide supporting information to evaluate the hydraulic conductivity. Most importantly, because the pilot study includes tracer testing and oxidant injection, the arrival of tracer and oxidant color will also be used to further evaluate aquifer hydraulic properties. If more extensive testing is deemed necessary in the future, it can be conducted as part of remedial design (as applicable).

4. Section 3.2.5, Remedial Investigation, discusses a screening level approach used to collect groundwater samples from newly installed monitoring wells MW-15 through MW-19 and MW-20 through MW-24. The text states that the screening results collected after these monitoring wells were installed in May and June 2013 were not validated and are not used in the nature and extent discussion and risk assessments. However, Table 4-4, Validated Groundwater Exceedances 2006-2014, reports results for these monitoring wells for groundwater samples collected in June and July 2013. The text should clarify when monitoring wells MW-15 through MW-24 were sampled for validated definitive level results as compared to the screening approach discussed in Section 3.2.5. Revise the RI Report to clarify the groundwater sampling performed at the new monitoring wells during the RI.

   Navy Response: Text has been added to Section 3.2.5 that clarifies when the un-validated screening level data were collected and when the definitive, validated data were collected.

5. Section 4.1.3, Pesticides/PCBs (polychlorinated biphenyls), states that Aroclor-1254 was detected at a concentration [28 micrograms per kilogram (ug/kg) in SS12] slightly above the soil screening level (SSL), but Table 4-1, Validated Surface Soil Exceeded Analytical Data 2006-2014, and Appendix H Table H-1, Validated Surface Soil Raw Analytical Data, list the detected PCB as Aroclor-1260 (28 ug/kg in SS12). Revise the RI Report to resolve this discrepancy in the detected PCB analyte.

   Navy Response: The text in Section 4.1.3 was edited to list Aroclor 1260 instead of Aroclor 1254.

6. The RI Report does not include the depths of the subsurface soil samples in Table 4-2, Validated Subsurface Soil Exceeded Analytical Data 2006-2014, or Appendix H Table H-2, Validated Subsurface Soil Raw Analytical Data. This information should be incorporated into these tables, so that the depth of the subsurface soil data is clearly reported and available to support evaluation of the nature and extent of contamination. Revise Tables 4-2 and H-2 to include the depths of the subsurface soil samples.

   Navy Response: The depth of the soil samples is included in the sample ID of each sample but this is not described in the report so a new row has been added to Table 4-2 and H-2 entitled “Depth of Soil Sample Below Land Surface” and the depths of each have been added.

7. The RI Report presents rejected data with an “R” after the numerical result in Table 4-4, Validated Groundwater Exceedances 2005-2014. For example, the trichloroethene (TCE) result for the sample at MW-04 collected July 29, 2010 is listed as “0.5 R”. However, rejected values are unusable and should be removed to ensure that rejected data are not erroneously used either in the current investigation or as secondary data in future investigations. Revise the RI Report to remove the values associated with the rejected results.

Navy Response: The format and content of the data tables used in this RI Report match those that have been consistently used in Vieques reports for years and we have not experienced a situation where "rejected" results have been inadvertently used. The standard process followed is that if a constituent is detected in any sample, the results for that constituent in all samples collected are included on the associated detection table, including rejected results with their "R" qualifier.

8. The Appendix J, Data Quality Evaluation (DQE), does not provide sufficient information regarding the quality control (QC) exceedances that led to qualification of the results. The following are examples of situations where further detail is needed:

    a. The DQE does not discuss the overall biases and trends in the QC results, including if any overall biases or trends impacted project decisions. For example, Section 1.6 indicates Table I-2 is used to identify trends and biases in the QC results, but any noted trends and biases are not discussed in the text, and it is unclear if the low bias identified in this table impacted project decisions and how this was determined. The DQE should discuss overall biases and trends noted in the data, how the trends and biases were evaluated, and provide sufficient information to verify all conclusions on data usability with regard to project decisions.

    Navy Response: Please refer to Table J-2. Noted trends and biases are not discussed in the text because they are indicated in Table J-2. That is, there is a table in lieu of text. Although some data are affected by a potential low bias or a potential high bias, this is not significant enough to affect data usability because estimated results are usable at their reported concentrations, which is how the SAP states estimated data will be used. Note also that some data are affected by an extreme low bias, and this affects data usability; hence this is discussed in Section 1.6 Note 1.

    Evaluation of the Response to GC 8, Item a: The response does not address the comment. The response indicates that trends and biases are provided in Table J-2 rather than discussed in the text, and that although some data are affected by a potential low/high bias, this is not significant enough to affect data usability because estimated results are usable at their reported concentrations. However, Table J-2 only identifies individual results with potential bias and does not identify any overall quality control (QC) exceedance trends in the data. In addition, there should be a discussion of overall QC trends and biases in the text, including how the trends and biases were evaluated, and to provide sufficient information to verify all conclusions on data usability with regard to project decisions. Revise Appendix J, Data Quality Evaluation (DQE) to include this information.

    Navy Response to Follow up Comment: The overall trend is that data were acceptable because there were not QC exceedances affecting them. Please note that, aside from the rejected results which are not usable, only 2.7% of the data (31 of 1,167 results) are affected by a trend/bias and such trend/bias is not significant enough to affect usability. Text has been added to Appendix J Section 1.6 that indicates evaluation of trends/biases was performed and a Note 2 added with the information above, which will also reference back to Table J-2. Please also note that this level of detail is comparable to previous DQEs done for Vieques, which were acceptable to EPA.

    b. The DQE does not provide a summary of the extent of all QC exceedances that led to qualifications of the data. The DQE should discuss the exceedances of acceptance criteria and the range of these exceedances, so the impact on data usability is clear. Although it is not necessary to discuss every exceedance, it is recommended that a table summarizing the exceedances and extent of exceedances be provided. Additionally, specific references to the data validation reports (DVRs) (i.e., DVR number, section number, and page number) should be provided when outliers are discussed.

Navy Response: Please refer to the data validation reports (i.e., Appendix I) for a summary of all QC exceedances that led to qualification of the data. This information is not in Appendix J because it is in Appendix I. In Appendix J, the data quality evaluation, QC exceedances are only noted when they are significant enough to warrant qualification of the data. This is the same process that has been used for previous DQEs done for Vieques.

c. The DQE does not discuss whether results for QC samples were acceptable (e.g., trip blanks and field duplicates), and it is unclear if the results for these samples may impact data usability.

Navy Response: Unless an issue is noted, there is not a QC exceedance significant enough to warrant qualification of the data. Please refer to Table J-2. Qualification, as a result of field QC exceedances, was necessary due to field duplicate (precision) and equipment rinseate blank (contamination).

Evaluation of the Response to GC 8, Items b & c: The responses do not address the comments. The comments state that the DQE does not provide a summary of the extent of all QC exceedances that led to qualification of the data, nor does it discuss whether results for QC samples were acceptable. The responses refer the reviewer to the data validation reports in Appendix I for the summary of all QC exceedances, and states that unless an issue is noted, there is not a QC exceedance significant enough to warrant qualification of the data. However, Appendix I is over 2,400 pages, which makes it difficult to use. It also does not summarize the QC exceedances. So that each document user does not have to perform a review of all validation reports and compile and assess the information, the DQE should provide a summary of all QC parameters evaluated, the extent of QC exceedances, samples associated with the exceedances, and qualifiers applied.

Navy Response to Follow up Comment: The DQE has been revised to provide a summary of QC parameters evaluated (example: “spiked surrogate recovery”) and the DQE already provides a summary of the qualifiers applied (refer to Table J-2). The samples associated with the exceedances are the ones that received a qualifier. The Navy feels that the information provided in the DQE is appropriate and follows the same process as previous DQEs done for Vieques, which have been acceptable to EPA. The data validator is responsible for evaluating the QC parameters, determining when there are exceedances, determining the extent of exceedance, determining which samples are associated with the exceedances, and applying qualifiers. Only those results requiring qualifiers receive them, and they have already been discussed in the DQE. After qualifiers have been applied, the data validation reports are reviewed and the DQE is written in order to ensure data are used appropriately.

The DQE will not be revised to discuss the extent of QC exceedances because this is done in the data validation reports when deciding which qualifiers to apply to the data. However, if the reviewer wishes to perform that evaluation and provide it to the Navy, please refer to Appendix I (the data validation reports) or to the full analytical dataset in Appendix H.

Revise the DQE to include this information on the QC exceedances noted during data validation.

Navy Response: Please refer to individual responses to comments immediately above. Based on those responses, no revision to the DQE appears to be warranted.

9. The discussion on uncertainty should summarize the detected results reported below the limits of quantitation (LOQs) as well as the limits of detection (LODs), as results below the LOQ are not quantifiably reliable. In addition, for detected results between the LOQ and LOD, the DQE should discuss the uncertainty associated with these results, and why they are sufficient to make project decisions. Revise the DQE to include this discussion on sensitivity and uncertainty for results below the LOQ.

Navy Response: The laboratory (and subsequently the data validator) apply a J-flag to detected results that are less than the LOQ to indicate that they are 'estimated.' While it is noted that detected results less than the LOQ (i.e. detections between the DL and LOQ) are estimated, they are still fully usable as detections at their reported concentration, as stated in the RI SAP. This is the same as for estimated results J-qualified for other reasons. It is understood that, for a detection between the DL and the LOQ, the chemical is present and the concentration is less than the LOQ; if the screening level is also less than the LOQ then it is not known whether the analyte is present at greater than or less than the screening level. Because estimated results are usable at their reported concentration, the data point is still used according to its proximity to the screening level in this situation.

Evaluation of the Response to GC 9: The response does not address the comment. There is inherent uncertainty in any result reported as detected below the limit of quantitation (LOQ). As indicated in the response, if the screening level is less than the LOQ, then it is not known whether a detected analyte is present at greater than or less than the screening level. However, this is not discussed in the RI Report. Further, detected results below the LOQ are not quantifiably reliable, and simply flagging the results as estimated and using them may not be acceptable. If detected results less than the LOQ will be used, the RI Report should discuss the uncertainty associated with these results. In addition, the RI Report should discuss why the uncertainty associated with detected results less than the LOQ was considered acceptable and allowed for project data quality objectives (DQOs) to be met. For example, if the project action limit (PAL) is below background, the elevated laboratory LOQ would not be an issue assuming it was also below or equal to the background value. A second example for sufficient rationale for determining that DQOs were met in cases where the LOQ is above the PAL would be that the compound is not a site contaminant of concern (COC) and/or had never been recorded as used at the site. A final example which may be acceptable is that the COC is part of a larger group of analytes, is not expected to be found alone, and that other analytes in the group have LOQs less than the PALs. Please note that these are only examples and the RI Report should provide specifics for this particular situation. In addition, from the information presented, it is unclear if any detection limits (DLs) or limits of detection (LODs) exceed the screening limits. If DLs and/or LODs are above the screening limits, the RI Report should also discuss the uncertainty associated with results where the screening limit is below the DL and/or LOD including why this level of uncertainty was considered acceptable for this project. For example, there is additional uncertainty with results reported between the LOD and the DL. According to the DoD QSM, values above the LOD have a 99% probability of being properly reported as detected, and a 1% chance of being misreported as a non-detect. However, this is also not addressed in the RI Report. In cases where the screening level is less than the LOQ, revise the RI Report to discuss the uncertainty associated with results less than the LOQ. Revise the RI Report to discuss why this level of uncertainty was considered acceptable and allowed project DQOs to be met.

Navy Response to Follow up Comment: The DQE has been revised to include the definitions of LOQ, LOD, and DL, as well as a general discussion of what each means and their significance, especially relative to each other. In addition, a table has been added to the DQE to list the possible situations (example: SL > LOQ, detection < LOQ) and what are the added uncertainties associated with these situations. However, according to the SAP (CH2M, 2011), "Estimated data are generally considered usable for all purposes." Section 1.1 of the DQE already states "risk assessment guidance (EPA, 1989) suggests that one should use "J-qualified concentrations the same way as positive data that do not have this qualifier." Additionally, it is noted that the DQE discussion regarding estimated results follows the same format and content as previous Vieques DQEs that were acceptable to EPA. It should be noted that J-qualified (not due to QC exceedance) results correspond to only 4.4% of the total number of results; as 87.2% of the results are unqualified detects and nondetects, there are plenty of data available for use without the added uncertainty due to detection < LOQ.

