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FINAL MASTER SAMPLING AND ANALYSIS PLAN ADDENDUM 5 UNEXPLODED ORDNANCE 17 (UXO 17) POTENTIAL AREA OF CONCERN EE REMEDIAL INVESTIGATION ATLANTIC FLEET WEAPONS TRAINING AREA, FORMER VIEQUES NAVAL TRAINING RANGE VIEQUES ISLAND PUERTO RICO

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Final

Master Sampling and Analysis Plan - Addendum 5 UXO 17 Potential Area of Concern EE Remedial Investigation

Atlantic Fleet Weapons Training Area – Vieques

Former Vieques Naval Training Range

Vieques, Puerto Rico

April 2017

Final

Master Sampling and Analysis Plan – Addendum 5
UXO 17, Potential Area of Concern EE
Remedial Investigation

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

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Executive Summary

This Sampling and Analysis Plan (SAP) is prepared as an addendum to the Master SAP for East Vieques Terrestrial UXO Sites (denoted as the Master SAP in this SAP Addendum) (CH2M, 2013) to update the Conceptual Site Model (CSM) and associated Remedial Investigation (RI) approach for Potential Area of Concern (PAOC) EE based on data collected since the Master SAP was finalized (i.e., during the PAOC EE Time-Critical Removal Action [TCRA] for munitions and explosives of concern [MEC]). In addition, this SAP Addendum provides the analytical laboratory worksheets specific to the PAOC EE RI. The location of PAOC EE is shown in **Figure ES-1**.

This addendum includes only those worksheets from the Master SAP that have been revised as a result of the aforementioned activities. Worksheets from the Master SAP (CH2M, 2013) that were prepared for this project previously, but not included in this addendum, remain applicable and will be followed during the RI. Those worksheets are Worksheets # 3-8, 21, 22, 27, 29, and 31-37.

The general objectives of the RI for the UXO sites in the Master SAP are:

- To sufficiently characterize the nature and extent of MEC at each UXO site such that: (1) the final remedy determinations can be made regarding MEC based on the explosive hazard for the intended land use, and (2) environmental media can be appropriately characterized
- To determine if there has been a release of chemical constituents related to the former munitions-related activities at each UXO site and, if so: (1) whether the data sufficiently represent the nature and extent of contamination, (2) whether site-related contamination, if present, poses unacceptable human health and/or ecological risks, and (3) determine whether site-related contamination, if present, warrants action to achieve the proposed land use goals.

Based on the data collected through MEC investigations and removal actions to-date at PAOC EE, the nature and extent of MEC at PAOC EE has been sufficiently characterized to make decisions regarding the final MEC-related remedy for the site and to select appropriate sampling locations to characterize the nature and extent of potential munitions constituent (MC) contamination, as summarized in Worksheet #10 of this SAP Addendum. Therefore, the first objective listed above has been met and, in keeping with the decision analysis process shown in **Figure ES-2**, the process may proceed to the subsequent steps for munitions constituent characterization at the site.

The six-step decision analysis for potential munitions constituent contamination and associated Project Quality Objectives (PQOs) are described in detail in Worksheet #11 of the Master SAP (CH2M, 2013). As stated in the Master SAP, the approach for sampling is to focus on areas with the highest potential for contamination to provide the most conservative evaluation of releases and nature and extent of contamination. Based on this objective, the PAOC EE sampling design and rationale was jointly developed by the Navy and regulatory agencies in December 2015. To ensure conservative characterization of the site, soil sampling activities will focus on: (1) areas with the highest potential for contamination (i.e., locations with highest densities of munitions debris (MD), locations where MEC/unexploded ordnance (UXO)/discarded military munitions (DMM) were identified, and a former drum location), (2) highest potential exposure areas (i.e., beach areas used by recreators and by sea turtles as nesting habitat), and (3) representative areas where subsurface anomalies were left in place during the TCRA.

In total, soil samples will be collected from an estimated 34 locations at the site (**Figure ES-3**). The rationale for each sample is as follows:

- **MEC/UXO/DMM** – A discrete surface and subsurface soil sample will be collected at 13 locations where MEC/UXO/DMM were identified, for a total of 26 soil samples; these sample locations are representative of the various types of MEC encountered at the site. The sample locations represent areas where munitions

constituents may have been released from breaches in or corrosion of MEC/UXO/DMM and have the best chance of containing measurable explosives concentrations. Types of MEC/UXO/DMM identified at PAOC EE included flares, grenades, mortars, and MEC components such as electric blasting caps. Subsurface soil samples will be collected at the location and depth of subsurface MEC previously identified.

- **Spatial Extent in areas with higher densities of MD and small arms ammunition (SAA)** – A discrete surface and subsurface soil sample will be collected at 9 locations throughout PAOC EE to evaluate potential extent of contamination, focused within areas where higher densities of MD and/or SAA were identified (i.e., conservative representation), for a total of 18 soil samples. These sample locations represent areas where munitions constituents may have been released from corrosion of MD and/or SAA items. Two discrete soil sample locations will be collected adjacent to where the highest quantities of SAA were observed (3,105 at one location and 1,000 at another).
- **Anomalies at depth left in place** – Discrete subsurface soil sample will be collected at 3 locations where anomalies were detected below the maximum intrusive investigation depth of 1 foot below ground surface (bgs), for a total of 3 samples. These samples were located in areas where there were a higher density of anomalies left in place and in areas where there is a better chance to collect subsurface soil samples in accordance with Vieques protocols (i.e., further distance from the shoreline where groundwater is not expected to be shallow, which could prevent collection of a subsurface soil sample). Based on the findings of the TCRA, the majority of the items recovered were non-munitions related; therefore, more soil samples are focused on known areas of MEC and MD rather than at these anomaly locations.
- **Former drum location** – A drum was removed from a location within the western boundary of PAOC EE, which possibly contained fuel oil. The drum was breached during removal, but approximately 1 cubic yard of the soil impacted by the release was removed along with the drum. However, to determine if there is residual contamination in the soil, one subsurface soil sample will be collected at the former drum location.
- **Beach recreators and sea turtle nesting habitat** – Beach areas used by recreators and habitat supportive of nesting sea turtles in proximity to where MEC was found will be sampled. Hawksbill sea turtles usually nest high up on the beach underneath or in the beach and dune vegetation, while leatherback sea turtles nest in open sandy beach areas. Both of these species have been documented as nesting along the PAOC EE shoreline. Four locations within habitat supportive of each of the turtle species will be sampled at the discrete deeper surface soil interval of 18 to 36 inches. In addition, discrete surface soil samples will be collected at each of these locations to evaluate potential risks to beach recreators. Therefore, a total of 16 discrete surface soil samples will be collected from the 8 locations.

In general, all surface soil samples will be collected from 0 to 12 inches; if the location occurs within active land crab habitat (as observed during the sampling effort), the surface interval for those samples will instead be 0 to 24 inches.

For subsurface soil samples (other than the beach deeper surface soil samples), a hand auger or continuous split-spoon will be used to collect a 2-foot interval analytical sample between 1 foot (i.e., the bottom of the surface soil interval) and 6 feet (or water table if encountered above 6 feet). Selection of the 2-foot sample interval within this range will be targeted to where visual and/or instrument (e.g., OVA, if appropriate) aided screening suggests the presence of contamination. In the absence of potential contamination, the subsurface soil sample will be collected at the 4-to-6 foot interval (or just above the water table if encountered below this depth).

All soil samples will be analyzed for explosives, inorganic constituents, potential of Hydrogen (pH), total organic carbon (TOC), and oxidation-reduction potential (ORP). And as determined by the Vieques Environmental Restoration Program (ERP) Technical Subcommittee (see Worksheet #9), because the drum potentially containing petroleum may be representative of this type of use elsewhere at PAOC EE, as a conservative measure, polycyclic aromatic hydrocarbons (PAHs) will be analyzed in 10 percent of randomly selected soil samples, in addition to the former drum location. The data collected during the RI will be evaluated using the decision process identified in **Figure ES-2**, including preparation of human health and ecological risk assessments.

Resumen Ejecutivo

Este Plan de Muestreo y Análisis (SAP, por sus siglas en inglés) se prepara como un anejo al SAP Maestro para los Sitios UXO Terrestres del este de Vieques (en este Anejo al SAP se refiere como el SAP Maestro) (CH2M, 2013) para actualizar el modelo conceptual del sitio (CSM, por sus siglas en inglés) y el enfoque de la Investigación para la Remediación (RI, por sus siglas en inglés) para el sitio PAOC EE en base a los datos obtenidos desde que se finalizó el SAP Maestro (es decir, durante la Acción de Remoción de Tiempo Crítico (TCRA, por sus siglas en inglés) en PAOC EE para atender municiones y explosivos de preocupación [MEC, por sus siglas en ingles]). Además, este anejo provee las hojas de trabajo del laboratorio analítico específicas para el RI de PAOC EE. La localización de PAOC EE se muestra en la **Figura ES-1**.

Este anejo incluye solamente aquellas hojas de trabajo del Master SAP que han sido revisadas como resultado de las actividades mencionadas. Las hojas de trabajo del Master SAP (CH2M, 2013) que fueron preparadas anteriormente para este proyecto, pero que no se incluyen en este anejo, siguen siendo aplicables y se seguirán durante el RI. Las Hojas de Trabajo son # 3-8, 21, 22, 27, 29 y 31-37.

Los objetivos generales del RI para los sitios UXO en el Master SAP son:

- Caracterizar suficientemente la naturaleza y extensión de MEC en cada sitio UXO de tal manera que: (1) las determinaciones finales del remedio puedan ser tomadas con respecto a los MEC en base al peligro de explosión en relación al uso planificado del terreno, y (2) los medios ambientales puedan ser adecuadamente caracterizados.
- Determinar si ha habido un escape de compuestos químicos relacionado a las antiguas actividades con municiones en cada sitio UXO y, de ser el caso: (1) definir si los datos representan lo suficientemente la naturaleza y extensión de la contaminación, 2) determinar si la contaminación relacionada al sitio, de existir, presenta riesgos inaceptable para la salud humana y/o riesgos ecológicos, y (3) determinar si la contaminación relacionada con el sitio, de estar presente, amerita alguna acción para alcanzar las metas de uso propuestas para los terrenos.

En base a los datos obtenidos a través de las investigaciones y las acciones de remoción de MEC realizadas hasta la fecha en PAOC EE, la naturaleza y la extensión de MEC en PAOC EE han sido caracterizadas suficientemente para tomar decisiones sobre el remedio final relacionado a MEC para este sitio y seleccionar las localidades de muestreo apropiadas para caracterizar la naturaleza y la extensión de la contaminación potencial de constituyentes de municiones (MC, por sus siglas en inglés), como se resume en la Hoja de Trabajo # 10 de este Anejo. Por lo tanto, se ha cumplido con el primer objetivo antes mencionado y, de acuerdo con el proceso de análisis de decisión mostrado en la **Figura ES-2**, el proceso puede continuar con las etapas subsiguientes para la caracterización de los constituyentes de municiones en el sitio.

Los seis pasos del análisis de decisión para determinar la contaminación de constituyentes de municiones potenciales y los Objetivos de Calidad del Proyecto (PQOs, por su siglas en inglés) se describen en detalle en la Hoja de Trabajo # 11 del SAP Maestro (CH2M, 2013). Como se indica en el SAP Maestro, el enfoque para el muestreo es concentrarse en áreas con el mayor potencial de contaminación para proveer una evaluación más conservadora de los escapes y la naturaleza y la extensión de la contaminación. En base a este objetivo, el diseño y el razonamiento para el muestreo en PAOC EE fueron desarrollados conjuntamente por la Marina y las agencias reguladoras en diciembre de 2015. Para asegurar una caracterización conservadora del sitio, las actividades de muestreo de suelo se enfocarán en: (1) áreas con el mayor potencial de contaminación (es decir, localidades con las densidades más altas de escombros de municiones (MD, por sus siglas en inglés), localidades donde se identificaron MEC/ UXO/municiones militares descartadas (DMM, por sus siglas en inglés) y la antigua localización de un barril), (2) áreas con potencial de exposición más alto (es decir, áreas de playa utilizadas por visitantes y por

las tortugas marinas como hábitat de anidaje), y (3) áreas representativas donde se dejaron anomalías debajo de la superficie durante el TCRA.

En total, las muestras de suelo se obtendrán de un estimado de 34 localidades en el sitio (**Figura ES-3**). La justificación para cada muestra es la siguiente:

- **MEC/UXO/DMM** – Se obtendrá una muestra discreta de suelo superficial y una de subsuelo en 13 localidades donde se identificaron MEC/UXO/DMM, para un total de 26 muestras de suelo; estas localidades de muestreo son representativas de los diversos tipos de MEC que se han encontrado en el sitio. Las localidades de las muestras representan áreas donde constituyentes de municiones pudieron haber sido liberados de fisuras o por la corrosión de MEC/UXO/ DMM y con la mejor posibilidad de que contengan concentraciones medibles de explosivos. Los tipos de MEC/UXO/DMM identificados en PAOC EE incluyeron bengalas, granadas, morteros y componentes de MEC tales como detonadores eléctricos. Las muestras de subsuelo se obtendrán en la localidad y a la profundidad en la que se encontró el MEC debajo de la superficie.
- **Extensión espacial en áreas con densidades más altas de MD y municiones de armas cortas (SAA, por sus siglas en inglés)** - Se obtendrá una muestra discreta de suelo superficial y subsuelo en 9 localidades a través de PAOC EE para evaluar la extensión potencial de la contaminación, enfocándose en áreas con mayores densidades de MD y/o SAA (que es una representación conservadora), para un total de 18 muestras de suelo. Estas localidades de muestreo representan áreas en las que constituyentes de municiones pudieron haber sido liberados por la corrosión de los artículos de MD y/o SAA. Se obtendrán dos muestras de suelo discretas de dos localidades adyacentes a los lugares donde se observaron las mayores cantidades de SAA (3,105 en una localidad y 1000 en otra).
- **Anomalías profundas que se quedaron en su lugar** - Se obtendrá una muestra discreta de suelo debajo de la superficie de 3 localidades donde se detectaron anomalías por debajo de la profundidad de investigación intrusiva máxima de 1 pie bgs (bgs, debajo del terreno), para un total de 3 muestras. Estas muestras se localizaron en áreas donde hay una mayor densidad de anomalías dejadas en su lugar y en áreas donde hay una mejor oportunidad de obtener muestras de subsuelo siguiendo los protocolos de Vieques (es decir, a una mayor distancia de la orilla donde no se espera que el agua subterránea sea poco profunda, lo que podría impedir la obtención de una muestra de subsuelo). En base a los hallazgos de la TCRA, la mayoría de los artículos recuperados no estaban relacionados con municiones; por lo tanto, la mayoría de las muestras de suelo se enfocan en las áreas donde se sabe que MEC y MD están presentes en vez de en localidades donde se encontraron estas otras anomalías.
- **Localización del antiguo barril** - Un barril, que posiblemente contenía combustible, fue removido de un lugar dentro del límite occidental de PAOC EE. El barril se rompió durante la remoción, pero se removió aproximadamente 1 yarda cúbica del suelo impactado por este derrame junto con el barril. Sin embargo, para determinar si hay contaminación residual en el suelo, se obtendrá una muestra de subsuelo en la ubicación donde se encontró el barril.
- **Visitantes de playas y hábitat de anidación de tortugas marinas** – Se obtendrán muestras de las áreas de playa utilizadas por visitantes para actividades recreativas y el hábitat que apoya el anidaje de tortugas marinas en las proximidades donde se encontró MEC. Las tortugas carey suelen anidar en lo alto de la playa, debajo o en la vegetación de dunas y playas, mientras que el tinglar anida en áreas abiertas de playas arenosas. Ambas especies han sido documentadas como especies que anidan a lo largo de la costa de PAOC EE. Se obtendrán muestras de suelo superficial más profundas a un intervalo discreto de 18 a 36 pulgadas de cuatro localidades dentro del hábitat de cada una de las especies de tortugas. Además, se obtendrán muestras discretas de suelo superficial en cada una de estas localidades para evaluar los riesgos potenciales para las personas que visitan la playa. Por lo tanto, se obtendrá un total de 16 muestras de suelo superficial discreto de 8 lugares.

En general, todas las muestras de suelo superficial se obtendrán de 0 a 12 pulgadas; si la localidad está dentro del hábitat activo de los jueyes (según se observe durante el esfuerzo de muestreo), el intervalo de superficie para esas muestras será de 0 a 24 pulgadas.

Para muestras de subsuelo (fuera de las muestras de suelo superficial más profundas de la playa), se utilizará un perforador manual o una cuchara dividida continua para obtener una muestra analítica a intervalos de 2 pies entre 1 pie (lo que se considera el intervalo de abajo de una muestra de suelo superficial) y 6 pies (o al nivel freático si éste está sobre los 6 pies). La selección de las muestras a los intervalos de 2 pies se determinará por inspección visual y/o con la ayuda de instrumentos (por ejemplo, analizador de vapores orgánicos, [OVA por sus siglas en inglés, si es apropiado) sugiera la presencia de contaminación. En ausencia de una contaminación potencial, la muestra de subsuelo se obtendrá del intervalo entre 4 a 6 pies (o justo por encima del nivel freático si se encuentra por debajo de esta profundidad).