10. With regard to carcinogens, the human health risk assessment (HHRA) defines Contaminants of Concern (COCs) as those constituents associated with an individual Excess Lifetime Cancer Risk (ELCR) of greater than 1E-06 in a given environmental medium. Section 6.4, Chemicals of Concern, indicates that there were no COCs

in soil. In point of fact, Table 7.7.RME, Calculation of Chemical Cancer Risks and Noncancer Hazards, of Appendix K, Human Health Risk Assessment, indicates that arsenic in soil is associated with a residential risk of 3E-06. Although this quantitative point estimate is near the lower bound of the stipulated risk range (1E-06 to 1E-04) and may generally be viewed as not actionable from a remediation standpoint (especially in light of the projected future uses of the site), arsenic should be listed as a site COC for the purposes of the public record. Ensure this update is reflected in Section 6, Human Health Risk Assessment, as well as Appendix K, where applicable.

Navy Response: The description of the COC identification process is already presented in the first paragraph of Section 6.4 of the HHRA:
"In general, COCs are identified when the potential ELCR or HI for a receptor group exceeds EPA threshold values (a total ELCR of $1x10^{-4}$ or a target organ-specific HI of 1) and concentrations are site-related and above background levels. When a potential ELCR of $1x10^{-4}$ is exceeded for an exposure medium for a receptor group, the COPCs above background levels and posing an individual ELCR greater than $1x10^{-6}$ in the environmental medium responsible for the unacceptable risks are identified as COCs. …"

Since cumulative risk estimates for soil did not exceed the upper end of the EPA acceptable range (i.e., 10^{-4}) for aggregate future residents, no COCs were identified in soil. This approach is consistent with the Chemicals of Concern section of the Vieques HHRA Protocol (CH2M, 2010).

11. There is inconsistency throughout the document in terms of how the investigation and the supporting risk assessment characterize surface soil. In some instances, surface soil is characterized as 0-1 foot below ground surface (bgs) (e.g., Appendix K, Human Health Risk Assessment, Section 2.1, Data Used in the HHRA) and other instances where surface soil is characterized as 0-2 feet bgs (e.g., Appendix K, Table 1, Selection of Exposure Pathways). Revise the RI Report to clarify these apparent inconsistencies.

    Also, Appendix K indicates that constituent-specific soil exposure point concentrations (EPCs) for use in assessing residential exposure are selected from the greater of the two values resulting from analysis of the surface soil and total soil datasets. It does appear that this process was followed in the actual selection of the appropriate EPC, and the EPCs appear to be correct in the derivation of quantitative point estimates of risk and hazard [e.g., use of the arsenic EPC of 1.2 milligrams per kilogram (mg/kg), reflective of the surface soil dataset in preference to the arsenic EPC for total soil of 0.937 mg/kg]; however, associated quantitative point estimates are routinely attributed as total soil (0-6 feet), even when the risk or hazard estimate is actually predicated on a surface soil EPC. It appears the original intention was to present two sets of quantitative point estimates for use in assessing future potential residential exposure to soil: 1) one EPC based on surface soil (presuming no regrading of soil during development), and 2) a second EPC reflective of total soil data. It appears that this presentation has been truncated to one set of point estimates predicated on the greater constituent-specific EPC selected between the surface soil and total soil datasets. This process is inferred from the tables in Appendix K, but is not sufficiently described within the text of the RI Report or Appendix K. Clarify the data grouping and selection process within Appendix K, at a minimum.

    Navy Response: Surface soil is defined as 0-1 foot bgs at this site since land crabs are not present. RAGS Table 1 in Appendix K was revised to replace 0-2 feet with 0-1 foot (**see attached**). All other text, tables, and attachments that refer to the samples used in the risk assessment, surface soil is defined as 0-1 foot, so no additional revisions are needed.

    For evaluation of soil under a residential exposure scenario, the higher of the two EPCs from 0-1 foot bgs and 0-6 feet bgs for each COPC were used conservatively in the risk calculations. The text in Section 3.1 (the first paragraph under Residents) was modified as follows:

    "Ingestion, dermal contact, and inhalation exposures to COPCs in surface soil (0-1 foot) and total soil (0-6 feet) were quantified for hypothetical adult and child residents; EPCs for both the 0-1 foot interval and 0-6 feet interval are presented in **Tables 3.1.RME and 3.2.RME, respectively, of Attachment K-1**; for each COPC, the higher calculated EPC (considering both the 0-1 foot interval and the 0-6 feet interval) was used in the intake

calculations for this receptor. The final EPCs in soil are presented in **Table 3.2.RME Supplement of Attachment K**."

12. Appendix K, Human Health Risk Assessment, fails to appropriately select site chemicals of potential concern (COPCs). The document does not clarify the treatment of non-detect results which are associated with an elevated reporting level (insufficient sensitivity). The COPC selection tables only present detected constituents. Section 2, Data Evaluation, of Appendix K and Tables 2.1 through 2.4a (Occurrence, Distribution and Selection of Chemicals of Potential Concern) should be revised to reflect the selection of site COPCs which were not detected but which are associated with an elevated reporting level relative to the most appropriate health-based screening criterion. This list may be revised/reduced based on additional information to clarify whether any of the selected constituents are breakdown products of known site COPCs, were selected as COPCs in an upgradient/contributing medium, or were never manufactured, used, stored, etc. at the site. Revise Section 2, Data Evaluation, and Section 5.6, Uncertainty Analysis, of Appendix K to reflect this change and address the possible impact these data gaps may have on confidence in site or risk management decision making.

    Navy Response: Consistent with Data Collection and Evaluation Section of the Vieques HHRA Protocol (CH2M, 2010), "The **detected** constituents at each site will be screened to select the COPCs in accordance with EPA guidelines (EPA, 1989)." Therefore, the lists of chemicals in the Table 2 series of Appendix K will not be changed.

    Evaluation of the Response to GC 12: The response is not sufficient. Although EPA agrees that the detected constituents should be screened to identify COPCs, if a contaminant is not detected in any sample, and the detection limits are higher than appropriate screening values, this needs to be noted. It is premature to discount a chemical that would fall into this category - undetected, but with an inappropriate detection limit. Please identify any chemicals that would be categorized this way, and explain why these chemicals should or should not be retained for further analysis, or for further sampling using lower detection limits.

    Navy Response to Follow up Comment: An evaluation of the chemicals that are 100% non-detected in a matrix will be added as an attachment to the HHRA. For each chemical that is 100% non-detected, the evaluation will include a comparison of the maximum reporting limit to its screening level and the number of samples with reporting limits exceeding the screening level. For those 100% non-detected chemicals with at least one reporting limit exceeding its screening level, rationale will be provided for including or excluding the chemical as a COPC. A discussion of the results and its impacts on the risk estimates will be provided in the uncertainty analysis section of the HHRA.

13. The basis for soil data groupings used to underpin EPC development is unclear. It has been inferred from review of Appendix K, Human Health Risk Assessment, that the reason for using the total soil EPCs to underpin assessment of future industrial and construction worker exposures is based on an assumption of soil mixing and regrading under future potential site redevelopment. However, the decision rationale regarding use of surface soil or total soil datasets to underpin various receptor population-specific EPCs should be clarified (e.g., surface or total soil). Revise Appendix K, Section 3, Exposure Assessment, to clarify the basis for soil groupings used to underpin EPC development.

    Navy Response: The basis for the soil depth grouping for each receptor population was added to Section 3.1 of Appendix K, as indicated below:

    - "Recreational Users/Trespassers/Site Visitors - Ingestion, dermal contact, and inhalation exposures to COPCs in surface soil; recreational users/trespassers/site visitors are not likely to be exposed to subsurface soil during site activities; exposure point concentrations (EPCs) are presented in **Table 3.1.RME** of **Attachment K-1**.

- Maintenance Workers – Ingestion, dermal contact, and inhalation exposures to COPCs in surface soil; maintenance workers are not likely to be exposed to subsurface soil during routine activities (e.g., occasional landscaping and grounds maintenance, such as cutting grass and clearing brush, not involved with digging). EPCs are presented in **Table 3.1a RME** of **Attachment K-1**.
- Residents:
  - Soil - Ingestion, dermal contact, and inhalation exposures to COPCs in soil (0-1 foot or 0-6 feet, whichever depth interval has the higher EPC for each COPC); EPCs are presented in **Tables 3.1.RME** and **3.2.RME** of **Attachment K-1**. A comparison of the EPCs in the two depth intervals is presented in **Table 3.2.RME Supplement** of **Attachment K-1**…
- Industrial Workers:
  - Total Soil - Ingestion, dermal contact, and inhalation exposures to COPCs in total soil, based on an assumption of soil mixing and regrading under future site redevelopment as an industrial facility. EPCs are presented in **Table 3.2a** of **Attachment K-1**.
- Construction Workers – Ingestion, dermal contact, and inhalation exposures to COPCs in total soil, based on an assumption of excavation and construction activities to a depth of 6 feet across the site as part of future site redevelopment. EPCs are presented in **Table 3.2a RME** of **Attachment K-1**."

This approach is consistent with the Data Collection and Evaluation section of the Vieques HHRA Protocol (CH2M, 2010).

14. Decision criteria to support the selection of exposure parameter values predicated on professional judgement are not provided. For instance, the exposure frequency (EF) for use in assessing adult and child recreational exposure (Table 4.1RME, Values Used for Daily Intake Equations) references professional judgment, but fails to provide any supporting rationale. Revise Section 3, Exposure Assessment, of Appendix K and applicable table footnotes to reflect the decision criteria supporting the selection of all professional judgement-based parameter values.

    Navy Response: The decision criteria used to support the professional judgment-based parameter values are consistent with Tales 1 through 5 of the Vieques HHRA Protocol (CH2M, 2010). The following descriptions were added to the indicated tables for professional judgment-based parameter values:

    - Table 4.1 – Note 1 – Based on best professional judgment; assumed to visit the site twice a week (i.e., 104 days per year).
    - Table 4.2 – Note 1 – Based on best professional judgment; assumed to visit the site for 4 hours per event.
    - Table 4.3 – Note 3 – Based on best professional judgment; assumed to visit the site once per week to perform maintenance activities.
    - Table 4.4 – Note 3 – Based on best professional judgment; assumed to visit the site once per week to perform maintenance activities.
    - Table 4.6 – Note 4 – Based on best professional judgment; assumed that construction workers are present onsite for 8 hours per workday.
    - Table 4.7 – Note 4 – Based on best professional judgment; assumed that water is contacted for 12 minutes per day during face, arm, and hand washing.
    - Table 4.9 – Note 3 – Based on best professional judgment; assumed that workers are present in an industrial building for 8 hours per day.

15. Appendix L, Ecological Risk Assessment, states that no drinking water source is present on SWMU 20 and therefore exposure from the ingestion of drinking water was not included in the Ecological Risk Assessment (ERA). Even though this approach was followed in the ERA, the dietary intake equations shown in the text

(Section 3.2.4) and in the Attachment tables of Appendix L include a water ingestion rate and a chemical concentration in water as variables in the equations. The attachment tables also include a column for surface water concentration, which appropriately contain no values. The inclusion of water ingestion in the dietary intake equations and surface water concentrations in the dose tables is confusing since water intake is not considered as an exposure media in the ERA. It is suggested to remove all references to water intake in the dose equations and tables to eliminate any possible confusion. This proposed change will clarify how the ERA was conducted but will not affect the results of the Screening Level Ecological Risk Assessment (SLERA).

Navy Response: It is proposed that it is less confusing to include the water ingestion rate and the surface water concentration in the model and set them to zero; otherwise, it could be interpreted that this potential ingestion route was overlooked rather than deliberately set to zero based on site-specific factors (lack of a drinking water source). For clarity, the water ingestion rates in Tables L-10 and L-11, and in the Attachment L-1 tables, will be set to zero (along with an explanation stating why added to Tables L-10 and L-11). However, water ingestion rate will remain in the intake equations in Section 3.2.4 (with an explanation added) and Attachment L-1.