Todas las muestras de suelo se analizarán para explosivos, constituyentes inorgánicos, pH, carbono total orgánico (TOC, por sus siglas en inglés) y potencial de reducción y oxidación (ORP, por sus siglas en inglés). Y, según lo determinado por el Subcomité Técnico del Programa de Restauración Ambiental (ERP , por sus siglas en inglés) de Vieques (ver Hoja de Trabajo #9), ya que el barril que potencialmente contenía petróleo puede ser representativo de este tipo de uso en otras partes de PAOC EE, como medida conservadora, los hidrocarbonos policíclicos aromáticos (PAHs, por sus siglas en inglés) serán analizados en un 10 por ciento de las muestras de suelo seleccionadas al azar, en adición a la ubicación del barril viejo. Los datos que se obtengan durante el RI serán evaluados usando el proceso de decisión identificado en la **Figura ES-2**, incluyendo la preparación de evaluaciones de riesgo a la salud humana y de riesgos ecológicos.

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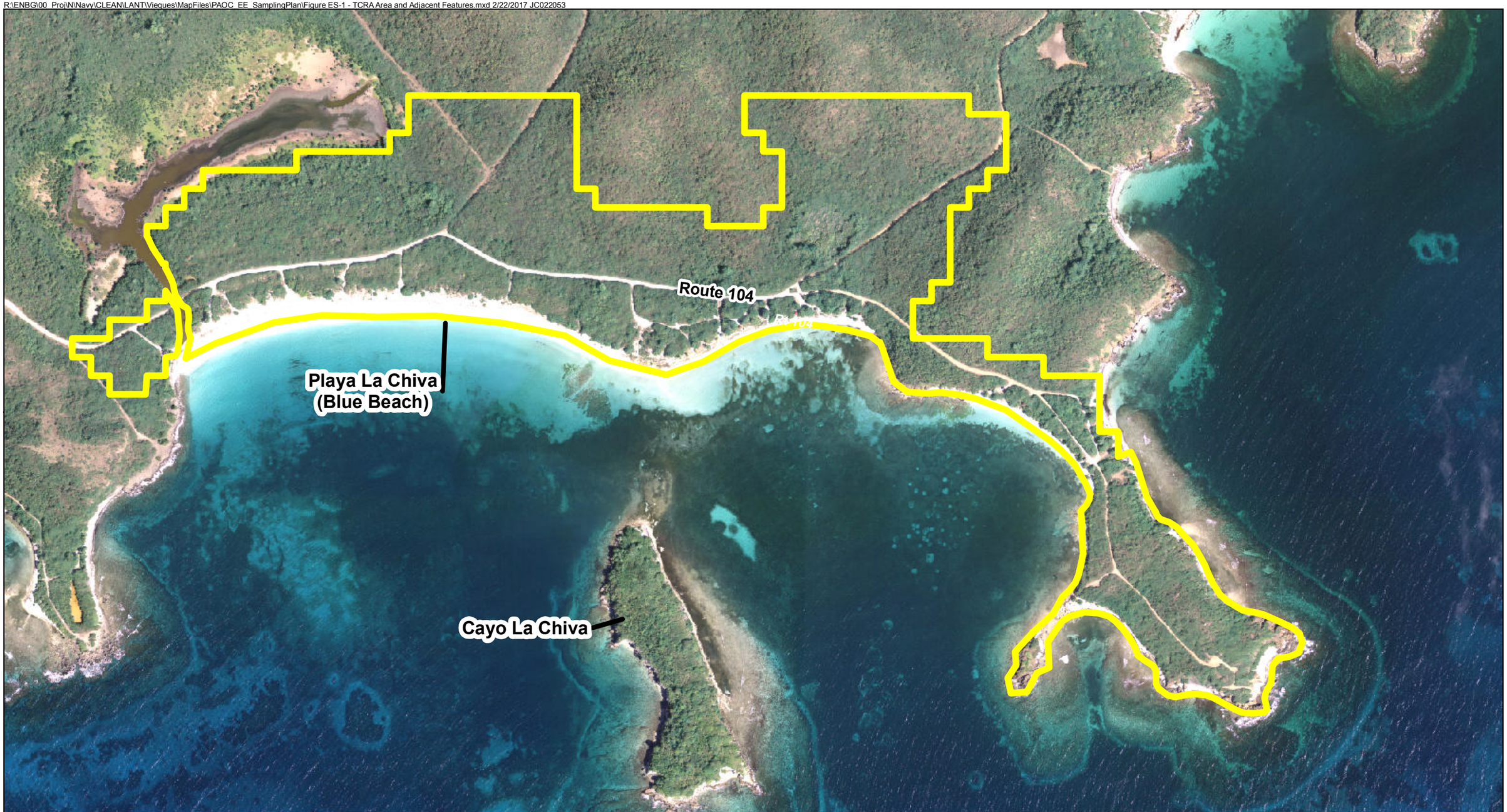

Legend

PAOC EE Site Boundary

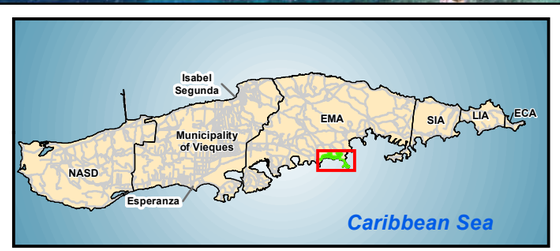

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Figure ES-1
PAOC EE Boundary
UXO 17 Master SAP Addendum
Atlantic Fleet Weapons Training Area - Vieques
Former Vieques Naval Training Range
Vieques, Puerto Rico

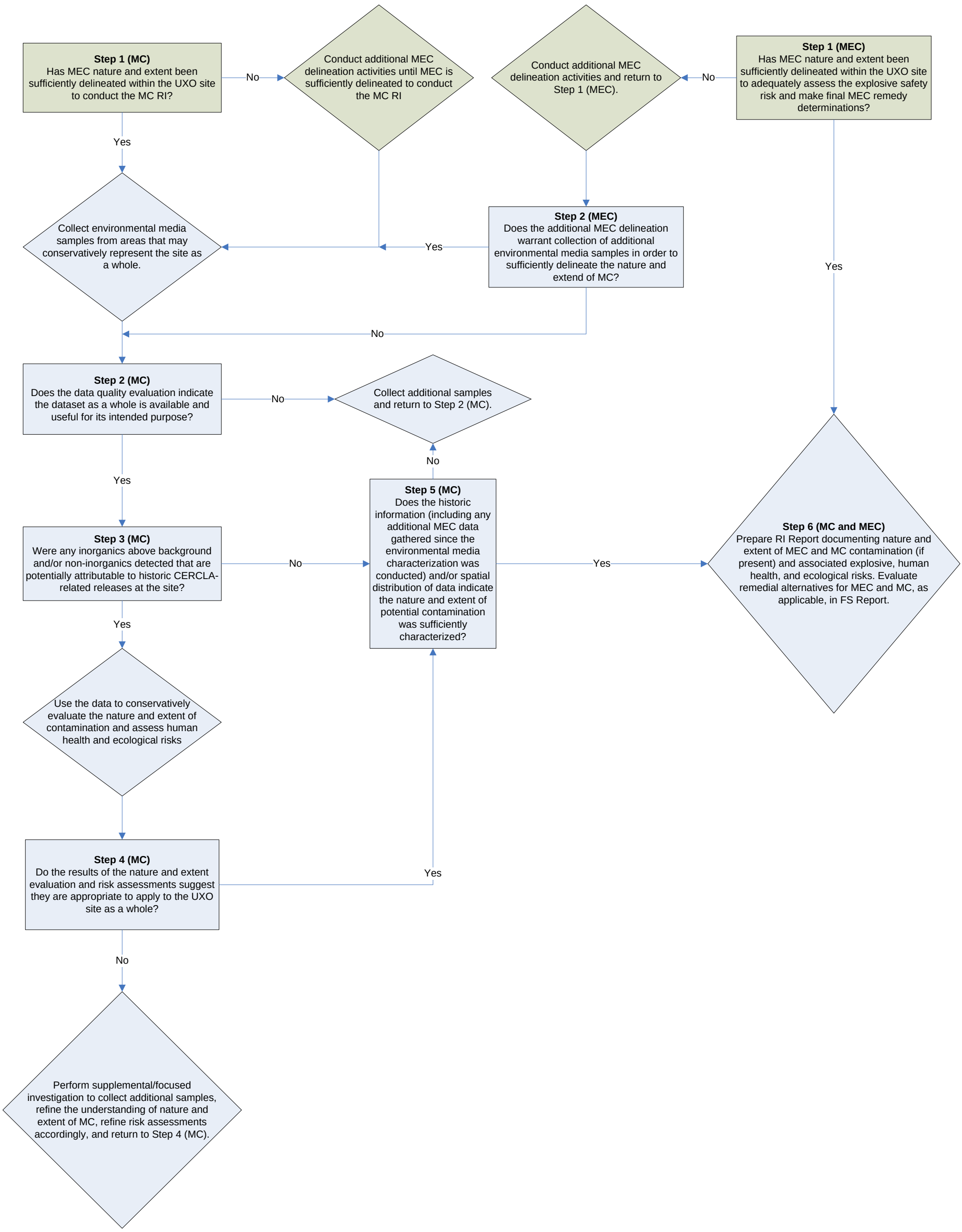

FIGURE ES-2
MEC and MC Remedial Investigation Decision Process
UXO 17 Master SAP Addendum
Former Vieques Naval Training Range
Vieques, Puerto Rico

Notes:
The decision makers associated with this decision tree are the Navy, USEPA, PREQB, and USFWS.

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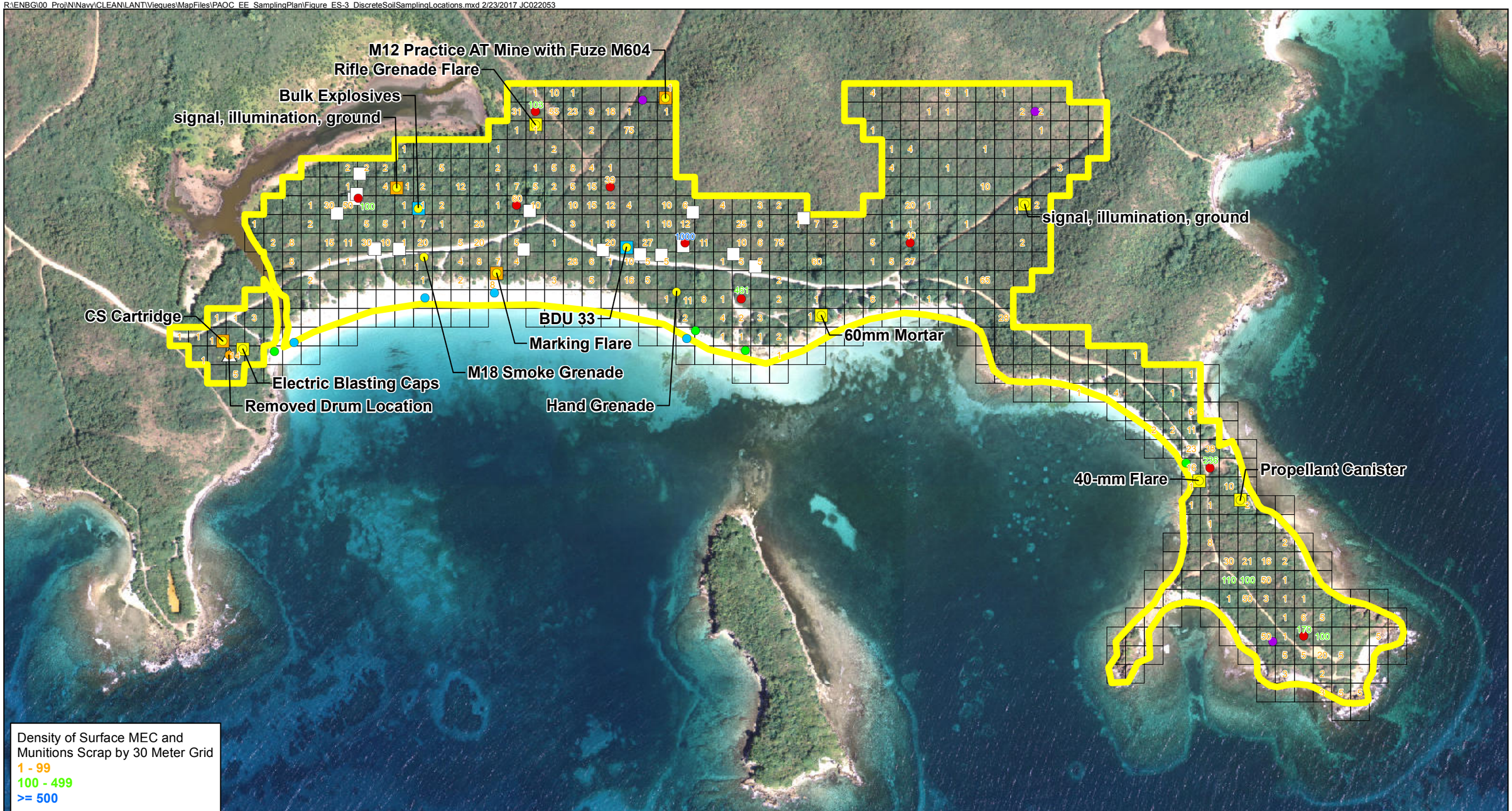

Legend

- PAOC EE Site Boundary
- Former Drum Location

MEC/UXO/DMM

- DMM
- MPPEH
- UXO
- Small Arms

- Discrete Soil Samples at Anomalies left in Place
- Discrete Soil Samples at former location of high densities of MD and/or Small Arms
- Discrete Soil Samples at former location of MEC/DMM/UXO
- Discrete Soil Samples at former drum location
- Discrete Deeper Surface Soil Sample at Hawksbill Turtle Nesting Habitat
- Discrete Deeper Surface Soil Sample at Leatherback Turtle Nesting Habitat

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Figure ES-3
RI Soil Sampling Locations
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Atlantic Fleet Weapons Training Area - Vieques
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Vieques, Puerto Rico

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9 Vieques Sampling Protocol Cross Section

Acronyms and Abbreviations

ASAP	as soon as possible
bgs	below ground surface
CCB	continuing calibration blank
CCV	continuing calibration verification
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CLEAN	Comprehensive Long-term Environmental Action—Navy
COC	chain of custody
CSM	Conceptual Site Model
CTO	contract task order
DDD	4,4'-dichlorodiphenyldichloroethylene
DDE	4,4'-dichlorodiphenyldichloroethane
DDT	4,4'-dichlorodiphenyltrichloroethane
DGM	digital geophysical mapping
DoD	Department of Defense
DL	detection limit
DMM	discarded military munitions
DOI	Department of the Interior
DQE	data quality evaluation
DQI	data quality indicator
DQO	data quality objective
EB	equipment blanks
ECA	Eastern Conservation Area
EDD	electronic data deliverable
ELAP	Environmental Laboratory Accreditation Program
EMA	Eastern Maneuver Area
EPA	Environmental Protection Agency
ERA	Ecological Risk Assessment
ERP	Environmental Restoration Program
ESV	ecological screening value
EXPLO	explosives
FD	field duplicate
FTL	Field Team Leader
H&S	health and safety
HASP	Health and Safety Plan
HHRA	Human Health Risk Assessment
HQ	hazard quotient
ICAL	initial calibration
ICB	initial calibration blank
ICS	interference check solutions
ICV	initial calibration verification
ID	identification
IDW	investigation-derived waste
IS	internal standard

LC-MS/MS	Liquid Chromatography and Tandem Mass Spectrometer
LCS	laboratory control sample
LD	laboratory duplicate
LDR	linear dynamic range
LIA	Live Impact Area
LIMS	Laboratory Information Management Systems
LOD	limit of detection
LOQ	limit of quantitation
LRB	laboratory reagent blank
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
MC	munitions constituent
MD	munitions debris
MEC	munitions and explosives of concern
mg/kg	milligrams per kilogram
mm	millimeter
MPC	measurement performance criteria
MPPEH	material potentially presenting an explosive hazard
MRA	Munitions Response Area
MSA	method of standard addition
MS/MSD	matrix spike/matrix spike duplicate
MSOPPP	Master Standard Operating Procedures, Protocols, and Plans
NA	not applicable
Navy	Department of the Navy
NASD	Naval Ammunition Support Detachment
NAVFAC	Naval Facilities Engineering Command
NIRIS	Navy Installation Restoration Information System
NMFS	National Marine Fisheries Services
NOAA	National Oceanic and Atmospheric Administration
ORP	oxidation-reduction potential
PA/SI	Preliminary Assessment/Site Inspection
PAH	polycyclic aromatic hydrocarbon
PAL	project action limit
PAOC	Potential Area Of Concern
PC	Project Chemist
PCT	percent
PDS	post-digestion spike
pH	potential of hydrogen
PI	Photo-Identified
PIL	project indicator limit
PM	Project Manager
POC	point of contact
PPE	personal protective equipment
PQL	project quantitation limit
PQO	project quality objective
PRDNER	Puerto Rico Department of Natural and Environmental Resources
PREQB	Puerto Rico Environmental Quality Board

QA	quality assurance
QAMS	Quality Assurance Management Section
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QC	quality control
QL	quantitation limit
QSM	Quality Systems Manual
RI	Remedial Investigation
RPD	relative percent difference
RPM	Remedial Project Manager
RRD	range related debris
RSD	relative standard deviation
RSL	regional screening level
RT	retention time
SAA	small arms ammunition
SAP	Sampling and Analysis Plan
SI	Site Inspection
SIA	Surface Impact Area
SOP	standard operating procedure
SSC	Site Safety Coordinator
SSL	soil screening level
SVOC	semivolatile organic compound
SWO	safe work observation
TAT	turnaround time
TBD	to be determined
TCRA	Time-Critical Removal Action
TOC	total organic carbon
UFP	Uniform Federal Policy
UFP-QAPP	Uniform Federal Policy for Quality Assurance Project Plans
U.S.	United States
USFWS	United States Fish and Wildlife Service
UTL	upper tolerance limit
UXO	unexploded ordnance
VNTR	Vieques Naval Training Range
WCHEM	wet chemistry

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SAP Worksheet #1—Title and Approval Page

Final
Master Sampling and Analysis Plan Addendum 5
UXO 17, Potential Area of Concern EE, Remedial Investigation

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

Contract Task Order 005

April 2017

Prepared for:

Department of the Navy
Naval Facilities Engineering Command
Atlantic

Prepared by:
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Prepared under:
Navy CLEAN 8012 Program
Contract N62470-11-D-8012

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SAP Worksheet #1—Title and Approval Page

Final
Master Sampling and Analysis Plan Addendum 5
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SAP Worksheet #1—Title and Approval Page

Final
Master Sampling and Analysis Plan Addendum 5
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Atlantic Fleet Weapons Training Area - Vieques
Former Vieques Naval Training Range
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SAP Worksheet #2—Sampling and Analysis Plan Identifying Information

Site Name/Number: UXO 17, Potential Area of Concern EE, Atlantic Fleet Weapons Training Area – Vieques, Former Vieques Naval Training Range, Vieques, Puerto Rico

Operable Unit: Not Applicable

Contractor Name: CH2M HILL

Contract Number: N62470-11-D-8012

Contract Title: Navy Comprehensive Long-term Environmental Action—Navy (CLEAN) Program 8012

Work Assignment Number (optional): Contract Task Order (CTO) 005

1. This Sampling and Analysis Plan (SAP) addendum was prepared in general accordance with the requirements of the Uniform Federal Policy-Quality Assurance Project Plans (UFP-QAPP) (EPA, 2005) and United States (U.S.) Environmental Protection Agency (EPA) Guidance for QAPPs, EPA QA/G-5, Quality Assurance Management Section (QAMS) (EPA, 2002).
2. Regulatory program: Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).
3. This SAP is prepared as an addendum to the Master SAP for East Vieques Terrestrial UXO Sites (denoted as the Master SAP in this SAP Addendum) (CH2M, 2013) to update the conceptual site model (CSM) and associated Remedial Investigation (RI) approach for PAOC EE based on data collected since the Master SAP was finalized (i.e., during the PAOC EE Time-Critical Removal Action [TCRA] for munitions and explosives of concern [MEC]). In addition, this SAP Addendum provides the analytical laboratory worksheets specific to the PAOC EE RI.
4. Dates of scoping sessions:

Scoping Sessions	Date
1. Master SAP scoping sessions through 2013 are provided in the Final Master SAP	
2. Vieques Environmental Technical Subcommittee Meeting – New York, New York	December 2, 2015

5. Dates and titles of any SAP documents written for previous site work that are or may be relevant to the current investigation.

Title	Date
Master Standard Operating Procedures, Protocols, and Plans, Environmental Restoration Program, Vieques, Puerto Rico (CH2M, 2010a)	April 2010
Master SAP for East Vieques Terrestrial UXO Sites, Former Vieques Naval Training Range, Vieques, Puerto Rico (CH2M, 2013)	January 2013

6. Organizational partners (stakeholders) and connection with lead organization:
   - **EPA Region 2** - Regulatory stakeholder overseeing CERCLA Vieques Environmental Restoration Program (ERP) implemented by lead organization.
   - **Puerto Rico Environmental Quality Board (PREQB)** - Regulatory stakeholder overseeing, on behalf of the Commonwealth of Puerto Rico, CERCLA Vieques ERP implemented by lead organization.
   - **Puerto Rico Department of Natural and Environmental Resources (PRDNER)** – The agency responsible for protecting natural resources, Commonwealth-owned conservation areas, submerged lands, and the coastal zone in the Commonwealth of Puerto Rico.

SAP Worksheet #2—Sampling and Analysis Plan Identifying Information (continued)

- **United States Fish and Wildlife Service (USFWS)** - Land owner of all Department of the interior (DOI) land on which CERCLA Vieques ERP actions are being taken. Regulatory stakeholder on actions which may affect vegetation or wildlife on their properties.
- **National Oceanic and Atmospheric Administration (NOAA)** – Marine habitat stakeholder and technical advisor to EPA.

7. Lead organization:
   - U. S. Department of the Navy (Navy)
8. The omitted SAP elements excluded and provide an explanation for their exclusion below:

   This addendum includes only those worksheets from the Master SAP that have been revised as a result of the aforementioned activities. Worksheets from the Master SAP (CH2M, 2013) that were prepared for this project previously, but not included in this addendum, remain applicable and will be followed during the RI. Those worksheets are Worksheets # 3-8, 21, 22, 27, 29, and 31-37.

SAP Worksheet #9—Project Scoping Session Participants Sheet

Project Name: Navy Clean - Vieques	**Site Name:** UXO 17, Potential Area of Concern EE
Projected Date(s) of Sampling: February 2017	**Site Location:** Vieques, Puerto Rico
Project Manager: Bill Hannah	
Date of Session: December 2, 2015	
Scoping Session Purpose: Concur on RI sampling approach for PAOC EE	

Name	Title	Affiliation	Phone #	E-mail Address	Project Role
Julio Vazquez	West Vieques Remedial Project Manager (RPM)	EPA	212/637-4323	Vazquez.Julio@epa.gov	Primary EPA Point of Contact (POC)
Diane Wehner	Regional Resource Coordinator	NOAA	240/338-3411	Diane.wehner@noaa.gov	Technical input and draft document review
Dan Waddill	Navy Activity Manager	Navy	757-322-4815	Dan.waddill@navy.mil	Navy Vieques Coordinator
Kevin Cloe	Vieques RPM	Navy	757-322-4736	Kevin.cloe@navy.mil	Primary Navy POC
Daniel Hood	Vieques RPM	NAVY	757-322-4630	Daniel.r.hood@navy.mil	Navy POC
Daniel Rodriguez	East Vieques RPM	EPA	787-741-5201 or 787-671-9879 (c)	Rodriguez.daniel@epamail.gov	No project specific role
Jim Pastorik	Technical support for munitions-related aspects of project	UXO Pro/ technical support contractor to PREQB	703-548-5300	jim@uxopro.com	No project specific role
Brett Doerr	Activity Manager	CH2M/Navy CLEAN contractor	757-671-6219	Brett.doerr@ch2m.com	Scope development and technical review, primary CH2M POC
Bill Hannah	Environmental Investigation Lead	CH2M/Navy CLEAN contractor	757-671-6230	Bill.Hannah@ch2m.com	CH2M Project Manager
Angela Carpenter	Technical Support EPA Special Projects Branch	EPA	212-637-4435	Carpenter.angela@epa.gov	No project specific role
Mindy Pensak	Ecological Risk Assessment Lead	EPA	732-321-6705	Pensak.mindy@epa.gov	Technical input and draft document review
Susan Silander	Vieques RPM/ Caribbean Islands Refuges Supervisor	USFWS	787-851-7258 (x 238)	Susan.silander@fsw.gov	USFWS POC
Mike Barandiaran	Refuge Manager	USFWS	787-741-2138	Mike_barandiaran@fws.gov	No project specific role

SAP Worksheet #9—Project Scoping Session Participants Sheet (continued)

Project Name: Navy Clean - Vieques	**Site Name:** PAOC EE
Projected Date(s) of Sampling: February 2017	**Site Location:** Vieques, Puerto Rico
Project Manager: Bill Hannah	
Date of Session: December 2, 2015	
Scoping Session Purpose: Concur on RI sampling approach for PAOC EE	

Name	Title	Affiliation	Phone #	E-mail Address	Project Role
Katarina Rutkowski	Technical support for human health-related aspects of project	TRC/technical support contractor to PREQB	860-305-4339	krutkowski@trcsolutions.com	Primary TRC POC
Mike Hester	Technical support	LTCI/technical support contractor to PRDNER	To be provided by PRDNER	To be provided by PRDNER	Primary LTCI POC
Diana Cutt	Geology/Hydrogeology Lead	EPA	212-637-4311	cutt.diana@epa.gov	Technical input and draft document review
Denise Zeno	Vieques RPM	EPA	212-637-4319	Zeno.Denise@epa.gov	EPA POC
Craig Lilyestrom	Vieques RPM	PRDNER	787-772-2022	Craig.lilyestrom@drna.gobierno.pr	PRDNER POC

Key Discussion Points

Daniel provided a presentation on the site background and proposed sampling approach. Angela commented that sampling should also include analysis for petroleum-related constituents in the vicinity of where the drum was encountered. Katarina recommended using the 7-point wagon wheel design as part of the soil sample in that area. Subsurface soil samples will be collected at the surface soil samples locations and at where anomalies at depth were left in place.

Action Item –Navy – Add PAHs 10% throughout PAOC EE and in the area of where the drum was encountered.

Action Item –Navy – Revise surface soil sampling to discrete soil sampling approach; collect subsurface soil samples at the surface soil sample locations and at locations where anomalies at depth were left in place.

Action Item –Navy – Provide where the anomalies at depth that were left in place in the SAP.

SAP Worksheet #10—Conceptual Site Model

Historical information regarding the former VNTR can be found in the *Site Management Plan Fiscal Year 2016* (CH2M, 2015c). This worksheet provides a summary of PAOC EE background and key elements of the CSM.

Site Background

Vieques is located in the Caribbean Sea and is the largest island of the Commonwealth of Puerto Rico other than mainland Puerto Rico; it is approximately 20 miles long and 4.5 miles wide (**Figure 1**). The former VNTR is situated in the eastern half of Vieques, and is bordered on the west by the community of Isabel Segunda, to the north by the Vieques Sound, and to the south by the Caribbean Sea. The former VNTR consists of approximately 14,500 acres that were divided operationally into four Munitions Response Areas (MRAs) that from west to east comprise: the 10,673-acre Eastern Maneuver Area (EMA); the 2,500-acre Surface Impact Area (SIA); the 900-acre Live Impact Area (LIA), and the 200-acre Eastern Conservation Area (ECA) on the easternmost tip of Vieques (CH2M HILL, 2006) (**Figure 2** bottom inset). The EMA, which includes UXO 17, was established in 1947 and provided maneuvering areas for training by Marine amphibious units and battalion landing teams in exercises that included amphibious landings such as Operation PORTREX, small arms fire, artillery and tank fire, shore fire control, and combat engineering tasks.

UXO 17 is located in the south-central area of the EMA (**Figure 2**). Potential Area of Concern (PAOC) EE is the only site within UXO 17 that is still under investigation. Other sites associated with UXO 17 are Photo-Identified sites 14 and 21 (PI 14 and PI 21), and PAOC FF. Investigations at all three of these sites led to no action, as documented in their respective No Action Decision Documents (CH2M, 2010c for PI 14 and PAOC FF; CH2M, 2014a for PI 21). Additionally, Laguna La Chiva, just north of PAOC EE, was investigated and closed out via a No Action Decision Document (CH2M, 2014b).

Historically, PAOC EE comprised Punta Conejo, but the findings of the TCRA and previous investigations were used to revise the PAOC EE boundary. The PAOC EE boundary is shown on **Figure 2**. The area was defined based on where historical information suggested military training activities associated with beach landings occurred and includes the area where surface/subsurface MPPEH were found. No known historical live fire activities occurred at the site, but the area was used for amphibious landings and other ship-to-shore activities.

The former VNTR was transferred to the Department of the Interior (DOI) in 2003 to be operated and managed by USFWS as a National Wildlife Refuge. Blue Beach, and parts of the surrounding area that make up the PAOC EE TCRA area, were made available for public use following the 2003 land transfer. The areas open to the public (beach, road, and parking areas) are largely used by USFWS for general refuge management activities and by the public for recreational use; however, public access and less common refuge management activities may also occur in the surrounding vegetated areas.

Investigation History

First Munitions Investigation of Playa La Chiva (Blue Beach)

A munitions investigation of Playa La Chiva/Blue Beach was conducted in association with the 2003 land transfer to inspect the sandy portion of the beach (area between the vegetation and water line) for MEC/MPPEH. The inspection consisted of performing a surface clearance for MEC and investigating subsurface anomalies that were identified through digital geophysical mapping (DGM) (**Figure 3**). The DGM identified 330 anomaly locations, of which 244 (74 percent) were intrusively investigated to determine their source. No MEC/MPPEH was identified on the ground surface or during the subsurface anomaly inspection. Three items that were classified as munitions debris (MD) were identified within the first foot of investigation below ground surface (bgs); the recovered items consisted of two expended 5.56-millimeter (mm) small arms cartridge cases and one expended 7.62-mm small arms cartridge case.

SAP Worksheet #10—Conceptual Site Model (continued)

Preliminary Assessment/Site Inspection of Punta Conejo (original PAOC EE boundary)

In 2011, a Preliminary Assessment/Site Inspection (PA/SI) was conducted within the original boundary of PAOC EE (Punta Conejo; **Figure 3**) to determine the potential presence of MEC/MPPEH. The inspection consisted of conducting a DGM survey across all 18 acres and excavating a number of anomalies to assess if MEC/MPPEH were present. The DGM identified 2,542 anomalies, of which 458 of the anomalies (18 percent) were intrusively investigated to determine their source. Two of the anomaly sources were classified as discarded military munitions (DMM), consisting of a MK 50 Decoy Flare (found within the top 1 foot bgs) and a M203 propellant for 155-mm howitzer (2-4 feet bgs). The remaining excavated anomalies consisted of small arms, range-related debris (RRD), and cultural debris; no additional MEC/MPPEH was identified.

Second Munitions Investigation of Playa La Chiva (Blue Beach)

In June 2013, a follow-up investigation of the Playa La Chiva area was conducted due to the results of the historical investigations and the findings at nearby UXO 18 (Cayo La Chiva), where five unexploded ordnance (UXO) items (5-inch rockets) were identified and subsequently destroyed through open detonation. The investigation consisted of performing DGM on the sandy portion of the beach, the public parking areas and pathways, and transects within the vegetated area north of Route 104 with subsequent investigation of all identified anomalies. While preparing the site for the DGM survey, vegetation removal and surface MEC clearance was conducted as necessary. Although no MEC/MPPEH were identified on the ground surface, the following MEC/MPPEH were identified during the investigation of the 864 subsurface anomalies:

- MPPEH
  - One signal, ground, illumination was identified in a parking area
  - Seven items (bulk explosives, flares, small arms cartridge cases, BDU 33, and a M12 practice anti-tank mine (no explosive components installed) were identified in the area north of Route 104
- DMM
  - One rocket fuze (described as a MEC component) was identified at the eastern end of Playa La Chiva adjacent to Punta Conejo
  - Two DMM (grenade, rifle, smoke M22 and trip flare) were found in the area north of Route 104

In addition to the MEC/MPPEH, approximately 1,000 small arms ammunition (SAA) were also found in one location in the area north of Route 104 and approximately 450 pieces of MD were identified in the investigation area. All of the MPPEH, DMM, and small arms and 93 percent of the MD were found within the first foot bgs. The locations of the items found are presented in **Figure 3**.

Time-Critical Removal Action

Based on the findings of the investigations listed above, a Time-Critical Removal Action (TCRA) was conducted in 2014 (CH2M, 2015a) to reduce the potential explosive hazard due to the potential presence of surface and/or shallow subsurface MEC/MPPEH within the TCRA area (**Figure 2**). For the purposes of the TCRA, “shallow” was defined as the top 1 foot because 98 percent of the total items found during the three investigations in and around Blue Beach were in the top 1 foot. In fact, only one DMM was found deeper than 1 foot. In addition, the site history indicates the area was used for military maneuvers and there are no records of munitions burial or munitions being fired at the site.

Surface and subsurface MEC clearance was conducted using a “mag-and-dig” approach throughout the approximately 132-acre TCRA area from May 26 through October 23, 2014. The area was divided into grids to allow for complete inspection by the UXO technicians using magnetometers to locate potential MEC/MPPEH.

SAP Worksheet #10—Conceptual Site Model (continued)

The TCRA identified and removed over 100,000 metallic items from approximately 10,000 anomaly locations throughout the TCRA area. Of these items:

- 17 were classified as DMM
- 7 were classified as UXO
- 5 were classified as MPPEH

The remaining items were inert metal pieces or did not otherwise present an explosive hazard, including 3,596 small arms that were identified and removed from the site. Although unfired SAA do pose a very small explosive hazard, that hazard is not the same kind or as great as other military munitions or MEC for the following reasons:

- The small amount of propellant within unfired SAA does not detonate, it deflagrates using the resulting gases to propel the projectile.
- The consequences of a SAA initiating outside a weapon are localized. The propellant may rupture the cartridge case or eject the projectile in this scenario with the potential for likely minor injury and limited to a few feet.
- The likelihood of functioning a SAA outside a weapon is very small. The most likely cause would be that the SAA is placed or thrown into a fire. In this scenario, the SAA does not explode, rather the propellant heats up building gases that either expels the projectile or rupture the case. A projectile being expelled in this manner would not travel far because there is no obturation to the rear.

Figure 4 shows the distribution of the items with an explosive hazard and small arms identified and removed during the TCRA.

Approximately 3,500 locations (approximately 26 percent of total anomaly locations) were investigated to a depth of 1 foot bgs without identifying the source of the anomaly, suggesting that the anomaly source is at a depth greater than the maximum intrusive investigation depth of 1 foot bgs, or the item was identified within the top foot but extended deeper (e.g., wire and other cultural debris). **Figure 5** shows the locations where the source of the subsurface anomaly was not identified. It is important to note that of the 100,000 metallic items that were removed from 10,000 anomaly locations, only 29 were classified as MEC; therefore, the amount of anomalies below 1 ft likely to be MEC is very low.