16. The description in Appendix L, Ecological Risk Assessment, of the environmental setting is cited from the habitat characterization that was conducted in 2005 by Geo-Marine. This study is now over 10 years old. The age of the habitat characterization should be discussed in the uncertainty analysis, including whether there is a reason to believe that significant changes have or have not occurred over the past 10 years. Revise the ERA to address the age of the habitat assessment. Also note whether USFWS has conducted a more recent biological evaluation of the area.

    Navy Response: No more recent biological evaluations of this area are known to have been conducted by USFWS. However, qualitative surveys of vegetation/habitats and wildlife on SWMU 20 were conducted by a CH2M HILL biologist in September 2008 and in July 2014. Based on the results of these surveys, no observable changes have occurred to the habitats present on the site, or the biota potentially using the site, relative to the 2005 Geo-Marine survey. This information has been added to the text of Appendix L, Section 2.2 and to Section 7.2 of the main report.

SPECIFIC COMMENTS

1. **Section 3.2.1, Preliminary Assessment/Site Inspection, Pages 3-3 to 3-4:** The text discusses removal of a vault from the site, but further information is not provided. Revise this section to discuss the vault in greater detail, including how it was removed, if integrity issues (e.g., cracks, holes) were observed prior to or after removal, and if nearby soil and groundwater may be contaminated by the vault or activities associated with the historical use and/or removal of the vault. Alternatively, provide a reference to separate document(s) where this information may be found.

    Navy Response: The information provided in the report is all of the information known to exist. However, a groundwater well (MW-04, as shown in Figure 2-12) installed immediately downgradient of the vault was found to be uncontaminated.

    Evaluation of the Response to Specific Comment (SC) 1: The response partially addresses the comment. The response states that all information known to exist regarding the vault in Section 3.2.1 (Preliminary Assessment/Site Inspection) was provided. However, it also states that elevated concentrations of one volatile organic compound (VOC) and several metals were detected in a grab sample collected from the vault contents prior to removal. While it is noted that sampling of a nearby groundwater monitoring well has not resulted in detections of constituents of interest, no soil sampling adjacent to the vault appears to have been conducted. Additionally, the data associated with the sampling of the vault contents (with the exception of cis-1,2-dichloroethylene reported in Section 3.2.1) is not provided.

In the absence of soil data documenting the lack of a release from the vault to adjacent soils, it is unclear how it can be determined that this feature has been adequately characterized. Revise the RI Report to include additional justification for the adequacy of the historical characterization activities (e.g. historical soil characterization data) or to propose soil sampling adjacent to the former location of the vault.

Navy Response to Follow up Comment: There was no elevated concentration of a VOC in the vault water. The concentration of cis-1,2-DCE in the vault water was 0.13J µg/L, below the adjusted Tap Water RSL and MCL of 3.6 and 70 µg/L, respectively. Further, there is no information that would suggest additional characterization of the soil around the vault is warranted, as evinced by the multiple scoping sessions that have been held by the Vieques Technical Subcommittee since the vault data were collected. At no time during scoping was soil sampling around the vault considered warranted and there are multiple lines of evidence that support why it is not warranted. For example, if this area was an ongoing source of groundwater contamination observed at the site, the plume configuration would be different than what is observed (i.e., plume configuration would lead back to this location). In fact, MW-04 was installed immediately downgradient of the vaults to evaluate if a release to groundwater occurred; no chlorinated VOCs have been detected at this well. Details related to the vault removal and conclusions that no further characterization is necessary for the vault are summarized in both the PA/SI and the SI/ESI reports; please refer to Table 9-11 of the SI/ESI Report (CH2M, 2010) for the site decision tree summary.

The following has been added to last sentence of the first paragraph of Section 3.2.1: "Multiple lines of evidence indicate soil around the vault where the low concentration of cis-1,2-DCE was detected is not an ongoing source of groundwater contamination. For example, no VOCs were detected in MW-04, immediately downgradient of the former vault. Additional details related to the vault are discussed in the PA/SI Report (CH2M, 2008)."

2. **Section 3.4, Decontamination of Sampling Equipment and Investigation Derived Waste Management, Page 3-7:** The investigation derived waste (IDW) for the Supplemental Expanded Site Investigation is indicated to have been returned to the site, but the method(s) and location(s) of this disposal are not identified. The Master Standard Operating Procedures, Protocols, and Plans, dated April 2010, states that groundwater should be discharged to the site at least 25 feet from monitoring wells and in an area that will not affect sampling locations. In addition, soil should be returned to the boring, test pit, or trench from which it was removed. Revise the text to identify the location(s) where the IDW was disposed onsite.

   Navy Response: The following sentence has been added at the end of the third paragraph under Section 3.4: "The groundwater was siphoned out of the drums that were consolidated in an area north of monitoring well MW-11; care was taken to discharge the groundwater more than 25 feet from any well in the area. The soil in drums was also consolidated, dumped, and spread at this location. The IDW soil was from well installation could not be returned to the borings because the monitoring wells were installed in them."

3. **Section 4.1.4, Metals, Page 4-2:** The text discusses a detected concentration of arsenic [3.2 milligrams per kilogram (mg/kg)] in soil, but does not indicate that this concentration exceeds the adjusted residential Regional Screening Level (RSL) for arsenic in soil (0.68 mg/kg). Also, the text does not discuss if further investigation is necessary due to this exceedance. Revise Section 4.1.4 to discuss the exceedances of the arsenic RSL, including if further investigation is necessary to delineate the potential contamination.

   Navy Response: The first sentence in the 3rd paragraph of Section 4.1.4 has been edited as follows: "Arsenic exceeded background and screening criteria (Residential RSL of 0.68 mg/kg and SSL of 0.29 mg/kg) in one….." The existing text following this sentence includes an explanation of why the concentration, although above the background value is still likely attributable to background.

4. **Section 4.1.4, Metals, Page 4-2:** The discussion for cyanide indicates that two detected concentrations exceeded the adjusted residential RSL for cyanide in soil, but does not discuss if cyanide is an expected site contaminant and if further investigation is necessary to delineate the potential contamination. Further, other concentrations of cyanide are noted in Table 4-1 as non-detections with reporting limits (2.7 mg/kg) greater than the RSL (0.27 mg/kg). Revise this section to discuss the potential for cyanide contamination above the RSL in site soil and the sensitivity of the cyanide soil results.

   Navy Response: It is unlikely the cyanide concentrations are associated with a CERCLA-related release at the site, especially because there is no likely source at the site; cyanide is commonly associated with the mining, electroplating, photo-developing, and the manufacture of plastics, none of which occurred at SWMU 20. It may be associated with pesticides but, as discussed in Section 4.1.3, the presence of pesticides in site soil is attributable to normal pesticide application. This information has been added to the cyanide discussion in Section 4.1.4.

5. **Section 4.2.4, Metals, Page 4-4:** The text states that dissolved and total concentrations of vanadium exceeded the Tapwater Adjusted RSL in one well, but the concentrations of dissolved vanadium exceeding the Tapwater Adjusted RSL (refer to Table 4-4) in all five site monitoring wells are not discussed. Revise this section to discuss the exceedances of the vanadium Tapwater Adjusted RSL, including if further investigation is necessary.

   Navy Response: Section 4.2.4, last bullet first sentence has been edited as follows: "A total vanadium concentration was detected in one of the five monitoring wells sampled at a concentration of 22.1 ug/L. Dissolved vanadium concentrations were detected above the Adjusted Tap Water RSL in all five monitoring wells, with a maximum concentration of……" The rest of the text in the bullet supports the deduction that vanadium is likely attributable to background.

6. **Section 6.3, Risk Estimates, Page 6-3:** This section indicates that the adult resident hazard index attributable to groundwater is 139. Table 7.5 RME of Appendix K indicates that the value is 140. Resolve this apparent discrepancy.

   Navy Response: The adult resident groundwater hazard index presented in Section 6.3 has been changed to 140 (two significant figures).

7. **Section 6.4**, **Chemicals of Concern, Page 6-3:** EPA typically refers to risk-driving chemicals as Chemicals of Potential Concern until the time of the ROD, at which point they are then identified as Chemicals of Concern. Revise text to "Chemicals of Potential Concern".

   Navy Response: Please see the response to General Comment #10.

8. **Section 8, Page 8-1:** Due to the risk estimates of an excess lifetime cancer risk of 5 x 10-3 and an HQ of approximately 130 for adults and children, all primarily associated with TCE, is there any basis to define this as a Principle Threat Waste?

   Navy Response: As indicated in ***A Guide to Principal Threat and Low Level Threat Wastes*** (EPA, 1991), groundwater is not considered a source material and therefore would not be categorized as a principle threat.

9. **Appendix J, Section 1.2, Data Validation, Page 1-3:** The text discusses using rejected data in some cases, such as rejections due to extreme high bias. However, rejected values are unusable and should not be used for decision making. Revise this section to indicate that rejected data are not used for project decisions.

Navy Response: These sentences describe a theoretical situation in which rejected results could still be used for decision-making. That did not occur within this data set. The text referred to in the comment provides a sound reason for potentially considering the use of rejected data and should be retained. However, if rejected data are ever proposed for use, the use and rationale will be provided for regulatory consideration.

Evaluation of the Response to SC 9: The response partially addresses the comment. The response states that the discussion in Appendix J, Section 1.2 describes a theoretical situation in which rejected results could still be used for decision-making, but that this did not occur within this data set. The text in Section 1.2 should be revised to clearly state that this is a theoretical situation, and that rejected data were not used for project decisions during this investigation.

Navy Response to Follow up Comment: The text in Section 1.2 has been revised as requested.

10. **Appendix J, Section 2.4, Completeness, Page 2-1:** This section indicates completeness was calculated using the total number of measurements made, but it is unclear if all samples were collected as planned or if any results were not able to be obtained (e.g., due to sample breakage, inability to collect a sample, etc.). Revise this section to discuss if all planned samples were collected and analyzed, and provide the completeness when compared to the number of planned samples.

    Navy Response: Completeness is calculated based on the number of available results compared to the number of generated results. Failure to generate a result (for example, due to breakage or inability to collect) is not a data quality issue. Those situations would be discussed in the report body section related to work plan deviations, assuming they are not immediately corrected.

    Evaluation of the Response to SC 10: The response does not address the comment.
    The response states that completeness is calculated based on the number of available results compared to the number of generated results, and failure to generate a result (e.g., due to breakage) is not a data quality issue. While completeness may be calculated in this manner, this is usually referred to as laboratory completeness. In such cases, field completeness (using the planned number of samples in the denominator of the calculation) should also be reported. This section should be revised so completeness is determined by comparing the total number of results available to the total number of results planned in order to determine any limitation on data use, which is consistent with Section 5.2.3.1.6 of the Uniform Federal Policy for Quality Assurance Project Plans Manual, dated March 2005 (UFP QAPP Manual). Alternatively, field completeness should also be reported.

    Navy Response to Follow up Comment: In the DQE (Appendix J), references to "completeness" were changed to "laboratory completeness." In the report body, a bullet was added to Section 8.1 (summary and conclusions) to state:

    - All planned samples were collected. All planned laboratory analyses were performed. Field completeness is 100%.

11. **Appendix J, Table J-2, Qualifiers and Availability:** The Note 1 discusses 1,4-dioxane results, but is indicated in the row for the rejected data. However, the DQE does not indicate that 1,4-dioxane results were rejected. Revise this table to clarify Note 1.

    Navy Response: Note 1 on Table J-2 simply mentions that 1,4-Dioxane is included amongst the VOCs despite its status as an extractable. This is described in further detail in Section 1.5. Rejection of results is discussed in Note 1 under Section 1.6.

Evaluation of the Response to SC 11: The response does not address the comment. Appendix J, Table J-2, Note 1 discusses 1,4-dioxane results, but the reference to Note 1 appears in the row for rejected data, which gives the appearance that 1,4-dioxane results were rejected. Table J-2 should be revised to remove Note 1 from the rejected column as the DQE does not indicate that 1,4-dioxane results were rejected.