Conceptual Site Model

Figure 6 and **Table 1** are compilations of findings from the TCRA and previous investigations and demonstrate the nature and extent of MEC/MPPEH, SAA (and related potential contaminant sources) have been sufficiently characterized for the RI, which provide the basis for sufficiently characterizing the nature and extent of potential chemical contamination.

As noted above, the potential sources of contamination within PAOC EE are MEC/MPPEH and related debris, such as MD. The primary release mechanism of potential contaminants would be deterioration of MEC/MPPEH/debris and subsequent release of related chemicals.

UXO 17, including PAOC EE, will continue to be managed as part of the wildlife refuge. Potential receptors at the site are both human and ecological. Potential human receptors comprise USFWS workers, trespassers (adolescent and adult), and recreators (all ages) exposed to soil. Because all surface MEC/MPPEH at PAOC EE were removed, the associated explosive hazard has been mitigated unless uncontrolled excavation or excessive beach erosion occurs. Potential terrestrial ecological receptors associated with potentially complete exposure pathways are plants, soil invertebrates, birds, mammals, and reptiles. Potential birds and mammals consuming invertebrates, plants, and/or small mammals include the Fruit Bat, Velvet Free-tailed Bat, Norway Rat, Indian Mongoose, Common Ground Dove, Pearly-eyed Thrasher, Cave Swallow, and Red-tailed Hawk.

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SAP Worksheet #11—Project Quality Objectives/Systematic Planning Process Statements

1. Who will use the data and what will the data be used for?

The Navy, EPA, PREQB, PRDNER, and USFWS will use the data collected during the RI sampling (as well as relevant historical data) at PAOC EE to make determinations of whether CERCLA-related releases took place and, if so, whether further investigation or action is warranted. Site-specific data uses are defined in Item 5 of this worksheet.

2. What are the Project Action Limits (PALs)?

The PALs are defined in the Master Standard Operating Procedures, Protocols, and Plans (CH2M, 2010a) and are listed, by constituent group and medium, in Worksheet #15. In general, the PALs are:

- Vieques human health screening values for soil are the current (as of the time this SAP is prepared) RSLs (adjusted for a hazard quotient [HQ] of 0.1 for non-carcinogens) provided by EPA.
- Vieques ecological screening values for soil, which are listed in the Vieques Master Ecological Risk Assessment Protocol, Revision 1 (CH2M, 2015b).
- Vieques soil-to-groundwater leaching screening values provided by EPA.
- Vieques discrete surface soil inorganics screening values are the East Vieques background soil inorganics upper tolerance limits (UTLs) (CH2M, 2007).
- Where a specific PAL deviates from the above, it is footnoted in the applicable Worksheet #15 table.
- At the time of data evaluation, soil data will be screened against the most recent version of applicable screening values.
- There are no PALs or project indicator limits (PILs) for pH, oxidation-reduction potential (ORP), and total organic carbon (TOC) results; they are screening-level data or data used to support interpretation of ecological risk results. These parameters are identified in Worksheet #15.
- In addition to listing the particular analytes, PALs, and limits of quantitation (LOQs), Worksheet #15 identifies where limits of detection (LODs) are greater than PALs. Even though LODs may be greater than certain PALs, detection limits (DLs) may be closer to or less than PALs. When this occurs, and if a constituent is detected in a sample at or at greater than the PAL, then it is reported, qualified as applicable. The majority of the constituents have LODs less than PALs. For the following constituents, the DL is greater than the PAL: naphthalene (soil screening level [SSL]), 1,3-dinitrobenzene (SSL), 2,4,6-trinitrotoluene (SSL), 2,4-dinitrotoluene (SSL), 2,6-dinitrotoluene (SSL), 2-Amino-4,6-dinitrotoluene (SSL), 2-nitrotoluene (SSL), 3-nitrotoluene (SSL), 4-amino-2,6-dinitrotoluene (SSL), 4-nitrotoluene (SSL), hexahydro-1,3,5-trinitro-1,3,5-triazine (SSL), nitrobenzene (SSL), nitroglycerin (SSL), PETN (SSL), and hexavalent chromium (SSL and RSL). See related discussion in the next bullet.
- The use of “estimated” data will be discussed in the report. “Estimated” data are generally considered usable for all purposes. For results reported between the DL and LOQ the laboratory will apply J-flags. Although there is some added uncertainty in the concentration of estimated results, estimated data are generally considered usable for all purposes at their reported concentration. When the screening level is between the LOD and LOQ there is added uncertainty when the result is also between the LOD and LOQ (there is not added uncertainty when the result is detected at greater than the LOQ or is nondetect) but detections are still compared directly to screening levels. The added uncertainty is discussed in the data quality evaluation and risk assessments included in the RI Report.

SAP Worksheet #11—Project Quality Objectives/Systematic Planning Process Statements (continued)

- When detected results and screening levels are both less than the LOQ, results are still used at their reported concentration, which may be greater than or less than the screening level. The resulting uncertainty is acceptable because the planned data set is sufficiently large. In addition, the Data Quality Evaluation (DQE) will make an evaluation of the usability of the resulting dataset and will consider the quantity of estimated data versus unqualified data.
- The Vieques screening values on which the PALs are based are not of equal importance. Therefore, decisions with respect to a particular constituent can still be made when the DL is greater than the PAL. The SSLs are more qualitative than human health and ecological screening values. Past experience at Vieques has demonstrated that SSLs are not reliable predictors of leaching to groundwater; they are overly conservative (see multiple site-specific SSL discussions contained in the *Expanded Range Assessment/Site Inspection Report* [CH2M, 2010b). Hexavalent chromium is the only constituent for which there is a non-SSL screening value (i.e., the RSL) less than the LOD. However, the DL is equal to the RSL. Further, hexavalent chromium would not be expected to be present at the site based on past site use and anticipated geochemical conditions in the soil. Additionally, the hexavalent chromium data are used primarily to assist in interpreting the total chromium results. Therefore, the relationship of the hexavalent chromium RSL to the LOD will not affect the ability to make nature and extent and risk determinations for the site.
- Nondetect results are treated as non-exceedances. When the reporting limit (LOD) is greater than the screening level, there is added uncertainty surrounding this decision, but the uncertainty is acceptable with respect to the intended data use. This added uncertainty is discussed in the data quality evaluation included with the report.

3. What types of data are needed (matrix, target analytes, analytical groups, field screening, on-site analytical or off-site laboratory techniques, sampling techniques)?

- Soil samples will be submitted to an offsite laboratory for analysis (APPL, Inc., of Clovis, CA; ALS-Kelso of Kelso, WA).
- Chemicals of interest consist of explosives constituents, semivolatile organic compounds (SVOCs)/PAHs, and metals, as shown in Worksheet #15. The rationale for these analyses is provided in Worksheet #17.
- Worksheets #15 and #18 define the matrices, analytical groups, and, where applicable, specific target analytes for PAOC EE.

4. How "good" does the data need to be in order to support the environmental decision?

- The data will be of the quantity and quality necessary to provide technically sound and defensible assessments of the nature and extent of contamination and potential risks at PAOC EE. Laboratory methods will meet CERCLA, EPA Region 2, and Navy guidance and the data will be validated by a third-party validator using current EPA Region 2 standard operating procedures (SOPs), current national functional guidance, methodology, and/or laboratory SOPs, as described in Worksheet #36 of the Master SAP (CH2M, 2013).
- The laboratory will follow the Measurement Performance Criteria (MPC) in Worksheet #12 for field quality control (QC) samples and Worksheet #28 for laboratory QC samples. These MPC are consistent with the U.S. Department of Defense (DoD) Quality Systems Manual (QSM) as applicable and laboratory in-house limits where the QSM does not apply.

SAP Worksheet #11—Project Quality Objectives/Systematic Planning Process Statements (continued)

5. How much data should be collected (number of samples for each analytical group, matrix, and concentration)?

Worksheet #18 contains the number of samples per matrix per analytical group for PAOC EE. Worksheet #15 contains the particular analytes, PALs, and quantitation limits (QLs). Worksheet #17 provides the sampling rationale.

6. Where, when, and how should the data be collected/generated?

- Samples will be collected during a field mobilization tentatively planned to occur in February 2017.
- Data will be collected and generated in accordance with the procedures outlined in this SAP and the Master SAP. See the SOPs in Appendix D of the Master SAP (CH2M, 2013) for more details.

7. Who will collect and generate the data? How will the data be reported?

- CH2M field staff will collect the samples.
- Laboratory analysis will be performed by APPL, Inc., of Clovis, CA, with ORP analysis being performed by ALS-Kelso of Kelso, WA.
- The data will be evaluated and documented in an RI Report. If additional soil sampling is deemed necessary based on the data evaluation, such as whether data quality standards were sufficiently met or if data indicate areas warranting further evaluation, and with concurrence among the Vieques Technical Subcommittee, those additional soil samples will be collected under this SAP. It is possible additional samples may be collected at the time of the field event based on observations made during sampling. In these cases, the rationale for the additional sample collection will be provided in the RI Report.

8. How will the data be archived?

The data will be archived in accordance with procedures dictated in the Navy CLEAN program/contract. At the end of the project, archived data will be returned to the Navy.

9. List the Project Quality Objectives (PQOs) in the form of if/then qualitative and quantitative statements.

The general objectives of the RI for the UXO sites in the Master SAP are:

- To sufficiently characterize the nature and extent of MEC at each UXO site such that: (1) the final remedy determinations can be made regarding MEC based on the explosive hazard for the intended land use, and (2) environmental media can be appropriately characterized
- To determine if there has been a release of chemical constituents related to the former munitions-related activities at each UXO site and, if so: (1) whether the data sufficiently represent the nature and extent of contamination, (2) whether site-related contamination, if present, poses unacceptable human health and/or ecological risks, and (3) determine whether site-related contamination, if present, warrants action to achieve the proposed land use goals

Based on the data collected through MEC investigations and removal actions to-date at PAOC EE, the nature and extent of MEC at PAOC EE has been sufficiently characterized to make decisions regarding the final MEC-related remedy for the site and to select appropriate sampling locations to characterize the nature and extent of potential MC contamination, as summarized in Worksheet #10 of this SAP Addendum. Therefore, the first objective listed above has been met and, in keeping with the decision analysis process shown in **Figure 7**, the process may proceed to the subsequent steps for munitions constituent's characterizations at the site. The six-step decision analysis for potential munitions constituent contamination and associated PQOs are described in detail in Worksheet #11 of the Master SAP (CH2M, 2013).

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SAP Worksheet #12—Field Quality Control Samples

As requested by EPA in a comment on a previous SAP, all field QC sample information is provided within Worksheet #28.

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SAP Worksheet #13—Secondary Data Criteria and Limitations Table

Secondary Data	Data Source (originating organization, report title and date)	Data Generator(s) (originating organization, data types, data generation / collection dates)	How Data Will Be Used	Limitations on Data Use
TCRA and previous munitions investigations	UXO 17 Potential Area of Concern EE Time-Critical Removal Action After Action Report (CH2M, 2015a)	Locations and types of munitions-related items and other debris identified within PAOC EE between 2003 and 2014	Historical findings were used as a guide to select the appropriate locations for soil sampling under this SAP	None

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SAP Worksheet #14—Summary of Project Tasks

The *Master Standard Operating Procedures, Protocols, and Plans* (CH2M, 2010a) and Master SAP (CH2M, 2013) addresses the protocols and SOPs to be used for the RI. This section only contains those procedures differ from the procedures documented in the Master SAP. The sample design rationale for the proposed field activities is provided in Worksheet #17.

Vegetation Removal

Vegetation will be removed in accordance with the Vegetation Removal Standard Operating Procedure (SOP MR-1) in the Master SAP (CH2M, 2013), with the following modifications:

- A Schonstedt GA-52CX magnetometer (or comparable) will be used to assist in identifying potential surface munitions and explosives of concern (MEC) during the vegetation clearance.

Discrete Soil Sampling Methods

Worksheet #17 provides the soil sample location and depth selection rationale. The samples will be collected in accordance with SOPs A-2a in the Master SAP (CH2M, 2013).

Sample Analysis

All soil samples will be analyzed for explosives, inorganic constituents, pH, TOC, and ORP. In addition, PAHs will be analyzed in 10 percent of these samples, including the former drum location.

The laboratory will maintain, test, inspect, and calibrate analytical instruments (Worksheet #24 and #25). The laboratory will analyze soil samples for various groups of parameters as shown on Worksheets #15 and #18.

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SAP Worksheet #15-1—Reference Limits and Evaluation Table

Matrix: SB, SS
Analytical Group: SVOC

Analyte	CAS #[1]	Full Scan or SIM	RSLs Residential Soil Adjusted[2] (ug/kg)	RSLs Industrial Soil Adjusted[3] (ug/kg)	SSLs[2] (ug/kg)	Ecological Soil ESVs[2] (ug/kg)	Project QL Goal[3] (ug/kg)	Laboratory Limits[5] (ug/kg)			LCS and MS/MSD Recovery Limits and RPD[4](%)		
								LOQ	LOD	DL	LCL	UCL	RPD
2-Chloronaphthalene	91-58-7	Full Scan	480,000	6,000,000	3,900	NC	1,950	330	167	52.4	41	114	20
2-Methylnaphthalene	91-57-6	SIM	24,000	300,000	190	NC	95	5	1.67	0.94	39	114	
Acenaphthene	83-32-9	SIM	360,000	4,500,000	5,500	NC	2,750	5	1.67	0.97	44	111	
Acenaphthylene	208-96-8	SIM	NC	NC	NC	NC	NA	5	1.67	0.89	39	116	
Anthracene	120-12-7	SIM	1,800,000	23,000,000	58,000	NC	29,000	5	1.67	0.83	50	114	
Benzo(a)anthracene	56-55-3	SIM	160	2,900	4.2	NC	2	5	1.67	0.91	54	122	
Benzo(a)pyrene	50-32-8	SIM	16	290	240	NC	8.0	5	1.67	0.93	50	125	
Benzo(b)fluoranthene	205-99-2	SIM	160	2,900	41	NC	20.5	5	1.67	1.11	53	128	
Benzo(g,h,i)perylene	191-24-2	SIM	NC	NC	NC	NC	NA	5	1.67	1.34	49	127	
Benzo(k)fluoranthene	207-08-9	SIM	1,600	29,000	400	NC	200	5	1.67	1.04	56	123	
Chrysene	218-01-9	SIM	16,000	290,000	1,200	NC	600	5	1.67	0.85	57	118	
Dibenz(a,h)anthracene	53-70-3	SIM	16	290	13	NC	6.5	5	1.67	0.92	50	129	
Fluoranthene	206-44-0	SIM	240,000	3,000,000	89,000	NC	44,500	5	1.67	1.2	55	119	
Fluorene	86-73-7	SIM	240,000	3,000,000	5,400	NC	2,700	5	1.67	1	47	114	
Indeno(1,2,3-cd)pyrene	193-39-5	SIM	160	2,900	130	NC	65	5	1.67	0.9	49	130	
Naphthalene	91-20-3	SIM	3,800	17,000	0.54	NC	0.27	5	1.67	0.89	38	111	
Phenanthrene	85-01-8	SIM	NC	NC	NC	NC	NA	5	1.67	1.1	49	113	
Pyrene	129-00-0	SIM	180,000	2,300,000	13,000	NC	6,500	5	1.67	1.24	55	117	

Notes:
Shading represents instances where the PAL is less than the laboratory LOD. Non-detects will not be treated as exceedances, although they will be reported at a value greater than the PAL.
[1] Some CAS numbers are contractor-specific.
[2] Refer to Worksheet #11 for specific identification of PALs by matrix. RSLs values are current as of May 2016. SSLs are Risk-Based when an MCL-based value does not exist and are current as of November 2015. The Ecological Soil ESVs screening level for Total HMW PAHs is 1,100 ug/kg and the screening level for Total LMW PAHs is 29,000 ug/kg.
[3] The PQL Goal is 1/2 the lesser of the applicable screening levels.
[4] DoD QSM v5.0 is the basis for LCS and MS/MSD limits. Bolded values indicate analytes for which DoD QSM v5.0 does not provide limits and laboratory in-house limits are used.
[5] Results for non-aqueous samples are reported on a dry-weight basis.
NC indicates that there is no criterion for an analyte.