Navy Response to Follow up Comment: The footnote #1 on Table J-2 was incorrect. Further, to help avoid confusion, all footnotes were removed from both Tables J-1 and J-2 because the intended information appears elsewhere. On Table J-1, the comment column was renamed to "Comment – Refer to Section 1.5." On Table J-2, the comment column was renamed to "Comment – Refer to Section 1.6."

12. **Appendix J, Table J-2, Qualifiers and Availability:** This table provides reason codes for the identified validation qualifiers, but the reason codes are not defined. Revise this table to define the listed reason codes.

    Navy Response: The reason code definitions were inadvertently not included and have been added to Table J-2. They are:

    OT: Other
    CCH: Continuing Calibration (high)
    SSH: Spiked Surrogate (high)
    FD: Field Duplicate
    EBL: Equipment Blank
    SSL: Spiked Surrogate (low)
    CCL: Continuing Calibration (low)
    BD: Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
    MBL: Method Blank
    ICH: Initial Calibration (high)
    MSL: Matrix Spike (low)

13. **Appendix K, Table 3.3 Supplement A:** Please clarify why the value for fraction volatilized is in bold.

    Navy Response: Bolding was removed from the fraction volatilized value.

14. **Appendix K, Table 4.2 RME:** Add a footnote, or otherwise clarify, that the volatilization factor (VF) presented in this table is chemical-specific and applies only to cyanide.

    Navy Response: A footnote was added to indicate that the volatilization factor (VF) presented in the table is chemical-specific and applies only to cyanide (see attached table).

15. **Appendix L, Figure L-1:** As per comments on the interim ecological risk assessment deliverable, it would be helpful to incorporate the locations of the five historical areas, as shown on Figure 2-3 Site Features, onto the figure which illustrates the surface soil locations sampled for the ecological risk assessment.

    Navy Response: Figure L-1 has been modified to show the five historical potential source areas.

New Comments Submitted on June 6, 2016

- The cross sections (Figures F2-9 and F-10) need to indicate what contaminant the concentrations represent.

  Navy Response: TCE designation has been added to the figures.

A few comments on data gaps:

- As the new plume cross sections (Figures F2-9 and F-10) demonstrate, data gaps exist with regard to vertical delineation of the plume. Please include these data gaps in the report and indicate when they will be addressed.

  Navy Response: As indicated in the responses to other comments by EPA and EQB, additional discussion of data gaps has been added to the report. In any investigation, there are data gaps, not all of which are necessary to fill in order to complete an investigation, make remedial determinations for a site, and implement remedial actions. If there are data gaps that are necessary to be filled in order to make remedial determinations and implement remedial action for SWMU 20, they can be filled during stages of the CERCLA process performed following completion of the groundwater pilot study.

- As the natural attenuation parameters figure (Figure 4-6) indicates, wells in the center and the downgradient portion of the plume were sampled for the geochemical parameters that aid in the assessment of geochemical conditions at the site. Also, no ORP or DO results were included on the figure. Please include these as data gaps and indicate when they will be addressed.

  Navy Response: ORP and DO results have been added to the figure.

Final Responses to PREQB Comments on the Draft SWMU 20 Remedial Investigation Report

GENERAL COMMENTS

1. Appendix D (photos 16 through 21) shows that several test pits were excavated at SWMU 20 which appear to contain metal debris and one photo shows a pile of perforated steel plates. Please clarify whether soil beneath the debris was investigated and identify what measures are planned to address the metal debris at SWMU 20.

   Navy Response: The following paragraph has been added as the last paragraph of Section 2. "During the course of the Supplemental ESI, several small depressions were identified east of the "disturbed area" identified in the 1962 aerial photograph (**Figure 2-3**). Excavation of several of these areas was subsequently performed to determine the nature of the material within the depressions (see photographs 15 through 20 in Appendix D). As shown in the photographs, perforated steel plates were the only items found in the depressions. The depressions were further evaluated during the RI, in accordance with the approach concurred upon by the Navy and regulatory agencies and included in the RI SAP, as described in Section 3.1.4. The associated data evaluation is discussed in Section 4, which includes reference to a figure showing all sample locations relative to the depressions (i.e., **Figure 4-1**)."

   PREQB Evaluation of Navy Response: As discussed during the April ERP Meeting, the metal debris encountered at this site is not unique to this site. The USFWS has no concerns over leaving the debris onsite. Please note this information in the response.

   Navy Response to Evaluation Comment: The text in the original Navy Response has been edited by adding a sentence to the end of the paragraph that reads: "(i.e., Figure 4-1). The metal debris encountered at SWMU 20 is innocuous, not unique to SWMU 20, and is commonly encountered elsewhere on Vieques. Further, there is no planned land use in this area and USFWS has no concerns with leaving the debris in place."

2. Throughout Section 5.2, concentrations of various natural attenuation parameters in groundwater at four well locations (MW-05, MW-15, MW-16, and MW-18) are evaluated to assess whether concentrations of these parameters are indicative of reductive dechlorination (i.e. ethane/ethane) or conditions favorable to support attenuation of TCE (i.e., nitrate/nitrite and sulfate/sulfide). The spatial distribution of these wells with respect to the TCE plume does not appear to be adequate to support the conclusions reached in the sections in which these parameters are discussed. For example, Section 5.2.2 and Section 5.2.4 conclude that nitrate and sulfate reduction do not appear to be significant electron acceptor processes at SWMU 20. Likewise, Section 5.2.5 states that non-detect results for ethane and ethane at these wells indicates that reductive dechlorination is not complete at the site. Reductions in electron acceptors and detections of ethane or ethane indicative of biodegradation commonly occur within and downgradient of areas with the highest concentrations of contaminants. Figure 4-5, however, indicates that MW-05 and MW-15 are located upgradient of the plume, MW-16 is located near the north edge of the plume, and MW-18 is located cross-gradient just outside the footprint of the plume. Please modify the text in Sections 5.2.2, 5.2.4, and 5.2.5 to limit the conclusions to the area at the northern fringe of the plume and to acknowledge that the conclusions may not apply to the remainder of plume due to the lack of MNA data throughout the majority of the plume. Please note that additional sampling and analysis may be needed to more adequately evaluate natural attenuation depending on the scope of the remedial alternative selected for the site.

Navy Response: The following revisions have been made:

The natural attenuation parameters for well MW-05 have been added to Table 5-2.

Figure 4-6 has been created to show the natural attenuation parameters and the following sentence has been added to the end of the third paragraph in Section 4.2.1: "**Figure 4-6** displays the indicator parameters measured in various wells that can be used to help evaluate natural attenuation processes in groundwater at the site (Section 5.2)."

The second and third sentences of the second paragraph in Section 5.2 have been revised to read: "Samples collected and analyzed in the laboratory for wet chemistry parameters from four monitoring wells (MW-05, MW-15, MW-16, and MW-18) are summarized in **Table 5-2** and shown in **Figure 4-6**. Of the four wells, three (MW-05, MW-15, and MW-18) are to the north and east, just outside the 5 µg/L TCE plume boundary; MW-16 is within the northern portion of the TCE plume. Natural attenuation parameters, including the microbe parameter Dehalococcoides species, were analyzed in groundwater collected from monitoring well MW-05 when it was within the 5 µg/L plume boundary (2011), but its TCE concentration decreased to below 5 µg/L by 2013."

The second and third sentences in Section 5.2.2 have been revised to read: "Nitrate was detected at four monitoring wells with concentrations ranging from 0.35 mg/L (MW-05) to 4.16 mg/L (MW-16), while nitrite was not detected in the four samples. Based on results from MW-16, located within the northern portion of the plume, nitrate reduction does not appear to be a significant electron acceptor process, at least within the portion of the plume with characteristics represented by the data from MW-16. It is uncertain if nitrate reduction may be occurring in higher-concentration areas of the TCE plume."

The second paragraph in Section 5.2.4 has been revised to read: "Sulfate concentrations ranged from 167 (MW-15) to 235 mg/L (MW-18) in four monitoring wells, while sulfide concentrations were non-detect in those same four wells. Based on the sulfate results from MW-16 (196 mg/L), located within the northern portion of the plume, sulfate reduction is not a significant electron acceptor process, at least within the portions of the plume represented by MW-16 data, which is expected since nitrate and iron reductions are also absent. It is uncertain if sulfate reduction may be occurring in the higher-concentration areas of the TCE plume."

The third, fourth, and fifth sentences in Section 5.2.5 have been revised to: "Ethene and ethane were not detected in groundwater from the four monitoring wells for which these parameters were analyzed, including the one well (MW-16) located within the northern portion of the TCE plume. The lack of ethene and ethane detections is not unexpected with the infrequent and very low detections of cis-1,2-DCE and vinyl chloride in SWMU 20 groundwater. The non-detects of ethene and ethane indicate that reductive dechlorination of TCE is not complete, at least in the northern portion of the TCE plume; however, it is also likely not a significant process in the remainder of the plume due to the low concentrations and/or general absence of cis-1,2-DCE and vinyl chloride across the site."

PAGE-SPECIFIC COMMENTS

1. Figure ES-2: Sample locations MW-24D and MW-25D are not labeled. Please revise.

   Navy Response: Figures ES-2 and 4-1 have been edited to include MW-24D and MW-25D.

2. Page iii, Executive Summary: The second paragraph correctly states that TCE exceeded the Federal MCL of 5 µg/L. Please revise the text to note that TCE also exceeded the Puerto Rico Water Quality Standard (PRWQS) for groundwater, which is also 5 µg/L.

Navy Response: Executive Summary second paragraph, second sentence was edited to read: "….Maximum Contaminant Level (MCL) and Puerto Rico Water Quality Class SG standard for trichloroethene (TCE) of …."

3. Page iv, Executive Summary:

   a. Please delete "sufficiently" from the second bullet. While PREQB agrees that the three deep bedrock wells are sufficient to move forward with a pilot study and an evaluation of remedial alternatives, these three wells may not be sufficient to define the extent of impacts for the design/implementation of a full scale remedy. Later in the report, the Navy contends that the lower concentration of contaminants in the deeper bedrock as compared to wells completed in shallow bedrock or saprolite indicates that the boundaries of the deeper bedrock plume are confined within the footprint of the shallower plume. However, this would be true only if it can be demonstrated groundwater flow directions in shallow bedrock and deeper bedrock are the same. Since groundwater flow in rock is controlled largely by fracture orientations which may vary with depth, the possibility exists for the lateral extent of the plume to be larger in the deeper bedrock, particularly in the east-west direction. Please provide evidence that demonstrates that fractures in shallow and deeper bedrock are the same and that flow in the saprolite/shallow bedrock and the deeper bedrock are the same (i.e., groundwater flow directions in the saprolite/shallow bedrock and deeper bedrock are not tangential to one another). This comment also affects the fifth bullet of Section 8.1.

      Navy Response: The word "sufficiently" has been deleted from the bullet as requested, but the Navy disagrees with the suggestion made in the comment that the deeper plume may be larger than the shallower plume. For that to be true, increasing concentrations with depth should be observed, but the opposite is observed. In addition, while there may be localized, small-scale flow variations (as discussed in Section 2.2.5), there is no reason to believe, especially given the data that have been collected, that the deeper bedrock groundwater would flow in a direction other than toward the closest, lowest regional head, which is the sea.

      PREQB Evaluation of Navy Response: PREQB's comment did not intend to infer that the deeper bedrock plume was larger in overall area than the shallow bedrock plume. Rather, PREQB questioned whether groundwater in deeper bedrock flows in a tangential direction to shallow bedrock groundwater (which is not uncommon) and if so, is the deep bedrock plume confined within the boundaries of the shallow bedrock plume as shown. Deep wells installed to date are located in approximately a linear alignment along the axis of the plume. While PREQB agrees that decreasing hydraulic heads in deeper wells to the south indicate the deep groundwater is generally flowing towards the bay, there are no deep wells located cross gradient of the centerline of the plume to determine if the groundwater flow direction in deep bedrock is the same as in shallow bedrock or flows in a direction that is tangential to the shallow bedrock groundwater. While PREQB has agreed that information presented in the RI is adequate for the purposes of conducting a pilot study and evaluating remedial alternatives, additional deep bedrock wells need to be considered lateral to the axis of the plume as part of the long term monitoring program to document the effectiveness of the selected remedial action in reducing the lateral extent of impacts in deep bedrock groundwater.

      It was agreed during the April 2016 ERP Meeting that the Navy's response will include text recognizing that the configuration of the deeper groundwater plume may be slightly different than depicted as a result of fracture flow.

      Navy Response to Evaluation Comment: Section 4.2.1, after last sentence of the fourth paragraph, the following has been added:

"Although the overall groundwater flow in the bedrock and plume migration is toward the sea, because flow is through fractures, tangential flow on the small scale is possible such that the plume size and shape may be slightly different in the deeper aquifer than represented. However, the ocean is the ultimate discharge point (i.e., lowest hydraulic head). Therefore, because of the close proximity of SWMU 20 to the ocean, the overall groundwater flow direction at the site will be toward the ocean."

Additionally, Section 8.1, fifth bullet, the following has been added after the last sentence: "Because groundwater flow is through fractures, tangential flow on the small scale is possible such that the plume size and shape may be slightly different in the deeper bedrock. However, the ocean is the ultimate discharge point (i.e., lowest hydraulic head). Therefore, because of the close proximity of SWMU 20 to the ocean, the overall groundwater flow direction at the site will be toward the ocean."

b. Item 1: Please clarify how the vertical extent of the TCE plume is "well-delineated" when the concentrations at MW-17D, MW-24D, and MW-25D exceed the 5 µg/L MCL and PRWQS by a factor of approximately 20. This comment also affects the fifth bullet of Section 8.1.

Navy Response: Item number 1 has been revised to read: "The primary . . . is well-defined horizontally in the shallow bedrock based on the extensive . . . While concentrations detected in the deep bedrock wells demonstrate the plume extends deeper than has been delineated with the existing deep wells, the vertical extent delineation is sufficient for making remedial action determinations. Additional wells to refine the understanding of the vertical extent can be added as part of the remedial action and associated monitoring, as applicable."

The text in the fifth bullet of Section 8.1 has been revised to read: "While the vertical extent of contamination could not be completely determined from the five deep bedrock wells, available data indicate that contaminant concentrations decrease with depth, and suggest that the horizontal area of contamination, or plume footprint, is smaller in deep bedrock than in shallow bedrock."

PREQB Evaluation of Navy Response: See response to PREQB Comment 3a. Please revise the proposed text accordingly.

Navy Response to Evaluation Comment: Please see the additional text added in the response to PREQB Comment 3a above.

4. Page 2-3, Section 2.2.5: Please include a discussion of vertical groundwater flow in this section which affects the vertical distribution of contaminants and migration of the plume. Please add groundwater elevations and vertical groundwater equipotential contours to cross-section A-A (Figure 2-9) to support the discussion and infer the vertical extent of the plume.

Navy Response: Groundwater elevations and the estimated piezometric surface for the deep wells have been added to Figures 2-8 and 2-9. In addition, the following has been added to the second paragraph of Section 2.2.5: "As shown in **Table 2-1** and displayed on **Figures 2-8 and 2-9**, the piezometric head between the shallow and deep bedrock varies across the site. This is not unusual for fractured bedrock/saprolite, such as that present at SWMU 20, because the measured head reflects the pressures imparted by the various fractures the well screen encounters (which likely vary in all directions), which are themselves influenced by the degree of interconnectivity both laterally and vertically. Slightly upward gradients, such as those observed in well pairs MW-13/13D, MW-24/24D, and MW-25/25D, may reflect semi-confined conditions, but may also reflect a higher degree of connectivity to downgradient areas (laterally) of lower head in the shallower zone. Conversely, slightly downward gradients, such as those observed in well pair MW17/17D, may reflect unconfined conditions and/or a higher degree of connectivity to horizontally downgradient areas (laterally) of

lower head in the deeper zone. Neutral gradients, such as that observed at well pair MW-28/28D, generally reflect unconfined conditions and a high degree of interconnectivity between the two zones and/or with downgradient, lower head areas."

PREQB Evaluation of Navy Response: It is unclear from the Navy's Response whether vertical groundwater equipotential contours were added to Figure 2-9. As discussed in the original comment, PREQB requested that vertical equipotential contours be shown, in part, to infer the vertical extent of the plume. Please include vertical equipotential contours on Figure 2-9 if not already added and include a discussion of the inferred vertical extent of the plume based upon these contours.

Navy Response to Evaluation Comment: The vertical groundwater flow directions have been added to figures 2-9 and 2-10 along with the shallow and deep bedrock groundwater elevations at each monitoring well cluster. Equipotential contours have not been added due to the complexity of fractured groundwater flow and the difference of interconnectivity between the two zones (as discussed in the response above); a simple correlation of equipotential contours cannot be made between the two zones.

5. Page 2-3, Section 2.2.5.1:

   a. The first bullet presents a range of hydraulic gradients observed at the Site. Please clarify if these hydraulic gradients were derived from water levels obtained from wells completed in the saprolite/shallow bedrock or deeper bedrock wells.

      Navy Response: The first bullet in Section 2.2.5.1 has been revised to add: "(based on water levels obtained from wells completed in the saprolite/shallow bedrock)."

   b. The second bullet cites a hydraulic conductivity of 5.3 feet/day based upon slug test data for SWMU 4. These data are used later to estimate the groundwater seepage velocity. Please clarify whether the hydraulic conductivity and estimated seepage velocity are interpreted to be representative of the saprolite/shallow bedrock, deep bedrock, or both.

      Navy Response: The third sentence of the second bullet in Section 2.2.5.1 has been revised to read: "Based on SWMU 4 slug tests (average of eight wells screened in saprolite/shallow bedrock): k = . . . "

   c. Please clarify whether the effective porosity is interpreted to be representative of the saprolite/shallow bedrock, deep bedrock, or both and provide a reference for the value that is cited.

      Navy Response: The assumed effective porosity representative of the saprolite/shallow bedrock (value of 0.18) was derived from:

      a) effective porosities listed in Freeze and Cherry (1979), using the ranges expressed for silt (0.01 - 0.39) and clay (0.01 – 0.18)

      b) professional judgement and experience from environmental work in fractured bedrock/saprolite
      This information has been added to the third bullet in Section 2.2.5.1.

6. Page 2-6, Section 2.3, Supplemental ESI:

   a. According to Figure 2-12, wells MW-8 and MW-12 were installed during the Supplemental ESI. Please add this to the discussion in this section.

Navy Response: The following sentence has been added to the end of the paragraph after the two bullets in Section 2.3: "During the Supplemental ESI, subsurface soil samples were collected (SB-16 through SB-20) and seven monitoring wells were installed (MW-08 through MW-14), as shown in **Figure 2-12**."

b. Please add the collection of subsurface soil samples from SB-16 through SB-20 to this section, as per Figure 2-12 and Table 2-3.

Navy Response: Please see the response to the previous comment.

7. Table 2-3:

a. Please add TOC to the Analytes for the soil samples collected in the 2011 Supplemental ESI, as per Section 3.1.3 of the report.

Navy Response: TOC has been added to the "Analytes" list for the "5 SB" samples collected during the 2011 Supplemental ESI in Table 2-3.

b. Please clarify what "Cell" refers to in the list of analytes for the groundwater samples collected in the 2011 Supplemental ESI.

Navy Response: The word "Cell" has been replaced with *Dehalococcoides* (MW-05 only) and the *Dehalococcoides* results (along with the other natural attenuation parameters measured in MW-05) have been added to Table 5-2.

8. Table 3-1:

a. For the 2013 groundwater samples, please change the sample identifications for locations GW21, GW22, GW23, and GW24 from 0613 to 0713

Navy Response: The sample identifications have been corrected.

b. For the 2013 groundwater samples GW15, GW16, and GW18, please change the end of the sample identifications from 052313, 051613, and 052113 to "0613."

Navy Response: The sample identifications have been corrected.

c. The text in the next to last paragraph on page 3-6 states that samples from 32 wells collected during 2013 were analyzed for 1,4-dioxane. However, Table 3-1 shows only 29 wells analyzed for 1,4-dioxane. Please revise Table 3-1 or the text, as appropriate.

Navy Response: Table 3-1 was updated to include 1,4-dioxane to the "3 GW" row.

9. Page 3-3, Section 3.1.4, last paragraph: As per Table 3-1, the list of analytes for the soil samples should also include 1,4-dioxane.

Navy Response: The text in last paragraph of Section 3.1.4 has been updated to include 1,4-dioxane.

10. Page 3-4, Section 3.2.5: This section states that 19 shallow wells and five deep monitoring wells were installed in 2013 and 2014 to complete the delineation of the lateral and vertical extent of groundwater contamination.

Please delete the word "complete" from the text. Additional data/analysis is needed to support that delineation of contamination is complete (refer to comments 3a and 4).

Navy Response: The first sentence of Section 3.2.5 has been revised to read: ". . . during the RI to delineate the . . ."

11. Page 3-5, Section 3.2.5, Deep Bedrock Wells: The text states that Geophysical Logs and Video Logs are provided in Appendix C. Therefore, please address the following:

    a. Heat pulse flow meter is cited as one of the tools used to log MW-13D and MW-17D. These logs were not provided in Appendix C. Please provide the heat pulse logs for PREQB review.

    Navy Response: The heat pulse logs have been added to Appendix C.

    b. Appendix C contains a note that video logs are provided on a C-ROM. Please provide the video logs for PREQB review.

    Navy Response: PREQB should already have the video logs. They are contained on the CD that was included with the report. On the CD, there is folder labeled "Appendix C – Video Logs" that contains the video logs for MW-13D and MW-17D.

12. Page 3-6, Section 3.2.7:

    a. Paragraph 4: New shallow bedrock wells should refer to MW-08 through MW-14, not MW-07 through MW-14. Please revise the text accordingly.

    Navy Response: The text has been corrected as stated in the comment.

    b. Paragraph 7: Please clarify why the list of wells sampled in 2014 includes MW-15, which according to Tables 3-1 and 4-4, was only sampled in 2013.

    Navy Response: The first sentence of the seventh paragraph of Section 3.2.7 has been revised as follows: ". . . (MW-10, MW-13, MW-14, MW-16 through MW-30) and all . . ." Additionally, "TCL VOCs" in the "Analytes" cell for the "26 GW" in Table 3-1 ("2014 Investigation Date" was revised to PCE, TCE, 1,1-DCE, cis-1-2-DCE, trans-1,2-DCE, VC. Also, MW-24 was added to the list in the cell of Abbreviated Nomenclature for that same row.

13. Table 3-2, Summary of Monitoring Well Construction Details:

    a. Please clarify why the depth to bentonite is greater than the depth of the sandpack. It appears that the headings for "Depth to Bentonite" and "Depth to Sandpack" may be reversed. Please clarify and revise as appropriate.

    Navy Response: The information in Table 3-2 was corrected and in several logs in Appendix B. Additionally, soil boring and monitoring well completion logs for wells MW-01 through MW-07 have been added to Appendix A and Appendix B, respectively.

    b. The depth intervals of the screen, depth of sandpack, depth of bentonite seals for some of the wells, and the ground surface elevation for some of the wells do not appear to match the well completion logs contained in Appendix B. Table 3-2 for example shows the ground surface elevation to be 31.2 feet above

mean sea level, the screen interval to be 35 to 45 feet below land surface (bls), the depth of sand pack to be 33 feet bls (assumed - see comment (a) above), and the depth of bentonite to be 31 feet bls (assumed – see comment (a) above) at monitoring well MW-08. The well completion log for this well shows these parameters to be 35.74 feet, 33.97 to 43.97 ft bls, 30 ft bls, and 28 ft bls, respectively. Please review all of the logs, clarify the discrepancies between the Table 3-2 and the well completion logs, and revise the table and/or the well completion logs as appropriate. In addition, Appendix B does not include well completion logs for monitoring wells MW-01 through MW-07. Please provide the well completion logs for these wells as part of the RI Report in Appendix B and the corresponding boring logs in Appendix A.

Navy Response: Please see the response to the previous comment.