SAP Worksheet #15-2—Reference Limits and Evaluation Table

Matrix: SB, SS
Analytical Group: EXPLO

Analyte[1]	CAS #	RSLs Residential Soil Adjusted[3] (ug/kg)	RSLs Industrial Soil Adjusted[3] (ug/kg)	SSLs[2] (ug/kg)	Ecological Soil ESVs[2] (ug/kg)	Project QL Goal[3] (ug/kg)	Laboratory Limits[5] (ug/kg)			LCS and MS/MSD Recovery Limits and RPD[4](%)		
							LOQ	LOD	DL	LCL	UCL	RPD
1,3,5-Trinitrobenzene (1,3,5-TNB)	99-35-4	220,000	3,200,000	2,100	NC	1,050	500	200	79	80	116	20
1,3-Dinitrobenzene (1,3-DNB)	99-65-0	630	8,200	2	NC	1	450	200	63.4	73	119	
2,4,6-Trinitrotoluene (2,4,6-TNT)	118-96-7	3,600	51,000	15	10,000	7.5	500	200	83	71	120	
2,4-Dinitrotoluene (2,4-DNT)	121-14-2	1,700	7,400	0.32	11,000	0.16	500	200	83	75	121	
2,6-Dinitrotoluene (2,6-DNT)	606-20-2	360	1,500	0.07	8,500	0.034	500	200	83	79	117	
2-Amino-4,6-dinitrotoluene (2-Am-DNT)	35572-78-2	15,000	230,000	30	80,000	15	500	200	75	71	123	
2-Nitrotoluene (2-NT)	88-72-2	3,200	15,000	0.3	NC	0.15	500	200	66	70	124	
3-Nitrotoluene (3-NT)	99-08-1	630	8,200	1.6	NC	0.8	500	200	71	67	129	
4-Amino-2,6-dinitrotoluene (4-Am-DNT)	19406-51-0	15,000	230,000	30	NC	15	500	200	75	64	127	
4-Nitrotoluene (4-NT)	99-99-0	25,000	140,000	4	NC	2	500	200	80	71	124	
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	6,100	28,000	0.27	10,000	0.135	500	200	80	67	129	
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	479-45-8	16,000	230,000	370	10,000	185	500	200	91	68	135	
Nitrobenzene (NB)	98-95-3	5,100	22,000	0.092	2,260	0.046	500	200	75	67	129	
Nitroglycerin (NG)	55-63-0	630	8,200	0.85	NC	0.425	500	200	85	73	124	
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	390,000	5,700,000	1,300	10,000	650	500	200	80	74	124	
Pentaerythritol tetranitrate (PETN)	78-11-5	13,000	160,000	28	NC	14	2500	1000	450	72	128	
Perchlorate	14797-73-0	5,500	82,000	NC	1,000	500	6	4	2	84	121	15
Picric Acid	88-89-1	5,700	74,000	84	53,400	42	200	120	60	**30**	**130**	20

Notes:
Shading represents instances where the PAL is less than the laboratory LOD. Non-detects will not be treated as exceedances, although they will be reported at a value greater than the PAL.
[1] Full 8330B-list (excluding 3,5-dinitroaniline [3,5-DNA] due to a lack of toxicity data) plus Picric Acid and Perchlorate.
[2] Refer to Worksheet #11 for specific identification of PALs by matrix. RSLs values are current as of May 2016. SSLs are Risk-Based when an MCL-based value does not exist and are current as of November 2015.
[3] The PQL Goal is 1/2 the lesser of the applicable screening levels.
[4] DoD QSM v5.0 is the basis for LCS and MS/MSD limits. Bolded values indicate analytes for which DoD QSM v5.0 does not provide limits and laboratory in-house limits are used.
[5] Results for non-aqueous samples are reported on a dry-weight basis.
NC indicates that there is no criterion for an analyte.

SAP Worksheet #15-3—Reference Limits and Evaluation Table

Matrix: SB, SS
Analytical Group: METAL

Analyte	CAS #	Method	RSLs Residential Soil Adjusted[1] (mg/kg)	RSLs Industrial Soil Adjusted[3] (mg/kg)	SSLs[1] (mg/kg)	Ecological Soil ESVs[2] (ug/kg)	Project QL Goal[3] (mg/kg)	Laboratory Limits[4] (mg/Kg)			LCS and MS/MSD Recovery Limits and RPD[5](%)		
								LOQ	LOD	DL	LCL	UCL	RPD
Aluminum	7429-90-5	6010C	7,700	100,000	30,000	NC	3,850	50	4	1.98	74	119	
Antimony	7440-36-0	6020A	3.1	47	0.27	0.27	0.135	0.2	0.2	0.1	72	124	
Arsenic	7440-38-2	6020A	0.68	3	0.29	18	0.145	0.5	0.3	0.08	82	118	
Barium	7440-39-3	6010C	1,500	22,000	82	330	41	2	0.4	0.07	83	113	
Beryllium	7440-41-7	6010C	16	230	3	21	1.6	0.5	0.2	0.04	83	113	
Cadmium	7440-43-9	6020A	7	98	0.38	0.36	0.18	0.1	0.08	0.03	84	116	
Calcium	7440-70-2	6010C	NC	NC	NC	NC	20	100	20	12	81	116	
Chromium	7440-47-3	6020A	0.3	6.3	100,000	26	0.15	0.5	0.2	0.07	83	119	
Chromium (hexavalent)	18540-29-9	7199	0.3	6.3	0.00067	NC	0.000335	0.6	0.4	0.3	**80**	**120**	
Cobalt	7440-48-4	6020A	2.3	35	0.27	13	0.135	0.1	0.08	0.02	84	115	
Copper	7440-50-8	6010C	310	4,700	46	28	14	5	0.4	0.21	81	117	
Iron	7439-89-6	6010C	5,500	82,000	350	NC	175	80	4	3.5	81	118	20
Lead	7439-92-1	6010C	400	800	14	11	5.5	0.9	0.8	0.25	81	112	
Magnesium	7439-95-4	6010C	NC	NC	NC	NC	4	30	4	3.5	78	115	
Manganese	7439-96-5	6010C	180	2,600	28	220	14	4.5	0.4	0.13	84	114	
Nickel	7440-02-0	6010C	150	2,200	26	38	13	4	0.4	0.11	83	113	
Potassium	7440-09-7	6010C	NC	NC	NC	NC	50	300	50	40	81	116	
Selenium	7782-49-2	6020A	39	580	0.26	0.52	0.13	0.5	0.1	0.1	80	119	
Silver	7440-22-4	6020A	39	580	0.8	4.2	0.4	0.1	0.05	0.02	83	118	
Sodium	7440-23-5	6010C	NC	NC	NC	NC	50	500	50	45	83	118	
Thallium	7440-28-0	6020A	0.078	1.2	0.14	1	0.039	0.1	0.05	0.02	83	118	
Vanadium	7440-62-2	6010C	39	580	86	7.8	3.9	2	0.4	0.1	82	114	
Zinc	7440-66-6	6010C	2,300	35,000	370	46	23	8	4	1.15	82	113	

Notes:

Shading represents instances where the PAL is less than the laboratory LOD. Non-detects will not be treated as exceedances, although they will be reported at a value greater than the PAL.

[1] Refer to Worksheet #11 for specific identification of PALs by matrix. RSLs values are current as of May 2016. SSLs are Risk-Based when an MCL-based value does not exist and are current as of November 2015.

[2] For Ecological Soil ESVs, the lowest of the Eco-SSLs was used as the PAL. The chromium value of 26 mg/kg represents chromium (III).

[3] The PQL Goal is 1/2 the lesser of the applicable screening levels.

[4] Results for non-aqueous samples are reported on a dry-weight basis.

[5] DoD QSM v5.0 is the basis for LCS and MS/MSD limits. Bolded values indicate analytes for which DoD QSM v5.0 does not provide limits and laboratory in-house limits are used.

NC indicates that there is no criterion for an analyte.

SAP Worksheet #15-4—Reference Limits and Evaluation Table

Matrix: SB, SS
Analytical Group: WCHEM

Analyte	CAS #[1]	Units	Project Indicator Limit[2]	Project QL Goal[2]	Laboratory Limits			LCS and MS/MSD Recovery Limits and RPD[3] (%)		
					LOQ	LOD	DL	LCL	UCL	RPD
pH	PH	pH units	NA	NA	NA	NA	NA	NA	NA	NA
Redox (MV) (ORP)	REDOX	MV	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon (TOC)	TOC	MG/KG	NA	NA	200	150	100	80	120	20

Notes:

[1] Some CAS numbers are contractor-specific.

[2] There are not project indicator limits for these WCHEM data. pH data are used to help interpret metals data for ecological receptors. TOC data may be used to create site-specific leaching factors. ORP and pH data are used to help interpret hexavalent chromium results.

[3] DoD QSM v5.0 is the basis for LCS and MS/MSD limits. Bolded values indicate analytes for which DoD QSM v5.0 does not provide limits and laboratory in-house limits are used.

SAP Worksheet #16—Project Schedule/Timeline Table

The PAOC EE soil sampling will be implemented in accordance with the schedule provided in the *Site Management Plan Fiscal Year 2017,* amended as necessary with concurrence among the stakeholder agencies.

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SAP Worksheet #17—Sampling Design and Rationale

As stated in the Master SAP, the approach for sampling is to focus on areas with the highest potential for contamination to provide the most conservative evaluation of releases and nature and extent of contamination. All soil samples will be collected in accordance with SOP A-2 in Appendix D of the Master SAP (CH2M, 2013).

Based on this objective, the PAOC EE sampling design and rationale was jointly developed by the Navy and regulatory agencies in December 2015

To ensure conservative characterization of the site, soil sampling activities will focus on: (1) areas with the highest potential for contamination (i.e., locations with highest densities of MD, locations where MEC/UXO/DMM were identified, and a former drum location), (2) highest potential exposure areas (i.e., beach areas used by recreators and by sea turtles as nesting habitat), and (3) representative areas where subsurface anomalies were left in place during the TCRA.

In total, soil samples will be collected from an estimated 34 locations at the site (**Figure 8**). The various sample depths are consistent with those defined in the Master Soil Sampling Depth Selection Protocol (CH2M, 2017), which is graphically demonstrated in **Figure 9**.

The rationale for each sample is as follows:

- **MEC/UXO/DMM** – A discrete surface and subsurface soil sample will be collected at 13 locations where MEC/UXO/DMM were identified, for a total of 26 soil samples; these sample locations are representative of the various types of MEC encountered at the site. The sample locations represent areas where munitions constituents may have been released from breaches in or corrosion of MEC/UXO/DMM and have the best chance of containing measurable explosives concentrations. Types of MEC/UXO/DMM identified at PAOC EE included flares, grenades, mortars, and MEC components such as electric blasting caps. Subsurface soil samples will be collected at the location and depth of subsurface MEC previously identified.
- **Spatial Extent in areas with higher densities of MD and SAA** – A discrete surface and subsurface soil sample will be collected at 9 locations throughout PAOC EE to evaluate potential extent of contamination, focused within areas where higher densities of MD and/or SAA were identified (i.e., conservative representation), for a total of 18 soil samples. These sample locations represent areas where munitions constituents may have been released from corrosion of MD and/or SAA items. Two discrete soil sample locations will be collected adjacent to where the highest quantities of SAA were observed (3,105 at one location and 1,000 at another).
- **Anomalies at depth left in place** – Discrete subsurface soil sample will be collected at 3 locations where anomalies were detected below the maximum intrusive investigation depth of 1 foot bgs, for a total of 3 samples. These samples were located in areas where there were a higher density of anomalies left in place and in areas where there is a better chance to collect subsurface soil samples in accordance with Vieques protocols (i.e., further distance from the shoreline where groundwater is not expected to be shallow, which could prevent collection of a subsurface soil sample). Based on the findings of the TCRA, the majority of the items recovered were non-munitions related; therefore, more soil samples are focused on known areas of MEC and MD rather than at these anomaly locations.
- **Former drum location** – A drum was removed from a location within the western boundary of PAOC EE, which possibly contained fuel oil. The drum was breached during removal, but approximately 1 cubic yard of the soil impacted by the release was removed along with the drum. However, to determine if there is residual contamination in the soil, one subsurface soil sample will be collected at the former drum location.

SAP Worksheet #17—Sampling Design and Rationale (continued)

- **Beach recreators and sea turtle nesting habitat** – Beach areas used by recreators and habitat supportive of nesting sea turtles in proximity to where MEC was found will be sampled. Hawksbill sea turtles usually nest high up on the beach underneath or in the beach and dune vegetation, while leatherback sea turtles nest in open sandy beach areas. Both of these species have been documented as nesting along the PAOC EE shoreline. Four locations within habitat supportive of each of the turtle species will be sampled at the discrete deeper surface soil interval of 18 to 36 inches. In addition, discrete surface soil samples will be collected at each of these locations to evaluate potential risks to beach recreators. Therefore, a total of 16 discrete surface soil samples will be collected from the 8 locations

In general, all surface soil samples will be collected from 0 to 12 inches; if the location occurs within active land crab habitat (as observed during the sampling effort), the surface interval for those samples will instead be 0 to 24 inches.

For subsurface soil samples (other than the beach deeper surface soil samples), a hand auger or continuous split-spoon will be used to collect a 2-foot interval analytical sample between 1 foot (i.e., the bottom of the surface soil interval) and 6 feet (or water table if encountered above 6 feet). Selection of the 2-foot sample interval within this range will be targeted to where visual and/or instrument (e.g., OVA, if appropriate) aided screening suggests the presence of contamination. In the absence of potential contamination, the subsurface soil sample will be collected at the 4-to-6 foot interval (or just above the water table if encountered below this depth.

As noted previously, the deeper surface soil sampling interval on the beach (recreator and turtle nesting habitat) will be 18 to 36 inches. Based on the proximity to sea level, this interval is appropriate not only for nesting turtles, but also the depth interval a recreator could be expected to dig.

All soil samples will be analyzed for explosives, inorganic constituents, pH, TOC, and ORP. And as determined by the Vieques ERP Technical Subcommittee (see Worksheet #9), because the drum potentially containing petroleum may be representative of this type of use elsewhere at PAOC EE, as a conservative measure, PAHs will be analyzed in 10 percent of randomly selected soil samples, in addition to the former drum location. The data collected during the RI will be evaluated using the decision process identified in **Figure 7**, including preparation of human health and ecological risk assessments.

SAP Worksheet #18—Sampling Locations and Methods/SOP Requirements Table

Station ID / Sample ID[1]	Matrix	Depth	Analytical Group[2]	Number of Samples	Sampling SOP Reference
UXO17					
Surface Soil & Subsurface Soil Samples					
VE-UXO17-SS01-0001 / VE-UXO17-SB01-TDBD VE-UXO17-SS01P-0001 / VE-UXO17-SB01P-TDBD	SS SB	0 - 12 inches TBD	EXPLO, PAH, METAL, WCHEM (pH, TOC, and ORP) - only 10% of the samples require the PAH analysis; therefore only a total of 3 surface soils and 3 subsurface soils will be analyzed for PAHs[3]	2 (FD)	
VE-UXO17-SS02-0001 / VE-UXO17-SB02-TDBD VE-UXO17-SS02-000-MS1 / VE-UXO17-SB02-TDBD-MS VE-UXO17-SS02-0001-SD / VE-UXO17-SB02-TDBD-SD	SS SB	0 - 12 inches TBD		SS: 3 (MS/MSD) SB: 3 (MS/MSD)	
VE-UXO17-SS03-0001 / VE-UXO17-SB03-TDBD	SS SB	0 - 12 inches TBD		SS: 1 SB: 1	
VE-UXO17-SS04-0001 / VE-UXO17-SB04-TDBD	SS SB	0 - 12 inches TBD		SS: 1 SB: 1	
VE-UXO17-SS05-0001 / VE-UXO17-SB05-TDBD	SS SB	0 - 12 inches TBD		SS: 1 SB: 1	
VE-UXO17-SS06-0001 / VE-UXO17-SB06-TDBD	SS SB	0 - 12 inches TBD		SS: 1 SB: 1	
VE-UXO17-SS07-0001 / VE-UXO17-SB07-TDBD	SS SB	0 - 12 inches TBD		SS: 1 SB: 1	
VE-UXO17-SS08-0001 / VE-UXO17-SB08-TDBD	SS SB	0 - 12 inches TBD		SS: 1 SB: 1	
VE-UXO17-SS09-0001 / VE-UXO17-SB09-TDBD	SS SB	0 - 12 inches TBD		SS: 1 SB: 1	
VE-UXO17-SS10-0001 / VE-UXO17-SB10-TDBD	SS SB	0 - 12 inches TBD		SS: 1 SB: 1	
VE-UXO17-SS11-0001 / VE-UXO17-SB11-TDBD	SS SB	0 - 12 inches TBD		SS: 1 SB: 1	
VE-UXO17-SS12-0001 / VE-UXO17-SB12-TDBD	SS SB	0 - 12 inches TBD		SS: 1 SB: 1	
VE-UXO17-SS13-0001 / VE-UXO17-SB13-TDBD	SS SB	0 - 12 inches TBD		SS: 1 SB: 1	
VE-UXO17-SS14-0001 / VE-UXO17-SB14-TDBD	SS SB	0 - 12 inches TBD		SS: 1 SB: 1	
VE-UXO17-SS15-0001 / VE-UXO17-SB15-TDBD	SS SB	0 - 12 inches TBD		SS: 1 SB: 1	

Worksheet #18—Sampling Locations and Methods/SOP Requirements Table (continued)

Station ID / Sample ID[1]	Matrix	Depth	Analytical Group[2]	Number of Samples	Sampling SOP Reference
UXO17					
Surface Soil & Subsurface Soil Samples					
VE-UXO17-SS16-0001 / VE-UXO17-SB16-TDBD	SS SB	0 - 12 inches TBD	EXPLO, PAH, METAL, WCHEM (pH, TOC, and ORP) - only 10% of the samples require the PAH analysis; therefore only a total of 3 surface soils and 3 subsurface soils will be analyzed for PAHs[3]	SS: 1 SB: 1	
VE-UXO17-SS17-0001 / VE-UXO17-SB17-TDBD VE-UXO17-SS17P-0001 / VE-UXO17-SB17P-TDBD	SS SB	0 - 12 inches TBD		2 (FD)	
VE-UXO17-SS18-0001 / VE-UXO17-SB18-TDBD	SS SB	0 - 12 inches TBD		SS: 1 SB: 1	
VE-UXO17-SS19-0001 / VE-UXO17-SB19-TDBD	SS SB	0 - 12 inches TBD		SS: 1 SB: 1	
VE-UXO17-SS20-0001 / VE-UXO17-SB20-TDBD	SS SB	0 - 12 inches TBD		SS: 1 SB: 1	
VE-UXO17-SS21-0001 / VE-UXO17-SB21-TDBD	SS SB	0 - 12 inches TBD		SS: 1 SB: 1	
VE-UXO17-SS22-0001 / VE-UXO17-SB22-TDBD	SS SB	0 - 12 inches TBD		SS: 1 SB: 1	
VE-UXO17-SS23-0001 / VE-UXO17-SB23-TDBD	SS SB	0---12 inches TBD		SS: 1 SB: 1	
Surface Soil and Deeper Surface Soil Samples					
Beach Recreators and Turtle Nest Habitat					
VE-UXO17-SS24-0001/VE-UXO17-SS24-1H02 VE-UXO17-SS24-0001P/VE-UXO17-SS24P-1H02	SS	0 - 12 inches and 18 - 36 inches	EXPLO, METAL, WCHEM (pH, TOC, and ORP)	2 (FD)	See Worksheet #21
VE-UXO17-SS25-0001/VE-UXO17-SS25-1H02 VE-UXO17-SS25-0001-MS/VE-UXO17-SS25P-1H02-MS VE-UXO17-SS25-0001-SD/VE-UXO17-SS25P-1H02-SD				3 (MS/MSD)	
VE-UXO17-SS26-0001/VE-UXO17-SS26-1H02				2	
VE-UXO17-SS27-0001/VE-UXO17-SS27-1H02				2	
VE-UXO17-SS28-0001/VE-UXO17-SS28-1H02				2	
VE-UXO17-SS29-0001/VE-UXO17-SS29-1H02				2	
VE-UXO17-SS30-0001/VE-UXO17-SS30-1H02				2	
VE-UXO17-SS31-0001/VE-UXO17-SS31-1H02				2	
Subsurface Soil Samples					
Removed Drum Location					
VE-UXO17- SB32-TDBD	SB	TBD	EXPLO, PAH, METAL, WCHEM (pH, TOC, and ORP)	1	See Worksheet #21

Worksheet #18—Sampling Locations and Methods/SOP Requirements Table (continued)

Station ID / Sample ID[1]	Matrix	Depth	Analytical Group[2]	Number of Samples	Sampling SOP Reference
At Anomalies Left In Place					
VE-UXO17-SB33-TDBD VE-UXO17-SB33P-TDBD	SB	TBD	EXPLO, METAL, WCHEM (pH, TOC, and ORP)	2 (FD)	See Worksheet #21
VE-UXO17-SB34-TDBD VE-UXO17-SB34-TDBD-MS VE-UXO17-SB34-TDBD-SD				3 (MS/MSD)	
VE-UXO17-SB35-TDBD				1	

Notes:
At any surface soil location found to support land crabs, the surface soil will be collected at 0-24 inches instead of 0-12.
[1]TDBD = Top depth, bottom depth in feet (i.e. 0-6" is 000H)
[2]Field QC samples will not be analyzed for WCHEM.
[3]Only 10% of the samples will be analyzed for PAHs; therefore only a total of 3 normal samples, 1 FD, and 1 MS/MSD will be collected for PAHs.

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SAP Worksheet #19—Field Sampling Requirement Table

Matrix	Analytical Group[1,2]	Analytical and Preparation Method / SOP Reference	Containers[2]	Sample Volume[3]	Preservation Requirements	Maximum Holding Time
SB, SS	SVOC (SB, SS only)	SW-846 3550C, SW-846 8270D, SW-846 8270D_SIM/ SON009, ANA8270, ANA8270SIM	1 x 8 oz amber glass wide-mouth jar with Teflon lined screw cap	30 g	≤ 6°C but not frozen	14 days / 40 days
	EXPLO	SW-846 8330B / HPL8330, MSE018		20 g[4]		
		SW8330B, SW-846 8321A / MSE018, HPL8321				
		SW-846 6850 / HPL6850		10 g[5]	Headspace in jar; ≤ 6°C but not frozen	28 days
	METAL	SW-846 3050B, 6010C, 6020A / PRE3050B, ANA6010, ANA6020	1 x 8 oz amber glass wide-mouth jar with Teflon lined screw cap	1 g	≤ 6°C but not frozen	180 days
		SW-846 3060A, SW-846 7199/ ANA3060A, ANA218.6-7199		2.5 g		7 days / 30 days
	WCHEM (pH)	SW-846 9045D / ANA9045		20 g		ASAP
	WCHEM (TOC)	Walkley Black / ANAWALKLEY		0.5 g		28 days
	WCHEM (ORP)	ASTM D1498 / GEN-CR6	1 x 4 oz glass jar	10 g		30 days

Notes:

[1] Refer to Worksheet #18 for details regarding analytical groups to be tested for each media.

[2] All fractions are shipped to APPL.

[3] Fill to capacity. These are minimum required for preparation and/or analysis.

[4] 8330B Select Explosives and Picric Acid are analyzed from the same extract.

[5] APPL will extract 10g of soil for perchlorate rather than the typical 1g. This is intended to provide a more-representative extraction.

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SAP Worksheet #20—Field Quality Control Sample Summary Table

Matrix	Analytical Group	No. of Sampling Locations	No. of Field Duplicates	No. of MS/ MSD Pairs	No. of Trip Blanks[1]	No. of Equipment Blanks[1]	Total No. of Samples to Lab
UX017 Subsurface Samples (SB)							
SB (Variable Depths)[2]	SVOC (PAHs)	3	1	1	--	1	6
	EXPLO	23	3	2	--	2	30
	METAL	23	3	2	--	2	30
	WCHEM (pH)	23	0	0	--	0	23
	WCHEM (TOC)	23	0	0	--	0	23
Removed Drum Location (Variable Subsurface)	SVOC (PAHs)	1	1	1	--	1	4
	EXPLO	1	1	1	--	1	4
	METAL	1	1	1	--	1	4
	WCHEM (pH)	1	1	1	--	0	3
	WCHEM (TOC)	1	1	1	--	0	3
At Anomalies Left in Place (Variable Subsurface)	EXPLO	3	1	1	--	1	6
	METAL	3	1	1	--	1	6
	WCHEM (pH)	3	0	0	--	0	3
	WCHEM (TOC)	3	0	0	--	0	3
UX017 Surface Samples (SS)							
SS will be collected at 0-12 inches; Land Crab Habitat will be collected at 0-24 inches[3]	EXPLO	23	3	2	--	2	30
	SVOC (PAHs)	3	1	1	--	1	6
	METAL	23	3	2	--	2	30
	WCHEM (pH)	23	0	0	--	0	23
	WCHEM (TOC)	23	0	0	--	0	23
Beach Recreators (0 to 12 inches) and Turtle Nest Habitat (18 to 36 inches)	EXPLO	8	2	2	--	1	13
	METAL	8	2	2	--	1	13
	WCHEM (pH)	8	0	0	--	0	8
	WCHEM (TOC)	8	0	0	--	0	8

Notes:

[1]The number of equipment blanks is based on a fundamental assumptions. For surface and subsurface soil samples, it was assumed that 10 samples can be collected per day.

[2]All subsurface soil samples will be at the same locations as the surface soil samples.

[3]At any surface soil location found to support land crabs, the surface soil will be collected at 0-24 inches instead of 0-12 inches.

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SAP Worksheet #23—Analytical SOP References Table

Lab SOP Number	Title, Revision Date[1], and/or Number	Date Last Revisited if not Revised[1]	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis[1,2]	Variance to QSM	Modified for Project Work? (Y/N)
PRE3051A	Microwave Assisted Acid Digestion of Soil Samples and Extracts by EPA Method 3051A; 10/2015; Rev. 1		Definitive	SS/SB / METAL	N/A (digestion)	APPL	None	N
ANA6010	Inductively Coupled Plasma Atomic Emission Spectroscopy by EPA Method 6010; 01/2016; Rev. 9		Definitive	SS/SB / METAL	ICP-AES	APPL	None	N
ANA6020	Inductively Coupled Plasma-Mass Spectrometry by EPA Method 6020; 01/2016; Rev. 6		Definitive	SS/SB / METAL	ICP-MS	APPL	None	N
ANA7199/218.6	Hexavalent Chromium Analysis EPA Method 7199/218.6; 01/2016; Rev. 6		Definitive	SS/SB / METAL	IC	APPL	None	N
ANA8270SIM	PAH by SIM by EPA Method 8270; 04/216; Rev. 6		Definitive	SS/SB / SVOC	GC-MS	APPL	None	N
ANA8270	Semivolatile Organic Compounds by EPA Method 8270; 01/2016; Rev. 8		Definitive	SS/SB / SVOC	GC-MS	APPL	None	N
ANAWALKLEY	Total Organic Carbon (TOC) in Soil (Walkley-Black, Modified); 01/2016; Rev. 2		Screening	SB/SS / WCHEM	N/A (titration)	APPL	None	N
HPL6850	Analysis of Perchlorate in Environmental Samples by EPA 6850; 01/2016; Rev. 4		Definitive	SS/SB / EXPLO	HPLC	APPL	None	Y[3]
HPL8321	Method 8321 LC-Mass Spectrometer Analysis of Carbamate / Urea and Nitroaromatic / Nitrosamine Compounds; 01/2016; Rev. 5		Definitive	SS/SB / EXPLO (Picric Acid only)	HPLC	APPL	None	N

SAP Worksheet #23—Analytical SOP References Table (continued)

Lab SOP Number	Title, Revision Date[1], and/or Number	Date Last Revisited if not Revised[1]	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis[1,2]	Variance to QSM	Modified for Project Work? (Y/N)
HPL8330	Explosive Compounds: Diode Array Detector by High Pressure Liquid Chromatography; 01/2016; Rev. 7		Definitive	SS/SB / EXPLO	HPLC	APPL	None	N
PRE3050B	Acid Digestion of Sediments, Sludges, and Soils by EPA Method 3050B; 10/2015; Rev. 4		Definitive	SS/SB / METAL	N/A (digestion)	APPL	None	Y[4]
SON009	8270, BNA, SIM, and PAH Sonication Extraction of Soil, Sludge and Solids (EPA Method 3550C); 07/2015; Rev. 10		Definitive	SS/SB / SVOC	N/A (extraction)	APPL	None	N
ANA3060A	Alkaline Digestion for Hexavalent Chromium (Method 3060A); 06/2015; Rev. 1		Definitive	SS/SB / METAL (Hexavalent Chromium only)	N/A (digestion)	APPL	None	N
ANA9045D	pH in Soil and Waste (EPA SW846 Method 9045C&D); 06/2015; Rev. 3		Screening	SB/SS / WCHEM	pH Probe	APPL	None	N
ASTM D1498	ALS-Kelso employs ASTM D1498 for analysis of ORP in soil. Due to copyright restrictions, this method is not available for distribution.		Screening	SB/SS / WCHEM	ORP Probe	ALS - Kelso	None	N
GEN-CR6	HEXAVALENT CHROMIUM – COLORIMETRIC PROCEDURE; 12/2015: Rev. 13		Screening	SB/SS / WCHEM	ORP Probe	ALS - Kelso	None	N

SAP Worksheet #23—Analytical SOP References Table (continued)

Lab SOP Number	Title, Revision Date[1], and/or Number	Date Last Revisited if not Revised[1]	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis[1,2]	Variance to QSM	Modified for Project Work? (Y/N)
SHR001	Receiving Samples; 07/2015; Rev. 3		N/A (Receiving)	SB/SS / SVOC, EXPLO, METAL, FMETAL, WCHEM, GRAINSIZE	N/A (Receiving)	APPL	None	N
SHR003	Subcontracting Samples to Other Laboratories; 10/2015; Rev. 17		N/A (Receiving)	SB/SS / SVOC, EXPLO, METAL, FMETAL, WCHEM	N/A (Receiving)	APPL	None	N
SHR012	Sample Disposal and Waste Collection, Storage and Disposal; 01/2016; Rev. 16		N/A (Disposal)	SB/SS / SVOC, EXPLO, METAL, FMETAL, WCHEM	N/A (Disposal)	APPL	None	N
SMO-SCOC	Sample Tracking and Internal Chain-of-Custody; 12/01/12; Rev. 13	4/1/2015	N/A (Receiving)	SB/SS / WCHEM	N/A (Receiving)	ALS - Kelso	None	N
SMO-DISP	Sample Disposal; 6/01/14; Rev. 11	5/1/2015	N/A (Disposal)	SB/SS / WCHEM	N/A (Disposal)	ALS - Kelso	None	N
SMO-GEN	Sample Receiving; 7/31/13; Rev. 30	12/21/2015	N/A (Receiving)	SB/SS / WCHEM	N/A (Receiving)	ALS - Kelso	None	N
MSE018	EPA Method 8330 Mechanical Orbital Shaker Extraction for Solid Explosive Samples; 7/2015; Rev. 1		Definitive	SB/SS / EXPLO	N/A (extraction)	APPL	None	N
5+ANAISM02.2	Percent Solids and Percent Moisture analysis of solids; 1/25/17; Rev. 1		Definitive	SB/SS /SVOC, EXPLO, METAL, FMETAL, WCHEM	N/A (Gravimetric)	APPL	None	N

1. This worksheet was prepared in April 2016. It is intended to be a snapshot as it pertains to dates for SOP revision/revisitation and DoD ELAP accreditation.
2. The laboratories are DoD ELAP accredited for analysis methods they are to perform which will generate definitive data. Refer to Attachment A:
   APPL's DoD ELAP accreditation through PJLA is granted through June 30, 2017.
   ALS-Kelso's DoD ELAP accreditation through PJLA is granted through February 28, 2018.
3. Due to regulator request, APPL will extract 10g of soil for perchlorate rather than the typical 1g. This is intended to provide a more-representative extraction.
4. Due to regulator request, APPL will digest 10g of SMI for metals rather than the typical 1g. This is intended to provide a more-representative digestion.

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SAP Worksheet #24—Analytical Instrument Calibration Table

(UFP-QAPP Manual Section 3.2.2)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Person Responsible for Corrective Action	SOP Reference
GC-MS (for SVOC)	Tune Check	Prior to ICAL and prior to each 12-hour period of sample analysis.	Specific ion abundance criteria of BFB or DFTPP from method.	Retune instrument and verify.	Analyst	ANA8270, ANA8270SIM
	Performance Check (Method 8270 only)	At the beginning of each 12-hour period, prior to analysis of samples.	Degradation ≤ 20% for DDT. Benzidine and pentachlorophenol shall be present at their normal responses, and shall not exceed a tailing factor of 2.	Correct problem, then repeat performance checks.		
	Initial calibration (ICAL) for all analytes (including surrogates)	At instrument set-up, prior to sample analysis.	Each analyte must meet one of the three options below: Option 1: RSD for each analyte ≤ 15%; Option 2: linear least squares regression for each analyte: r2 ≥ 0.99; Option 3: non-linear least squares regression (quadratic) for each analyte: r2 ≥ 0.99.	Correct problem then repeat ICAL.		
	Retention Time window position establishment	Once per ICAL and at the beginning of the analytical sequence.	Position shall be set using the midpoint standard of the ICAL curve when ICAL is performed. On days when ICAL is not performed, the initial CCV is used.	NA		
	Evaluation of Relative Retention Times (RRT)	With each sample.	RRT of each reported analyte within ± 0.06 RRT units.	Correct problem, then rerun ICAL.		
	Initial Calibration Verification (ICV)	Once after each ICAL, analysis of a second source standard prior to sample analysis.	All reported analytes within ± 20% of true value.	Correct problem. Rerun ICV. If that fails, repeat ICAL.		
	Continuing Calibration Verification (CCV)	Daily before sample analysis; after every 12 hours of analysis time; and at the end of the analytical batch run.	All reported analytes and surrogates within ± 20% of true value. All reported analytes and surrogates within ± 50% for end of analytical batch CCV.	Recalibrate, and reanalyze all affected samples since the last acceptable CCV; or immediately analyze two additional consecutive CCVs. If both pass, samples may be reported without reanalysis. If either fails, take corrective action(s) and re-calibrate; then reanalyze all affected samples since the last acceptable CCV.		

SAP Worksheet #24—Analytical Instrument Calibration Table (continued)

(UFP-QAPP Manual Section 3.2.2)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Person Responsible for Corrective Action	SOP Reference
HPLC (for 8330B EXPLO)	5-point ICAL for linear calibration (6-points for quadratic)	At instrument setup and after ICV or CCV failure, prior to sample analysis.	ICAL must meet one of the three options below: Option 1: RSD for each analyte ≤ 15%; Option 2: linear least squares regression for each analyte: $r^2 \geq 0.99$; Option 3: non-linear least squares regression (quadratic) for each analyte: $r^2 \geq 0.99$.	Correct problem then repeat ICAL.	Analyst	HPL8330
	ICV	Once after each initial calibration.	Analytes within ± 20% of expected value (initial source).	Correct problem. Rerun ICV. If that fails, repeat ICAL.		
	RT window width	At method set-up and after major maintenance.	RT width is ± 3 times standard deviation for each analyte RT from 72-hour study.	NA		
	Establishment and verification of the RT window for each analyte and surrogate	Once per ICAL and at the beginning of the analytical shift for establishment of RT; and with each CCV for verification of RT.	Using the midpoint standard or the CCV at the beginning of the analytical shift for RT establishment; analyte must fall within established window during RT verification.	NA		
	Continuing Calibration Verification (CCV)	Before sample analysis, after every 10 field samples, and at the end of the analysis sequence.	All reported analytes and surrogates within ± 20% of the true value.	Recalibrate, and reanalyze all affected samples since the last acceptable CCV; or immediately analyze two additional consecutive CCVs. If both pass, samples may be reported without reanalysis. If either fails, take corrective action(s) and re-calibrate; then reanalyze all affected samples since the last acceptable CCV.		
HPLC-MS (for Picric Acid)	ICAL	At instrument set-up and after ICV or CCV failure, prior to sample analysis.	Minimum 5 levels for linear and 6 levels for quadratic. ICAL must meet one of the three options below: Option 1: RSD for each analyte ≤ 20%; Option 2: linear least squares regression for each analyte: $r^2 \geq 0.99$; Option 3: non-linear least squares regression (quadratic) for each analyte: $r^2 \geq 0.99$.	Correct problem then repeat ICAL.	Analyst	HPL8321
	Retention Time window position establishment	Once per ICAL and at the beginning of the analytical sequence.	Position shall be set using the midpoint standard of the ICAL curve when ICAL is performed. On days when ICAL is not performed, the initial CCV is used.	NA		
	Retention Time (RT) window width	At method set-up and after major maintenance (e.g., column change).	RT width is ± 3 times standard deviation for each analyte RT from the 72-hour study.	NA		
	ICV	Once after each ICAL, analysis of a second source standard prior to sample analysis.	All reported analytes within established RT windows. All reported analytes within ± 15% of true value.	Correct problem, rerun ICV. If that fails, repeat ICAL.		