14. Figure 3-1: Sample locations MW13D and MW17D need to be light blue in color since they were installed during the RI.

    Navy Response: The symbols in Figure 3-1 have been corrected.

15. Page 4-2, Section 4.1.4, paragraph 2: In the first sentence, please replace “metals” with “inorganics” since cyanide is not a metal.

    Navy Response: The requested edit has been made.

16. Page 4-2, Section 4.1.4: At the end of the second paragraph, please identify the wells that are referred to that are in the vicinity and downgradient of the surface and subsurface soil samples that contained antimony above the SSL.

    Navy Response: The last sentence of the second paragraph in Section 4.1.4 has been modified to read: “No antimony was detected in groundwater, including wells MW-3, MW-4, and MW-5, which are adjacent to and downgradient of these sample locations.”

17. Page 4-2, Section 4.1.4: At the end of the fourth paragraph, please note that barium was not detected in MW-03, which appears to be directly downgradient of SS-14.

    Navy Response: The following sentence was added at the end of the fourth paragraph of Section 4.1.4: “Additionally, barium was not detected in monitoring well MW-03, which is located directly downgradient of the SS14 location.”

18. Page 4-3, Section 4.2.1:

    a. The second paragraph states that TCE was detected above the adjusted Tapwater RSL in 28 monitoring wells during the investigations. However, Figure 4-5 shows exceedances at 29 locations. Please revise the text.

       Navy Response: The second paragraph of Section 4.2.1 has been edited from 28 to 29 monitoring wells.

    b. The fourth paragraph in describing the groundwater plume refers to Figure 4-3. However, Figure 4-3 shows subsurface soil exceedances. Please revise the text to refer to Figure 4-5 which shows concentrations in groundwater.

       Navy Response: The text has been edited as requested.

c. The fifth paragraph states that 1,4 dichlorobenzene was detected in just one sample at an estimated concentration of 0.013J µg/L at MW-05. However, Figure 4-4 and Table 4-4 also indicate that 1,4-dichlorobenzene was detected in samples from MW-06 and MW-07. Please revise the text as appropriate.

Navy Response: The fifth paragraph of Section 4.2.1 was edited to read: "1,4-dichlorobenzene was detected in three samples at estimated concentrations of 0.013J µg/L (MW-05), 0.011 J µg/L (MW-06), and 0.012 J µg/L (MW-07), well below . . . "

19. Page 4-4, Section 4.2.1: The last paragraph states "…the contaminants targeted for sampling were focused in subsequent investigations." For clarity, please identify in this sentence the list of specific contaminants analyzed for during the subsequent investigations (i.e., tetrachloroethene, trichloroethene, cis-1,2-dichloroethene, vinyl chloride, and 1,1-dichloroethene).

Navy Response: The last sentence of Section 4.2.1 has been edited to read: ". . . the contaminants targeted for sampling in subsequent investigations were focused (i.e., TCE, 1,1-DCE, cis-1,2-DCE, PCE, and VC)."

20. Page 4-4, Section 4.2.2: This section states that SVOCs were not detected in groundwater. Please clarify the text that SVOCs were not detected in groundwater at the five wells sampled (i.e., MW-01 through MW-05).

Navy Response: The sentence described above was edited to read: "SVOCs were not detected in groundwater from monitoring wells MW-01 through MW-05, which were analyzed for the full TCL SVOC list."

21. Page 4-5, Section 4.2.4: The text states that metals detections in groundwater were sporadic and infrequent. Since metals were sampled during one monitoring event at five wells, sporadic and infrequent do not appear to be appropriate for describing the detection of metals in groundwater. Please consider revising the text as follows: "Metal detections in groundwater exhibited no apparent spatial pattern that would indicate a metals plume and none of the concentrations of the same metals in soil exceeded its background UTL."

Navy Response: The sentence was edited as requested.

22. Table 4-1:

a. VEP4-SS16-0001, VEP4-SS17-0001, and VEP4-SS17P-0001: According to the boring log and Section 3.1.4, these samples were submitted for VOCs, SVOCs, and TOC. Please clarify why the results are listed as "NA" on this table.

Navy Response: Section 3.1.4 does not state these samples were analyzed for VOCs, SVOCS, and TOC. As stated in the last paragraph of Section 3.1.4 and shown in Table 3-1, the samples were submitted for a subset of (targeted) VOCs and TOC, which is why any parameter other than these are listed as "NA" for these samples in Table 4-1. As demonstrated in Table 4-1, which is a detections/exceedance table, none of the targeted VOCs was detected in these samples (otherwise they would be displayed) and these samples were not analyzed for SVOCs. Their TOC data are presented in the table. The boring logs for these samples incorrectly referred to the analyses and have been revised to accurately reflect the sample IDs and the analyses conducted, as shown in Section 3.1.4, Table 3-1, and Table 4-1.

b. VEP4-SS21-0001, VEP4-SS21P-0001, VEP4-SS22-0001, VEP4-SS23-0001, VEP4-SS24-0001, and VEP4-SS25-0001: According to the boring log and Section 3.1.4, these samples were submitted for VOC analysis. Please clarify why the results are listed as "NA" on this table.

Navy Response: Please see the response to the previous comment.

23. Table 4-2: Please add the VOC and TOC results of subsurface soil samples collected from SB-16 through SB-20, as discussed in Section 3.1.3.

    Navy Response: Please see the response to the previous comment. The results for these samples are already in Table 4-2.

24. Figure 4-5: Not all MCL exceedances were shaded on this figure. Please revise.

    Navy Response: Figure 4-5 has been corrected to include shading for all MCL exceedances.

25. Page 5-3, Section 5.1.4: The first paragraph states that "biodegradation is unlikely to contribute to decreasing concentrations." Please clarify the text to indicate that this statement applies to ambient groundwater conditions. The purpose of enhanced in-situ bioremediation potentially proposed as part of the pilot test is to manipulate the groundwater chemistry through the injection of amendments to create conditions in groundwater that promote biodegradation.

    Navy Response: The last sentence of the fourth paragraph in Section 5.1.4 has been revised to read: ". . . however, biodegradation under prevailing ambient groundwater conditions is unlikely to contribute to decreasing TCE concentrations."

26. Page 5-6, Section 5.3.2: Please revise the first sentence to read "….estimating horizontal and vertical distributions of **contaminants**,..."

    Navy Response: The sentence has been revised as requested.

27. Page 5-6, Section 5.3.2.1: Please revise the text to read "Since several investigations of soil were previously conducted in the potential source areas **and no ongoing source of contamination was found**, …"

    Navy Response: The sentence was revised as requested.

28. Page 8-1, Section 8.1: Please revise the text to state that TCE and PCE also exceed PRWQS for groundwater.

    Navy Response: The next to last bullet in Section 8.1 has been revised to read: "TCE and PCE concentrations in groundwater exceed the Federal MCLs and PRWQS."

29. Page 8-2, Section 8.3: This section includes recommendations for a pilot study. Please ensure that the pilot study is designed to prevent the accumulation of daughter products (i.e., 1,1-dichloroethene, cis-1,2-dichloroethene, and vinyl chloride) above their corresponding MCLs and PRWQS.

    Navy Response: The first bullet under Section 8.3 has be revised to read: "Evaluate in situ technologies that inject one or combination of reagents: ISCO, enhanced in situ bioremediation (EISB), and/or in situ chemical reduction (ISCR). The technology selected for the pilot study will be designed to minimize the potential for accumulation of COC daughter products above MCLs or PRWQS."

30. Page 8-2, Section 8.3: Under item#3, please include slug testing of the saprolite as well as the bedrock as contaminated groundwater is present in both media.

Navy Response: Section 8.3, Number 3 text has been edited to read: ". . . evaluate hydraulic characteristics of the saprolite and bedrock."

31. Appendix B, Boring Logs:

    a. MW-17D:

        i. Please correct the sample identifications on the boring to SS17 instead of SS21.

        Navy Response: The sample IDs and associated analyses have been corrected.

        ii. The analytical results for the surface and subsurface soil samples at this location are not presented within the RI report. Please provide.

        Navy Response: Please see the response to Comment #22. The detected results for these samples are provided in Tables 4-1 and 4-2. Complete analytical results are provided in Appendix H.

    b. MW-13D: The analytical results of the surface and subsurface soil samples collected at this location were not presented within the RI report. Please provide.

    Navy Response: Please see the response to the previous comment.

32. Appendix K, Human Health Risk Assessment:

    a. Please include the supporting rationale for using chromium VI as a surrogate for chromium for risk screening, but using chromium III as a surrogate for total chromium when quantifying site risk.

    Navy Response: This approach is consistent with the Data Collection and Evaluation Section of the Vieques Master HHRA protocol (CH2M, 2010). The first paragraph of Section 1.1 states that the HHRA approach is consistent with the Master HHRA protocol.

    PREQB Evaluation of Response: The Master HHRA protocol states, "…If chromium and/or mercury are identified as COPCs at the site, the risk estimates presented in RAGS Tables 7 and 9 will be based on the chemical form expected to be present in the specific environmental medium; *supporting rationale will be provided* [emphasis added]…" Please provide the information requested in our original comment and include the information in the text.

    Navy Response to Evaluation Comment: The supporting rationale for the chromium form expected to be present will be provided as an attachment to the HHRA and is included with these responses.

    b. Page 2-1, Section 2.2.1, COPC Screening Levels: This section states, "…Groundwater VISLs were calculated based on a target ELCR of 1x10-6 and non-carcinogenic HQ of 1 due to conservatism incorporated into the default attenuation factor between groundwater and indoor air. Please reduce noncarcinogenic VISLs by a factor of 10, consistent with the adjustments made to the RSLs, or provide documentation of concurrence by EPA that the use of VISLs at an HQ=1 is acceptable. This comment also applies to Attachment K-1, RAGS Part D Tables, Tables 2-4 and 2-4.

    Navy Response: Five VOCs were detected in groundwater. Inhalation toxicity data are not available for one VOC (cis-1,2-DCE). If VISLs are based on the lower of a HQ of 0.1 and ELCR of $1x10^{-6}$, the VISLs for three VOCs (1,1-DCE, PCE, and TCE) are based on non-cancer effects. However, the target organ/system basis for the non-cancer toxicity values (RfCs) are different for each VOC as indicated below:

- 1,1-DCE – liver
- PCE – neurological
- TCE – immunological, developmental, and cardiovascular

Since cumulative impacts on target organs are not a concern for these 5 VOCs, VISLs do not need to be adjusted downward to an HQ of 0.1 to account for cumulative effects from multiple chemicals.

PREQB Evaluation of Response: The above assessment is accepted; however, this information needs to be included in the text to support the use of the VISLs at an HQ=1 site-specifically. Please add the information presented in the response to the text of the HHRA.

Navy Response to Evaluation Comment: The information has been added to Section 2.2.1 of the HHRA.

c. Page 3-1, Section 3.1, Exposure Pathways Quantified: PREQB commented on the pre-interim deliverable and the interim deliverable that due to the increasing concentration trend at well MW-24 located in the core of the plume, including wells MW-17 and MW-25, which exhibit trichloroethylene (TCE) concentrations more than 100 parts per billion (ppb) less than the concentrations detected at MW-24, in the calculating of the exposure point concentration (EPC) is not appropriate. However, the Navy included wells MW-17 and MW-25 data in the EPC calculation. As unacceptable risks were calculated, the conclusions and recommendations of the HHRA and RI would not be affected if these wells had been excluded from the EPC calculations, PREQB will not comment further on this issue for this site.

Navy Response: Comment noted. Please recall that PREQB deferred their approval on this topic to EPA on 8/7/15 and EPA approved the response on 8/12/15; PREQB then indicated their concurrence to proceed with the report on 8/12/15.

d. Page 5-5, Section 5.6.2, Exposure Point Concentrations: The first paragraph states, "The HHRA assumed that soil and groundwater EPCs remain constant throughout the exposure period within the exposure area. This assumption results in an overestimation of risk since, because of the lack of a continuous release source, concentrations of COPCs will decrease over the exposure durations used in the HHRA." Although no source remains in soil, the potential exists for MW-24 to represent concentrations at the lead edge of the TCE slug migrating in a southeasterly direction, as current data for MW-24 suggest a potential increasing trend. Therefore, the potential exists for the EPCs to result in underestimation of current and future risks. Please revise the above text to discuss this uncertainty, presenting the potential for the 95% UCL comprised of data from MW-24 and significantly lower concentrations at MW-17 and MW-25 to underestimate actual risks, especially considering the current data for MW-24 exhibits a potential increasing trend, based on two rounds of data.

Navy Response: Although the concentrations of COPCs may fluctuate, it is still correct that without a continuous release source, concentrations of the main COPC (TCE) will decrease over the assumed 20 to 25-year exposure duration due to various degradation and volatilization processes (recognizing some daughter product concentrations may increase if environmental conditions are conducive, but the data collected to date suggest the concentrations are relatively insignificant). As the concentrations decrease, the associated risk will also decrease.

Regarding exclusion of groundwater samples collected at MW-17 and MW-25, please recall that PREQB deferred their approval on this topic to EPA on 8/7/15 and EPA approved the response on 8/12/15; PREQB then indicated their concurrence to proceed with the report on 8/12/15.

PREQB Evaluation of Response: Although the overall assumption that concentrations will be decreasing over the long term due to the lack of a source is valid, there is uncertainty as to the maximum

concentration at MW-24 (i.e., there is uncertainty as to how much higher concentrations at MW-24 will be in the future before decreasing due to the lack of a source) and what impact that may have on the EPC, as the current data demonstrates an increasing trend at that well. Please include a discussion of this uncertainty in Section 5.6.3, Exposure Assumptions (Uncertainty Assessment) of the HHRA.

Navy Response to Evaluation Comment: A discussion of the uncertainties associated with currently measured groundwater concentrations representing future groundwater concentrations has been added to Section 5.6.2 of the HHRA. The discussion will include the possibility of higher concentrations, but will note that the concentrations in the wells approximately 200 feet upgradient of MW-24 are considerably lower, so that if higher concentrations are observed in MW-24, they will likely be short-lived.

e. Appendix L, Section 4.3, Bioavailability Measures: The text indicates that total organic carbon sampling results were used in Sections 5.3 and 5.4 of the risk assessment. However, these data do not appear to have been used (nor do they appear necessary given the results of the soil sampling and ecological risk analyses). Please delete the reference to their use or specify where the TOC data was specifically used in characterizing ecological risks.

   Navy Response: Section 4.3 has been deleted from the document.

Two additional comments from PREQB on 6/3/16.

1. Figures 2-9 and 2-10: Please note in the legend stating whether isoconcentrations represent total VOC concentrations or concentrations of TCE.

   Navy Response: TCE has been added to the legend of both figures.

2. Figure 2-10: Please ensure that the depths of the isoconcentrations shown on Figure 2-10 at MW-24/24D match the depths shown on Figure 2-9. Figure 2-9 shows the 200-350 ppb and 150-200 ppb isoconcentrations extending to the bottom and below the well screen for MW-24, respectively; whereas, Figure 2-10 shows these isoconcentrations within the well screen of MW-24. Similarly, the vertical extent of the plume is inferred to be deeper on Figure 2-9 as compared to Figure 2-10.

   Navy Response: Figures have been edited to be consistent with each other.

Final Responses to PRDNER Technical Evaluation Comments on:
Draft SWMU 20 Remedial Investigation Report
Comments Made by PRDNER on January 25, 2016; Technical Evaluation of Responses Conducted April 15, 2016

Doc. Pg. # / Section	Highlighted Document Text / Summary of Content	DNER Comments	Navy Response	DNER Evaluation of Navy Response	Navy Response to Evaluation
Pg. iv / Exec. Summary	1. The primary constituent of interest at SWMU 20 is TCE in groundwater. The TCE plume in groundwater is well defined horizontally and vertically based on the extensive network of monitoring wells shown in **Figure ES-2**.	As further discussed in comments on Section 8.1 (Summary and Conclusions) below, the plume is not well defined vertically. Defining the plume's vertical extent would require determining and delineating the depth of the plume boundary (the 5 ppb TCE isoconcentration contour) across the site, which is not possible based on existing data from deep bedrock wells (two of which reach only the approximate depth of the 100 ppb TCE isoconcentration contour). Rather, the available data support delineation of the plume's horizontal extent, or footprint, in the deep bedrock wells. However, as also noted in comments below, since the deep bedrock wells are all aligned roughly along the north-south axis of the shallow bedrock plume, they provide no direct data on the east-west extent of the plume in deep bedrock. Thus, while the plume is well defined horizontally in shallow bedrock, it is much less well defined horizontally in deep bedrock. Accordingly, please replace the second sentence of the text with the following: "The TCE plume in groundwater is well defined horizontally in the shallow bedrock based on the extensive network	The second sentence of Item number 1 in the Executive Summary has been revised as follows: "The TCE plume in groundwater is well defined horizontally in the shallow bedrock based on the extensive network of monitoring wells shown in **Figure ES-2**. The horizontal extent of the plume in deep bedrock is not as extensively defined because there are less deep bedrock wells, but the available data suggest that the plume covers a smaller area than in shallow bedrock."	Okay.	

Doc. Pg. # / Section	Highlighted Document Text / Summary of Content	DNER Comments	Navy Response	DNER Evaluation of Navy Response	Navy Response to Evaluation
		of monitoring wells shown in **Figure ES-2**. The horizontal extent of the plume in deep bedrock has not been completely defined, but the available data suggest that it covers a smaller area than in shallow bedrock."			
Pg. iv / Exec. Summary	The concentrations of VOCs in MW-13D and MW-17D were lower than those in wells MW-13 and MW-17, respectively. This indicated the boundary of the deeper contamination was contained within (i.e., is smaller than) the boundary of the shallower contamination (i.e., concentrations decrease with depth).	While it is generally true that concentrations in MW-13D and MW-17D have been lower than in the corresponding shallow wells, results from 2014 sampling show that TCE concentrations in MW-13D were higher than in MW-13 (35.3 ppb vs. 32.3 ppb). Please revise the text to read: "With one exception in 2014, the concentrations of VOCs in MW-13D and MW-17D were lower than those in wells MW-13 and MW-17, respectively."	The referenced text will be revised to add the word "generally" because for all practical purposes there is no difference in a groundwater concentration of 35 ppm and 32 ppm.	Okay.	
Pg. 2-3 / 2.2.5	Groundwater flows as a subdued replica of the topography, through the fractured bedrock toward the south-southeast with a likely tidal influence associated with the bay to the south. The tides create a pressure change through the fractures within the bedrock. Because the flow and elastic storage properties of the fractures cause time lag and attenuation of the tidal pressure fluctuations, each well's water level is affected differently and has a unique tidal response.	Since groundwater flow and elevation are tidally influenced due to bedrock fractures, and each well's water level is individually affected by these fractures, could individual fractures also serve as potential conduits for tidal "flushing" of groundwater contaminants from individual wells to Bahia Tapon? Could flow rates within individual fractures be higher than the site-wide calculated groundwater flow rates, possibly resulting in discharges to the bay sooner than would be expected based on calculated flow rates alone? Are there any data on the degree, extent and possible size/width of bedrock fractures in the vicinity of SWMU 20 and	Please note that the wells are installed in volcanic rock, not karst limestone. Tidal influences on the fractures of the volcanic rock would be in the form of short-lived pressure changes, not "flushing" of contaminants. As with any non-karst fractured rock, there is always flow variations based on the size, direction, and degree of interconnectivity of fractures, but information gathered via the significant number of wells installed across the site and the borehole geophysics conducted on a subset of these wells suggest groundwater flow (and contaminant migration) is what is anticipated in fractured crystalline rock, not that there is an undiscovered	Okay.	

Doc. Pg. # / Section	Highlighted Document Text / Summary of Content	DNER Comments	Navy Response	DNER Evaluation of Navy Response	Navy Response to Evaluation
		Bahia Tapon that might permit an assessment of the potential for accelerated contaminant discharge through those fractures?	avenue for accelerated contaminant discharge.		
Pg. 2-4 / 2.2.5.1	Assuming effective porosity (neff) of 0.18, the seepage velocity ranges from 0.059 to 0.147 ft/day (or about 21 to 54 ft/year). The average is 0.103 ft/day (or about 38 ft/year).	What is the source or basis for the assumed effective porosity of 0.18? As shown in the geologic cross sections in Figures 2-9 and 2-10, groundwater across the site flows through a variable matrix of (1) sand mixed with silt and clay; (2) silt and clay; (3) saprolite; and (4) saprock / granodiorite. Does the assumed effective porosity figure cited here take into account the potentially differing porosities of these different matrices? Does the effective porosity take into account the potential for bedrock fractures (e.g., in the saprock / granodiorite) to serve as pathways/conduits (or, in effect, higher porosity zones) for more rapid groundwater and contaminant flow?	The assumed effective porosity representative of the saprolite / shallow bedrock (value of 0.18) was derived from: a) effective porosities listed in Freeze and Cherry (1979), using the ranges expressed for silt (0.01 - 0.39) and clay (0.01 – 0.18) b) professional judgement and experience from environmental work in fractured bedrock / saprolite. This information has been added to the third bullet in Section 2.2.5.1.	Okay. Please add Freeze and Cherry (1979) to the list of references in Section 9 of the RI Report.	The Freeze and Cherry (1979) reference has been added to Section 9 References
Pg. 2-4 / 2.2.5.1	Advective transport of contamination based on an assumed release year of 1960 (active facility) is about 29 ft/year (based on a plume length of approximately 1,550 feet and travel duration of 54 years). This is consistent with the calculated groundwater flow velocities [21 to 54 ft./year] shown above.	Section 5.3.2.2 (Migration in Groundwater, document pg. 5-6, PDF pg. 101, fourth paragraph) states: "Using the average groundwater velocity calculated in Section 2.2.5 (0.103 feet/day, or about 38 feet/year), the constituents of interest travel an estimated 0.004 to 0.086 feet/day (about 2 feet/year to 31 feet/year). The TCE plume dimensions of approximately 1,550 feet to the south toward Bahia Tapón corroborate the estimated	The first two sentences of the last paragraph in Section 5.3.2.2 have been revised as suggested.	Okay.	

Doc. Pg. # / Section	Highlighted Document Text / Summary of Content	DNER Comments	Navy Response	DNER Evaluation of Navy Response	Navy Response to Evaluation
		groundwater velocity and limited contaminant retardation." This indicates that the flow rate of 29 feet/year is comparable to the upper end (31 feet/year) of the range of advective transport rates for individual constituents of interest, which is based on their differing retardation coefficients. This is not clear from the phrasing of the text in Section 2.2.5.1. Therefore, please revise the text to read: "Based on their retardation coefficients (as discussed in Section 5), the average calculated groundwater flow velocity of 38 ft./year shown above yields estimated advective transport rates of about 2 ft./year to 31 ft./year for individual constituents of interest. Assuming a release year of 1960 (active facility), the travel duration of 54 years and observed plume length of approximately 1,550 feet yield an estimated maximum advective transport rate of 29 ft./year. This is consistent with the upper end of the range of transport rates for individual constituents of interest estimated from the average calculated groundwater flow rate."			
Pg. 3-7 / 3.3	The last sentence of the last paragraph in Section 3.3 (Surveying) states: "Note that MW-01 through MW-20 were surveyed twice to help confirm anomalous groundwater elevations were the result of differential tidal	This sentence is redundant, restating the first sentence of the same paragraph; please delete it.	The last sentence of the next-to-last paragraph of Section 3.3 has been deleted.	Okay.	