SAP Worksheet #24—Analytical Instrument Calibration Table (continued)

(UFP-QAPP Manual Section 3.2.2)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Person Responsible for Corrective Action	SOP Reference
HPLC-MS (for Picric Acid)	CCV	Before sample analysis, after every 10 field samples, and at the end of the analysis sequence.	All reported analytes and surrogates within established RT windows. All reported analytes and surrogates within ± 15% of true value.	Recalibrate, and reanalyze all affected samples since the last acceptable CCV; or immediately analyze two additional consecutive CCVs. If both pass, samples may be reported without reanalysis. If either fails, take corrective action(s) and re-calibrate; then reanalyze all affected samples since the last acceptable CCV.	Analyst	HPL8321
HPLC-MS (for Perchlorate)	Interference Threshold Study	At initial setup and when major changes occur in the method's operating procedures (e.g., addition of cleanup procedures, column changes, mobile phase changes).	Measure the threshold of common suppressors (chloride, sulfate, carbonate, bicarbonate) that can be present in the system without affecting the quantitation of perchlorate. The threshold is the concentration of the common suppressors where perchlorate recovery falls outside an 80-120% window.	NA	Analyst	HPL6850
	Mass Calibration	Instrument must have a valid mass calibration prior to any sample analysis. The mass calibration is updated on an as- needed basis (e.g., QC failures, ion masses show large deviations from known masses, major instrument maintenance is performed, or the instrument is moved).	Mass calibration range must bracket the ion masses of interest. The most recent mass calibration must be used for an analytical run, and the same mass calibration must be used for all data files in an analytical run. Mass calibration must be verified by acquiring a full scan continuum mass spectrum of a perchlorate stock standard.	If the mass calibration fails, recalibrate. If it still fails, consult manufacturer instructions on corrective maintenance.		
	Tune Check	Prior to ICAL and after any mass calibration or maintenance is performed.	Tuning standards must span the mass range of the analytes of interest and meet acceptance criteria outlined in the laboratory SOP.	Retune instrument and verify. If the tune check will not meet acceptance criteria, an instrument mass calibration must be performed and the tuning redone.		
	ICAL	At instrument setup or after ICV or CCV failure, prior to sample analysis.	Minimum of 6 calibration levels must be used. ICAL must meet one of the two options below: Option 1: RSD for each analyte ≤ 15%; Option 2: linear least squares regression for each analyte: r2 ≥ 0.995.	Correct problem, then repeat ICAL.		
	ICV	Once after each ICAL.	Perchlorate concentration must be within ± 15% of its true value.	Correct problem. Rerun ICV. If that fails, repeat ICAL.		
	CCV	On days an ICAL is performed, after every 10 field samples and at the end of the analytical sequence. On days an ICAL is not performed, at the beginning of the sequence, after every 10 field samples and at the end of the analytical sequence.	Perchlorate concentration must be within ± 15% of its true value.	Recalibrate, and reanalyze all affected samples since the last acceptable CCV; or immediately analyze two additional consecutive CCVs. If both pass, samples may be reported without reanalysis. If either fails, take corrective action(s) and re-calibrate; then reanalyze all affected samples since the last acceptable CCV.		

SAP Worksheet #24—Analytical Instrument Calibration Table (continued)

(UFP-QAPP Manual Section 3.2.2)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Person Responsible for Corrective Action	SOP Reference
HPLC-MS (for Perchlorate)	Laboratory Reagent Blank (LRB)	Prior to calibration and at the end of the analytical sequence.	No perchlorate detected > ½ LOQ.	Reanalyze reagent blank (until no carryover is observed) and all samples processed since the contaminated blank.	Analyst	HPL6850
ICP-AES (for METAL)	Linear Dynamic Range (LDR) or high-level check standard	At initial set up and checked every 6 months with a high standard at the upper limit of the range.	Within ± 10% of true value.	Dilute samples within the calibration range, or re-establish/ verify the LDR.	Analyst	ANA6010
	ICAL	Daily ICAL prior to sample analysis.	Minimum one high standard and a calibration blank. If more than one calibration standard is used, $r^2 \geq 0.99$.	Correct problem, then repeat ICAL.		
	ICV	Once after each ICAL, analysis of a second source standard prior to sample analysis.	All reported analytes within ± 10% of true value.	Correct problem. Rerun ICV. If that fails, repeat ICAL.		
	CCV	After every 10 field samples, and at the end of the analysis sequence.	All reported analytes within ± 10% of the true value.	Recalibrate, and reanalyze all affected samples since the last acceptable CCV; or immediately analyze two additional consecutive CCVs. If both pass, samples may be reported without reanalysis. If either fails, take corrective action(s) and re-calibrate; then reanalyze all affected samples since the last acceptable CCV.		
	Low-level Calibration Check Standard (Low-level ICV)	Daily.	All reported analytes within ± 20% of true value.	Correct problem and repeat ICAL.		
	Initial and Continuing Calibration Blank (ICB/CCB)	Before beginning a sample run, after every 10 field samples, and at end of the analysis sequence.	No analytes detected > LOD.	Correct problem and repeat ICAL. All samples following the last acceptable calibration blank must be reanalyzed.		
	ICS (also called Spectral Interference Checks)	After ICAL and prior to sample analysis.	ICS-A: Absolute value of concentration for all non- spiked project analytes < LOD (unless they are a verified trace impurity from one of the spiked analytes); ICS-AB: Within ± 20% of true value. All analytes must be within the LDR. ICS-AB is not needed if instrument can read negative responses.	Terminate analysis; locate and correct problem; reanalyze ICS, reanalyze all samples.		
ICP-MS (for METAL)	Linear Dynamic Range (LDR) or High-level Check Standard	At initial set-up and checked every 6 months with a high standard at the upper limit of the range.	Within ±10% of true value.	Dilute samples within the calibration range, or re-establish/verify the LDR.	Analyst	ANA6020
	Tuning	Prior to ICAL.	Mass calibration ≤ 0.1 amu from the true value; Resolution <0.9 amu full width at 10% peak height.	Retune instrument and verify.		

SAP Worksheet #24—Analytical Instrument Calibration Table (continued)

(UFP-QAPP Manual Section 3.2.2)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Person Responsible for Corrective Action	SOP Reference
ICP-MS (for METAL)	ICAL	Daily ICAL prior to sample analysis.	Minimum one high standard and a calibration blank. If more than one calibration standard is used, $r^2 \geq 0.99$.	Correct problem, then repeat ICAL.	Analyst	ANA6020
	ICV	Once after each ICAL, analysis of a second source standard prior to sample analysis.	All reported analytes, within ± 10% of true value.	Correct problem. Rerun ICV. If that fails, repeat ICAL.		
	CCV	After every 10 field samples and at the end of the analysis sequence.	All reported analytes within ± 10% of the true value.	Recalibrate, and reanalyze all affected samples since the last acceptable CCV; or Immediately analyze two additional consecutive CCVs. If both pass, samples may be reported without reanalysis. If either fails, take corrective action(s) and re-calibrate; then reanalyze all affected samples since the last acceptable CCV.		
	Low Level ICV	Daily.	All reported analytes within ± 20% of the true value.	Correct problem and repeat ICAL.		
	ICB/CCB	Before beginning a sample run, after every 10 field samples, and at end of the analysis sequence.	No analytes detected > LOD.	Correct problem and repeat ICAL. All samples following the last acceptable calibration blank must be reanalyzed.		
	ICS (also called Spectral Interference Checks)	After ICAL and prior to sample analysis.	ICS-A: Absolute value of concentration for all non- spiked project analytes < LOD (unless they are a verified trace impurity from one of the spiked analytes); ICS-AB: Within ± 20% of true value.	Terminate analysis, locate and correct problem, reanalyze ICS, reanalyze all samples.		
IC (for Hexavalent Chromium)	ICAL (minimum three standards and a calibration blank)	Daily ICAL prior to sample analysis.	$r^2 \geq 0.99$	Correct problem, then repeat ICAL.	Analyst	ANA218.6-7199
	ICV	Immediately following ICAL.	Value of second source within ± 10% of true value.	Correct problem and verify second source standard. Rerun ICV. If that fails, correct problem and repeat calibration.		
	CCV	Before and after every 10 field samples and at the end of the run.	Value of CCV within ± 10% of true value.	Recalibrate, and reanalyze all affected samples since the last acceptable CCV; or immediately analyze two additional consecutive CCVs. If both pass, samples may be reported without reanalysis. If either fails, take corrective action(s) and re-calibrate; then reanalyze all affected samples since the last acceptable CCV		
	CCB	Before and after every 10 field samples and at the end of the run.	No analytes detected > LOD.	Correct problem. Re-prep and reanalyze calibration blank. All samples following the last acceptable calibration blank must be reanalyzed.		

SAP Worksheet #24—Analytical Instrument Calibration Table (continued)

(UFP-QAPP Manual Section 3.2.2)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Person Responsible for Corrective Action	SOP Reference
pH meter	Minimum 3-point calibration	Daily or prior to analyzing samples.	±0.05 unit	Terminate analysis, recalibrate, and verify before sample analysis.	Analyst	ANA9045
	CCV	One CCV every 10 samples.	±0.05 unit	Terminate analysis, recalibrate, and verify before sample analysis.		
ORP Probe	Electrode zero	Daily.	±0.5mV	Correct the problem and repeat the electrode zero.	Analyst	ASTM D1498
	Check to Standard Redox Solution	Daily.	Within ±30mV of expected value. A second reading (from fresh solution) within ±10mv of first reading.	Correct the problem and repeat the check.		

Notes:
DoD QSM v5.0 or laboratory SOPs and analytical methods are the basis for this table.

SAP Worksheet #25—Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

Instrument / Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
GC-MS	Routine Maintenance under Service contract.	N/A	N/A	Twice a year and additionally as needed	N/A	N/A	Analyst/Supervisor	ANA8270, ANA8270SIM
	Clean and/or replace GC inlet.	Check system pressure for vacuum range and for steadiness with an HP Ion Gauge Pressure Measuring Device; run a manual tune.	Check and tighten interface column nut inside GC oven.	As needed.	Passing ICAL and CCV.	Thermally clean by "baking-out" the instrument.		
	Inspect, clean and/or replace ALS syringe. Replace column.	VOCs, SVOCs	Monitor for subtle changes in chromatography and/or calibration inconsistencies.	As needed.	Passing ICAL and CCV.	Replace syringe if dirt is noticeable in the syringe. Replace column if tailing occurs or decreased resolution.		
	Add oil to vacuum rough pump.	Check oil in vacuum rough pump.	Visually inspect for dark oil.	Every 4 to 6 weeks.	Passing ICAL and CCV.	Perform complete oil change.		
	Replace/refill oxygen and moisture traps.	VOCs, SVOCs	Perform oxygen and water check in tune parameters.	Yearly, or as needed.	Passing ICAL and CCV.	Replace traps.		
HPLC	Change guard cartridge, inlet filter, and PTFE frit.	EXPLO	Review pressure profile.	As needed, based on pressure profile.	Part was replaced.	Replace them and check often.	Analyst/Supervisor	HPL8330
	Change analytical column.		Check peak tailing, decreased sensitivity, retention time changes, etc.	When chromatography indicates.	Analyte separation and calibration curve meets 20% RSD.	Replace column, if needed.		
	Replace mobile phase daily.		Visually inspect for sufficient level of solvent.	Daily.	Solvent was replaced.	Prepare fresh mobile phase solution.		
HPLC-MS	Change guard cartridge, inlet filter, and PTFE frit.	Picric Acid	Review pressure profile.	As needed, based on pressure profile.	Passing ICAL and CCV.	Replace them and check often.	Analyst/Supervisor	HPL8321
	Change analytical column.		Check peak tailing, decreased sensitivity, retention time changes, etc.	When chromatography indicates.	Passing ICAL and CCV.	Replace with another analytical column.		
	Replace mobile phase daily.		Check the stability of the base line.	Daily.	Minimum noise in the base line.	Prepare fresh mobile phase solution.		
	Monitor for subtle changes in chromatography and detector quality.		Warning flags indicating a decrease in data quality include: a decreased detector response, elevated baseline or calibration inconsistencies.	Daily.	N/A	Tune MS.		

SAP Worksheet #25—Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table (continued)

Instrument / Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
HPLC-MS	Tune MS.		Manufacturer comes on-site to re-tune annually.	Annually.	Calibrations meet method acceptance criteria.	A service call should be placed with the manufacturer.	Analyst/Supervisor	HPL8321
HPLC	Change guard cartridge, inlet filter, and Ftpp frit.	Perchlorate	Review pressure profile.	As needed based on pressure profile.	Part was replaced.	Replace them and check often.	Analyst/Supervisor	HPL6850
	Chang analytical column.		Check peak tailing, decreased sensitivity, retention time changes, etc.	When chromatography indicates.	Analyte separation and calibration curve meets 20% RSD.	Replace column, if needed.		
	Replace mobile phase daily.		N/A	Daily.	Minimum noise in the base line.	Prepare fresh mobile phase solution.		
ICP-AES	Check instrument connections, gas flow, pressure.	Conduct leak test.	Visually inspect for wear or damage and indicator from computer controls.	Daily and annual maintenance from manufacturer.	Intensity of spectrum is within manufacture's recommendation.	Call for maintenance service.	Analyst/Supervisor	ANA6010
	Clean the torch in Aqua Regia solution and align the torch.	Conduct leak test and adjust alignment.	Inspect for leaks and align the torch and ensure that it is in the center.	Each week (minimum every 2 weeks).	Torch is centered and no leaks.	Replace or call for maintenance service.		
	Clean the chamber and nebulizer.	METAL	Visually inspect for foreign objects.	Each week.	Make sure chamber and nebulizer are clean.	Replace or call for maintenance service.		
	Clean the lens and optimize the detector sensitivity.		Clean up the dust from the lens.	Every 6 months.	In accordance with manufacturer's recommendation or lab SOP.	Install new lens.		
ICP-MS	Check windings.	METAL	Visually inspect for wear or damage.	8 hrs of operation.	Part was replaced.	Replace windings.	Analyst/Supervisor	ANA6020
	Clean nebulizer.		Visually inspect for wear or damage.	Daily prior to operation.	Part was replaced.	Flush with DI water.		
	Clean spray chamber.		Visually inspect for dirt or deterioration.	As necessary.	Part was replaced.	Rinse with DI water.		
	Clean torch.		Visually inspect for dirt or deterioration.	Monthly.	Part was replaced.	Clean with a 10% HNO3 solution and soak any parts with buildup overnight in a 5% HNO3 solution. Rinse with DI water and air dry.		

SAP Worksheet #25—Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table (continued)

Instrument / Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
Dionex IC	Inject DI rinse at the end of every run; rinse the piston seals.	Hexavalent Chromium, Anions	Check for and isolate leaks.	Daily.	None.	Clean up and repair any leaks.	Analyst/Supervisor	ANA218.6-7199
	Locate and replace any pinched or damaged airlines.		When chromatography indicates a flow problem.	As necessary.	None.	Repair any airlines.		
	Replace primary and rinse seals in pump heads.		When chromatography indicates a flow problem.	As necessary.	None.	Repair any seals or rinse pump heads.		
pH meter	Check LCD display and pH probe.	3 point calibration using known standards.	Visually inspect for wear or damage and indicator from computer controls.	Daily and annual maintenance from manufacturer.	± 0.05 units	Return to manufacturer for recalibration or call for maintenance service.	Analyst/Supervisor	ANA9045

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SAP Worksheet #26—Sample Handling System

(UFP-QAPP Manual Appendix A)

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT	
Sample Collection (Personnel/Organization):	Field Team Leader (TBD)/CH2M
Sample Packaging (Personnel/Organization):	Sample Processor or Field Team Member (TBD)/CH2M
Coordination of Shipment (Personnel/Organization):	Sample Processor or Field Team Member (TBD)/CH2M
Type of Shipment/Carrier:	Overnight/Federal Express
SAMPLE RECEIPT AND ANALYSIS	
Sample Receipt (Personnel/Organization):	Sample Receipt Personnel/APPL. Sample Receipt Personnel/ALS-Kelso. Note that all samples will be shipped to APPL who will forward ORP fraction to ALS.
Sample Custody and Storage (Personnel/Organization):	Sample Receipt Personnel/APPL. Sample Receipt Personnel/ALS-Kelso.
Sample Preparation (Personnel/Organization):	Digestion Personnel/APPL. Extraction Personnel/ALS-Kelso.
Sample Determinative Analysis (Personnel/Organization):	Analyst/APPL. Analyst/ALS-Kelso.
SAMPLE ARCHIVING	
Field Sample Storage (No. of days from sample collection):	90 Days
Sample Extract/Digestate Storage (No. of days from extraction/digestion):	Extracts may be disposed of 90 days after extraction. Digestates may be disposed of 90 days after digestion.
Biological Sample Storage (No. of days from sample collection):	90 days
SAMPLE DISPOSAL	
Personnel/Organization:	Environmental Health and Safety Officer/APPL. Environmental Health and Safety Officer/ALS-Kelso.
Number of Days from Analysis:	Samples may be disposed of 90 days after report mail date.