Doc. Pg. # / Section	Highlighted Document Text / Summary of Content	DNER Comments	Navy Response	DNER Evaluation of Navy Response	Navy Response to Evaluation
	influences and not inaccurate survey elevations.				
Pg. 4-2 / 4.1.4	Arsenic exceeded background and a screening criterion (SSL of 0.29 mg/kg) in one surface soil sample (SS01), at a concentration of 3.2 mg/kg. While the detected concentration is above the background UTL value of 1.6 mg/kg, arsenic was detected at concentrations as high as 5 mg/kg during the background study. While that value was considered an outlier at the time (solely based on an arbitrary threshold value for identifying outliers), it may in fact be representative of actual background arsenic concentrations.	Since this suggests that a previously determined outlier may now be considered representative of background concentrations – possibly allowing a detected concentration twice as high as the stated background UTL to be characterized as background – please provide the rationale for reversing the previous conclusion that the 5 mg/kg concentration is an outlier, and for revising or superseding the 1.6 mg/kg background UTL. This should include a discussion / summary of how and why the 5 mg/kg concentration was originally (and arbitrarily) characterized as an outlier, explanation and justification of why it may in fact not be an outlier (other than eliminating the need to address a concentration higher than the background UTL), how the background UTL was determined, and why the background UTL should now be revised or considered inapplicable in this case. For example, what number and percentage of samples from the background study had concentrations as high as the 5 mg/kg outlier – or higher than 3.2 mg/kg?	The following has been added at the end of the referenced text. “The East Vieques Background Soil Inorganics Report (CH2M, 2007) discusses how outliers were determined; they are simply mathematical outliers (i.e., at a statistically-derived concentration above the rest of the constituent concentrations), and states that outliers may actually be representative of true background concentrations. This is why for any metal, conclusions are not drawn solely upon whether the concentrations at the site are above the calculated background UTL; multiple lines of evidence (e.g., is the metal expected be present as a release based on historical site use; what does the spatial distribution suggest; how do the concentrations compare with concentrations observed elsewhere in similar lithologies; were comparable concentrations seen in the outlier dataset, etc.) are used. Of note, the most common outlier identified in the background dataset was calcium (see Table 9 of the Background Report). Since there would not have been a “release” of calcium, those outlier calcium concentrations are surely associated with background. They were removed from the	Okay.	

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			dataset simply due to the statistical threshold that was established. Therefore, it is likely that the outliers identified for the other metals are actually representative of true background, especially considering the sample locations were specifically selected to be outside of known or suspected areas of contamination."		
Pg. 4-3 / 4.1.4	In addition, although the background UTL for selenium in the soil type found on the site is 0.51 mg/kg, selenium concentrations of up to 1.3 mg/kg were detected during the East Vieques background soil investigation in nearby soil types. This suggests that the selenium concentrations detected in surface soils at SWMU 20 (maximum of 0.78 mg/kg) may be within the range of background.	Please provide justification for the suggestion that the range of background concentrations in "nearby" soil types is (or may be) representative of background concentrations in a different soil type sampled at the site. Otherwise, there is no basis/relevance for suggesting that selenium concentrations exceeding the stated background UTL of the soil type sampled at SWMU 20 "may be within the range of background" for a different soil type, and this passage should be removed from the report.	The last two sentences of the paragraph have been edited to read: "It is unlikely the selenium concentrations are associated with a CERCLA-related release at the site, especially because there is no likely source at the site; selenium is commonly associated with the production of electronics, glass, paints, inks, rubber, and pharmaceuticals, none of which occurred at SWMU 20. It may be associated with pesticides but, as discussed in Section 4.1.3, the presence of pesticides in site soil is attributable to normal pesticide application. Further, the selenium concentrations are relatively low (slightly above the background UTL) and consistent across the site."	Okay.	
Pg. 4-3 / 4.2.1	The fourth paragraph in Section 4.2.1 states: "The TCE plume core (hotspot), defined as concentrations above about 100 µg/L, is approximately three acres in size, as shown in **Figure 4-3**, with TCE concentrations between 100 and maximum of 334 µg/L."	The map of TCE concentrations showing the plume core is Figure 4-5, not Figure 4-3 as stated. Please revise accordingly.	The text in Section 4.2.1 has been corrected to refer to Figure 4-5.	Okay.	

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Pg. 4-3 / 4.2.1	The vertical impact of contamination ranges from 30 to 70 feet bgs, with declining concentrations and smaller area with depth, as demonstrated by comparison of concentrations in shallow/deep bedrock well pairs (i.e., MW-13/13D, MW-17/17D, MW-24/24D, MW-25/25D, and MW-28/28D).	Groundwater sampling and analytical results indicate that the vertical impact of contamination extends deeper than 70 feet bgs if the vertical extent of impact is defined by the depth below ground of the 5 ppb TCE isoconcentration contour (analogous to the horizontal impact). The most recent (September, 2014) groundwater sampling data for the five deep wells at the site show that two of these wells (MW-24D and MW-25D) had TCE concentrations of 98.2 ppb and 101 ppb, respectively, indicating that concentrations exceeding 5 ppb likely extend well below the bottoms of their screened intervals (71 and 70 feet, respectively). Only one of the five deep wells (MW-28D, which is screened down to 55 feet bgs) had a TCE concentration below 5 ppb. In addition, while TCE concentrations have been generally shown to decrease with depth, data from 2014 indicate that MW-13D had a TCE concentration (35.3 ppb) comparable to, and slightly higher than, the concentration in MW-13 (32.3 ppb). Furthermore, since the deep bedrock wells provide no direct data on the east-west extent of contamination in deep bedrock, it has not been conclusively shown that the horizontal area of contamination gets smaller down to 70 feet bgs, as stated here. In accordance with this and comments on	The third sentence of the fourth paragraph in Section 4.2.1 has been revised to read: “The vertical impact of groundwater contamination has been partially delineated and extends from depths of approximately 30 feet to over 70 feet bgs in portions of the site. Comparison of contaminant concentrations in shallow/deep bedrock well pairs (i.e., MW-13/13D, MW-17/17D, MW-24/24D, MW-25/25D, and MW-28/28D) indicates that concentrations generally decrease with depth, and suggests that the horizontal area of contamination, or plume footprint, is smaller in deep bedrock than in shallow bedrock.”	Okay.	

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		other sections of the report, please revise the text to read: "The vertical impact of groundwater contamination has been partially delineated and extends from depths of approximately 30 feet to depths of at least to a depth of 70 feet bgs over portions of the site. Comparison of contaminant concentrations in shallow/deep bedrock well pairs (i.e., MW-13/13D, MW-17/17D, MW-24/24D, MW-25/25D, and MW-28/28D) indicates that concentrations generally decrease with depth, and suggests that the horizontal area of contamination, or plume footprint, is smaller in deep bedrock than in shallow bedrock."			
Pg. 4-4 / 4.2.1	Because none of the non-TCE-related constituents was found consistently in site wells or at concentrations above MCLs/PRWQS criteria or that pose unacceptable risk during early investigations at SWMU 20, the contaminants targeted for sampling were focused in subsequent investigations.	There appears to be a phrase missing near the end of this sentence, where it says "the contaminants targeted for sampling were focused in subsequent investigations." Please insert the phrase "on TCE-related constituents" after the word "focused."	The last sentence of Section 4.2.1 has been edited to read: ". . . the contaminants targeted for sampling in subsequent investigations were focused (i.e., TCE, 1,1-DCE, cis-1,2-DCE, PCE, and VC)."	Okay.	
Pg. 7-2 / 7.5.1	[S]elenium does not pose an unacceptable risk to plants … based on the following: • The qualitative plant survey observed no obvious impacts to the terrestrial plant community based on the species composition found and the lack of stressed vegetation. • Selenium exceeded the soil ESV in 7 of 15 samples at a maximum HQ of	The lack of "obvious impacts" in a qualitative plant survey, and the observation that there are no "apparent impacts" (presumably visually apparent) to plants does not mean impacts are not occurring. In the absence of any quantitative evaluation of selenium uptake or plant stress, these qualitative and subjective assessments do not provide sufficient basis to conclude that	This topic was already addressed in the response to comments on the ERA interim deliverable, which was incorporated into the current text. While the text indicates that the plant survey was qualitative in nature, the primary line of evidence for selenium not being associated with a release is that the maximum soil concentration is within the range of background	Okay.	

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	1.50. As discussed in Section 4, although the background UTL for selenium in the soil type found on the site is 0.51 mg/kg, selenium concentrations of up to 1.3 mg/kg were detected during the East Vieques background soil investigation in nearby soil types. This suggests that the selenium concentrations detected in surface soils at SWMU 20 (maximum of 0.78 mg/kg) may be within the range of background. Further, the soil ESV (0.52 mg/kg) is based on potential impacts to plants. The site is heavily vegetated, with no apparent impacts to the terrestrial plant community.	selenium exceeding the [quantitative] soil ESV in nearly half the samples "does not pose an unacceptable risk to plants." Please revise this statement to read: "selenium does not appear to pose an unacceptable risk to plants … based on the following (noting, however, that no quantitative assessment or evaluation of plant stress was undertaken):". As noted above in comments on Section 4.1.4, Navy needs to provide justification for its suggestion that the range of background concentrations in "nearby" soil types is (or may be) representative of background concentrations in a different soil type sampled at the site. Otherwise, there is no basis/relevance for suggesting that selenium concentrations exceeding the stated background UTL of the soil type sampled at SWMU 20 "may be within the range of background" for a different soil type, and this statement should be removed from the text.	concentrations across the soil types found at Vieques. However, this text has been revised in accordance with the information provided in the response to the Section 4.1.4 comment regarding selenium (see above). Please note that qualitative survey observations are and have been commonly used as lines of evidence for multiple sites (see the final PA/SI and final SI/ESI reports). This information has been added to the text of Sections 4.1.4 and 7.5.1 of the main report, and to the relevant sections in Appendix L.		
Pg. 8-1 / 8.1	The area of deep bedrock groundwater contamination is contained within the area of shallow bedrock groundwater contamination (i.e., plume footprint is smaller), indicating the vertical extent has been delineated sufficiently.	Determining that the plume footprint in the deep bedrock wells is smaller than in the shallow bedrock wells does not delineate the vertical extent of the plume (i.e., its total depth across the site). Rather, it delineates the horizontal extent of the plume at a given depth (in this case, the depth of the screened intervals of the deep bedrock wells). In addition, since the five deep wells are aligned (roughly) along the north-south axis of the shallow plume, they provide	The fifth bullet has been revised as requested.	Okay.	

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		no data on the east-west extent or configuration of the plume footprint in deep bedrock, which consequently must be based on inference. Delineating the vertical extent of the plume (i.e., how deep it extends below ground) requires sufficient data to determine, or defensibly infer, the depth of the 5 ppb TCE isoconcentration contour across the site – the same measure used to delineate the plume's horizontal extent. The sampling data reported in Table 4-4 for the deep bedrock wells are not sufficient to support such a determination, but indicate instead that contamination extends to an undetermined depth beneath four of the five deep bedrock wells. The September 2014 sampling results, for example, showed that two of the deep wells (MW-24D and MW-25D) reached only the approximate depth of the 100 ppb TCE isoconcentration contour – the vertical extent of what has been called the plume "hot spot." While TCE concentrations have been shown to generally decrease with depth, existing data are not sufficient to defensibly infer the depth of both the 50 ppb and 5 ppb TCE isoconcentration contours below these wells. Only one deep well (MW-28) had a TCE concentration below 5 ppb, providing only one data point outside the location of the 5 ppb TCE			

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		isoconcentration contour in deep bedrock. While it likely is possible to combine existing deep well and shallow well data in a single vertical profile / cross section of the plume and thereby delineate or infer the depth and vertical configuration of the 100 ppb TCE isoconcentration contour, as well as portions of the 50 ppb and 5 ppb contours, the vertical extent of the TCE plume has not been fully delineated based on existing data. Accordingly, please revise the text as follows: "While the vertical extent of contamination could not be completely determined from the five deep bedrock wells, available data indicate that contaminant concentrations decrease with depth, and suggest that the horizontal area of contamination, or plume footprint, is smaller in deep bedrock than in shallow bedrock."			
Pg. 8-1 / 8.1	The ERA demonstrated no unacceptable ecological risks exist at the site.	In accordance with comments made above regarding Section 7.5.1, please revise this statement to read: "The ERA demonstrated no unacceptable ecological risks exist at the site. However, although selenium concentrations in 7 of 15 soil samples exceeded the soil ESV, potential selenium impacts to the plant community were evaluated qualitatively rather than quantitatively."	Please see the response to the comment on Section 7.5.1. No revisions to Section 8.1 are warranted.	Okay.	