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SAP Worksheet #28-1—Laboratory QC Samples Table

Matrix: SB, SS
Analytical Group: SVOC
Analytical Method/SOP Reference: SW-846 8270D, 8270D-SIM/ ANA8270, ANA8270SIM

QC Sample	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory QA/QC Samples						
Internal standards (IS)	Every field sample, standard, and QC sample.	Retention time within ± 10 seconds from retention time of the midpoint standard in the ICAL; EICP area within - 50% to +100% of ICAL midpoint standard.	Inspect mass spectrometer and GC for malfunctions and correct problem. Reanalysis of samples analyzed while system was malfunctioning is mandatory.	Analyst/Supervisor	Accuracy	Same as Method/SOP QC Acceptance Limits
Method Blank (MB)	One per preparatory batch.	No analytes detected > ½ LOQ or > 1/10 the amount measured in any sample or 1/10 the regulatory limit, whichever is greater. Common contaminants must not be detected > LOQ.	Correct problem. If required, re-prep and reanalyze MB and all samples processed with the contaminated blank. Results may not be reported without a valid method blank. Flagging is only appropriate in cases where the samples cannot be reanalyzed.		Contamination	
Laboratory Control Sample (LCS)	One per preparatory batch.	See Worksheet #15.	Correct problem, then re-prep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. Must contain all surrogates and all analytes to be reported. Results may not be reported without a valid LCS. Flagging is only appropriate in cases where the samples cannot be reanalyzed.		Accuracy	
Matrix Spike (MS)	One per preparatory batch.	See Worksheet #15.	Examine the project- specific requirements. Contact the client as to additional measures to be taken. For the specific analyte(s) in the parent sample, apply J-qualifier if acceptance criteria are not met and explain in the case narrative.		Accuracy	
Matrix Spike Duplicate (MSD) or Matrix Duplicate (MD)	One per preparatory batch.				Accuracy, Precision	
Surrogate Spike	All field and QC samples.	Nitrobenzene-d5 : 44-125% 2-Flurobiphenyl: 46-115% Terphenyl-d14: 58-133%	Correct problem, then re-prep and reanalyze all failed samples for all surrogates in the associated preparatory batch, if sufficient sample material is available. If obvious chromatographic interference with surrogate is present, reanalysis may not be necessary.		Accuracy	

SAP Worksheet #28-1—Laboratory QC Samples Table (continued)

Matrix: SB, SS
Analytical Group: SVOC
Analytical Method/SOP Reference: SW-846 8270D, 8270D-SIM/ ANA8270, ANA8270SIM

QC Sample	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field QA/QC Samples						
Field Duplicate (for SB, SS)	One per 10 normal field samples per matrix.	% Relative Percent Difference (RPD) < 30%.	Assess laboratory homogenization procedures and precision. Examine laboratory replicate. Assess field homogenization procedures. Qualify as per Worksheet #36.	PM/FTL, Data Validator	Precision	Same as Method/SOP QC Acceptance Limits
Equipment Blank	One per day per equipment type (when decontaminated). One per event per equipment type (when disposable).	Same as method blank (see below).	Assess decontamination procedures. Consider recollection if the exceedance may cause data rejection. Qualify as per Worksheet #36.	Laboratory PM, PM/FTL, Data Validator	Contamination	
Matrix Spike/Matrix Spike Duplicate	One per 20 normal field samples per matrix.	See above.				
Temperature Blank	One per cooler.	≤ 6°C but not frozen.	Notify project chemist. Assess sample packaging and shipment procedures. Consider recollection if the exceedance may cause data rejection. Qualify as per Worksheet #36.	Laboratory PM, PM/FTL, Data Validator	Representativeness	Same as Method/SOP QC Acceptance Limits

Notes:
The specifications in this table meet the requirements of DoD QSM v5.0.
All discrete soil samples will not be ground and sieved as part of EPA Method 8330B.

SAP Worksheet #28-2—Laboratory QC Samples Table

Matrix: SB, SS
Analytical Group: EXPLO
Analytical Method/SOP Reference: SW-846 8330B / HPL8330

QC Sample	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory QA/QC Samples						
Soil drying procedure	Each sample, LCS, and Method Blank.	Laboratory must have a procedure to determine when the sample is dry to constant mass. Record date, time, and ambient temperature on a daily basis while drying samples.	NA	Analyst/Supervisor	NA	Same as Method/SOP QC Acceptance Limits
Method Blank	One per preparatory batch.	No analytes detected >1/2 LOQ or > 1/10 the amount measured in any sample or 1/10 the regulatory limit, whichever is greater.	Correct problem. If required, re-prep and reanalyze method blank and all samples processed with the contaminated blank. If reanalysis cannot be performed, data must be qualified and explained in the case narrative. Apply B-flag to all results for the specific analyte(s) in all samples in the associated preparatory batch. Results may not be reported without a valid method blank. Flagging is only appropriate in cases where the samples cannot be reanalyzed.		Contamination	
Laboratory Control Sample (LCS)	The LCS is prepared from a ground clean sand matrix.	See Worksheet #15.	Correct problem. If required, re-prep and reanalyze the LCS and all samples in the associated preparatory batch for the failed analytes, if sufficient sample material is available. Results may not be reported without a valid LCS. Flagging is only appropriate in cases where the samples cannot be reanalyzed.		Accuracy	
Matrix spike (MS) / Matrix Spike Duplicate (MSD)	One per preparatory batch.	See Worksheet #15.	Examine the project- specific requirements. Contact the client as to additional measures to be taken. For the specific analyte(s) in the parent sample, apply J-qualifier if acceptance criteria are not met and explain in the case narrative.		Accuracy, Precision	

SAP Worksheet #28-2—Laboratory QC Samples Table (continued)

Matrix: SB, SS
Analytical Group: EXPLO
Analytical Method/SOP Reference: SW-846 8330B / HPL8330

QC Sample	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory QA/QC Samples						
Surrogate Spike	All field and QC samples.	1,2-Dinitrobenzene: 78-119%	Correct problem, then re-prep and reanalyze all failed samples for all surrogates in the associated preparatory batch, if sufficient sample material is available. If obvious chromatographic interference with surrogate is present, reanalysis may not be necessary.		Accuracy	
Confirmation of positive results (second column)	All positive results must be confirmed.	Calibration and QC criteria are the same for the confirmation analysis as for initial or primary column analysis. Results between primary and second column RPD ≤ 40%.	Report results from column with the higher concentration if the RPD >40% between columns. Apply J flag if RPD>40%. Discuss in the case narrative.		Accuracy, Precision	
Field QA/QC Samples						
Field Duplicate (for SB, SS)	One per 10 normal field samples per matrix	% Relative Percent Difference (RPD) < 30%.	Assess laboratory homogenization procedures and precision. Examine laboratory replicate. Assess field homogenization procedures. Qualify as per Worksheet #36.	PM/FTL, Data Validator	Precision	
Equipment Blank	One per day per equipment type (when decontaminated). One per event per equipment type (when disposable).	Same as method blank (see above).	Assess decontamination procedures. Consider recollection if the exceedance may cause data rejection. Qualify as per Worksheet #36.	Laboratory PM, PM/FTL, Data Validator	Contamination	
Matrix Spike/Matrix Spike Duplicate	One per 20 normal field samples per matrix	See above.				
Temperature Blank	One per cooler	≤ 6°C but not frozen.	Notify project chemist. Assess sample packaging and shipment procedures. Consider recollection if the exceedance may cause data rejection. Qualify as per Worksheet #36.	Laboratory PM, PM/FTL, Data Validator	Representativeness	Same as Method/SOP QC Acceptance Limits

Notes:
The specifications in this table meet the requirements of DoD QSM v5.0.

SAP Worksheet #28-3—Laboratory QC Samples Table

Matrix: SB, SS
Analytical Group: EXPLO – Picric Acid
Analytical Method/SOP Reference: SW-846 8321A / HPL8321

QC Sample	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory QA/QC Samples						
Method Blank (MB)	One per preparatory batch.	No analytes detected > 1/2 LOQ or > 1/10 the amount measured in any sample or 1/10 the regulatory limit, whichever is greater.	Correct problem. If required, re-prep and reanalyze MB and all samples processed with the contaminated blank. If reanalysis cannot be performed, data must be qualified and explained in the case narrative. Apply B-flag to all results for the specific analyte(s) in all samples in the associated preparatory batch. Results may not be reported without a valid method blank. Flagging is only appropriate in cases where the samples cannot be reanalyzed.	Analyst/Supervisor	Contamination	Same as Method/SOP QC Acceptance Limits
Laboratory Control Sample (LCS)	One per preparatory batch.	See Worksheet #15.	Correct problem, then re-prep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. Results may not be reported without a valid method blank. Flagging is only appropriate in cases where the samples cannot be reanalyzed.		Accuracy	
Matrix Spike (MS)	One per preparatory batch.	See Worksheet #15.	Examine the project- specific requirements. Contact the client as to additional measures to be taken. For the specific analyte(s) in the parent sample, apply J-qualifier if acceptance criteria are not met and explain in the case narrative.		Accuracy	
Matrix Spike Duplicate (MSD) or Matrix Duplicate (MD)	One per preparatory batch.	See Worksheet #15.			Accuracy, Precision	
Surrogate Spike	All field and QC samples.	1,2-Dinitrobenzene: 50-150%	Correct problem, then re-prep and reanalyze all failed samples for all surrogates in the associated preparatory batch, if sufficient sample material is available. If obvious chromatographic interference with surrogate is present, reanalysis may not be necessary.		Accuracy	

SAP Worksheet #28-3—Laboratory QC Samples Table (continued)

Matrix: SB, SS
Analytical Group: EXPLO – Picric Acid
Analytical Method/SOP Reference: SW-846 8321A / HPL8321

QC Sample	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field QA/QC Samples						
Field Duplicate (for SB, SS)	One per 10 normal field samples per matrix.	% Relative Percent Difference (RPD) < 30%.	Assess laboratory homogenization procedures and precision. Examine laboratory replicate. Assess field homogenization procedures. Qualify as per Worksheet #36.	PM/FTL, Data Validator	Precision	
Equipment Blank	One per day per equipment type (when decontaminated). One per event per equipment type (when disposable).	Same as method blank (see above).	Assess decontamination procedures. Consider recollection if the exceedance may cause data rejection. Qualify as per Worksheet #36.	Laboratory PM, PM/FTL, Data Validator	Contamination	
Matrix Spike/Matrix Spike Duplicate	One per 20 normal field samples per matrix.	See above.				
Temperature Blank	One per cooler.	≤ 6°C but not frozen.	Notify project chemist. Assess sample packaging and shipment procedures. Consider recollection if the exceedance may cause data rejection. Qualify as per Worksheet #36.	Laboratory PM, PM/FTL, Data Validator	Representativeness	Same as Method/SOP QC Acceptance Limits

Notes:
The specifications in this table meet the requirements of DoD QSM v5.0.

SAP Worksheet #28-4—Laboratory QC Samples Table

Matrix: SB, SS
Analytical Group: EXPLO - Perchlorate
Analytical Method/SOP Reference: SW-846 6850 / HPL6850

QC Sample	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory QA/QC Samples						
Laboratory Reagent Blank (LRB)	Prior to calibration and at the end of the analytical sequence.	No perchlorate detected > ½ LOQ.	Reanalyze reagent blank (until no carryover is observed) and all samples processed since the contaminated blank. Problem must be corrected. Results may not be reported without a valid reagent blank. Flagging is only appropriate in cases where the samples cannot be reanalyzed.	Analyst/Supervisor	Contamination	Same as Method/SOP QC Acceptance Limits
Method Blank (MB)	One per preparatory batch.	No analytes detected >1/2 LOQ or > 1/10 the amount measured in any sample or 1/10 the regulatory limit, whichever is greater.	Correct problem. Re-prep and reanalyze method blank and all samples processed with the contaminated blank. Flagging is only appropriate in cases where the samples cannot be reanalyzed. Results may not be reported without a valid method blank. Flagging is only appropriate in cases where the samples cannot be reanalyzed.		Contamination	
Laboratory Control Sample (LCS)	One per preparatory batch.	See Worksheet #15.	Correct problem. Re-prep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. Problems must be corrected. Results may not be reported without a valid LCS. Flagging is only appropriate in cases where the samples cannot be reanalyzed.		Accuracy	
Matrix Spike (MS)	One per preparatory batch per matrix.	See Worksheet #15.	Examine the project- specific requirements. Contact the client as to additional measures to be taken. For the specific analyte(s) in the parent sample, apply J-qualifier if acceptance criteria are not met and explain in the case narrative.		Accuracy	
Matrix Spike Duplicate (MSD) or Laboratory Duplicate (LD)	One per preparatory batch per matrix.	See Worksheet #15.			Accuracy, Precision	
Internal Standard (IS)	Addition of ^{18}O-labeled perchlorate to every sample, batch QC sample, standard, instrument blank, and method blank.	Measured ^{18}O IS area within ± 50% of the value from the average of the IS area counts of the ICAL. RRT of the perchlorate ion must be 1.0 ± 2% (0.98 – 1.02).	Rerun the sample at increasing dilutions until the ± 50% acceptance criteria are met. If criteria cannot be met with dilution, the interference is suspected and the sample must be re-prepped using additional pretreatment steps.		Accuracy	

SAP Worksheet #28-4—Laboratory QC Samples Table (continued)

Matrix: SB, SS
Analytical Group: EXPLO - Perchlorate
Analytical Method/SOP Reference: SW-846 6850 / HPL6850

QC Sample	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory QA/QC Samples						
Interference Check Sample (ICS)	One ICS is prepared with every batch of 20 samples and must undergo the same preparation and pretreatment steps as the samples in the batch. It verifies the method performance at the matrix conductivity threshold (MCT). At least one ICS must be analyzed daily. The ICS shall be prepared at the LOQ.	Perchlorate concentration must be within ± 20% of its true value.	Correct problem. Reanalyze all samples and QC samples in the batch. If poor recovery from the cleanup filters is suspected, a different lot of filters must be used to re-extract all samples in the batch. If column degradation is suspected, a new column must be calibrated before the samples can be reanalyzed.	Analyst/Supervisor	Accuracy, Bias	Same as Method/SOP QC Acceptance Limits
Isotope Ratio $^{35}Cl/^{37}Cl$	Every sample, batch QC sample, and standard.	Monitor for either the parent ion at masses 99/101 or the daughter ion at masses 83/85 depending on which ions are quantitated. Must fall within 2.3 to 3.8.	If criteria are not met, the sample must be rerun. If the sample was not pretreated, the sample must be re-extracted using cleanup procedures. If, after cleanup, the ratio still fails, use alternative techniques to confirm presence of perchlorate, e.g., a post spike sample or dilution to reduce any interference.		Accuracy	
Field QA/QC Samples						
Field Duplicate (for SB, SS)	One per 10 normal field samples per matrix.	% Relative Percent Difference (RPD) < 30%.	Assess laboratory homogenization procedures and precision. Examine laboratory replicate. Assess field homogenization procedures. Qualify as per Worksheet #36.	PM/FTL, Data Validator	Precision	
Equipment Blank	One per day per equipment type (when decontaminated). One per event per equipment type (when disposable).	Same as method blank (see above).	Assess decontamination procedures. Consider recollection if the exceedance may cause data rejection. Qualify as per Worksheet #36.	Laboratory PM, PM/FTL, Data Validator	Contamination	
Matrix Spike/Matrix Spike Duplicate	One per 20 normal field samples per matrix.	See above.				
Temperature Blank	One per cooler.	≤ 6°C but not frozen.	Notify project chemist. Assess sample packaging and shipment procedures. Consider recollection if the exceedance may cause data rejection. Qualify as per Worksheet #36.	Laboratory PM, PM/FTL, Data Validator	Representativeness	Same as Method/SOP QC Acceptance Limits

Notes:
The specifications in this table meet the requirements of DoD QSM v5.0.

SAP Worksheet #28-5—Laboratory QC Samples Table

Matrix: SB, SS
Analytical Group: METAL
Analytical Method/SOP Reference: SW-846 6010C / ANA6010

QC Sample	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory QA/QC Samples						
Method Blank	One per preparatory batch.	No analytes detected > 1/2 LOQ or > 1/10 the amount measured in any sample or 1/10 the regulatory limit, whichever is greater.	Correct problem. If required, re-prep and reanalyze method blank and all samples processed with the contaminated blank. Results may not be reported without a valid method blank. Flagging is only appropriate in cases where the samples cannot be reanalyzed.	Analyst/Supervisor	Contamination	Same as Method/SOP QC Acceptance Limits
Laboratory Control Sample (LCS)	One per preparatory batch.	See Worksheet #15.	Correct problem, then re-prep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. Must contain all reported analytes. Results may not be reported without a valid LCS. Flagging is only appropriate in cases where the samples cannot be reanalyzed.		Accuracy	
Matrix spike (MS) / Matrix Spike Duplicate (MSD)	One per preparatory batch.	See Worksheet #15.	Examine the project- specific requirements. Contact the client as to additional measures to be taken. For the specific analyte(s) in the parent sample, apply J-qualifier if acceptance criteria are not met and explain in the case narrative. Perform dilution test or PDS addition.		Accuracy, Precision	
Dilution test	One per preparatory batch if MS or MSD fails. Only applicable for samples with concentrations > 50 x LOQ (prior to dilution).	Five-fold dilution must agree within ± 10% of the original measurement.	No specific CA, unless required by the project. For the specific analyte(s) in the parent sample, apply J-qualifier if acceptance criteria are not met and explain in the case narrative.		Accuracy, Precision	
Post-digestion spike (PDS) addition	Perform if MS/MSD fails. One per preparatory batch (using the same sample as used for the MS/MSD if possible). Criteria applies for samples with concentrations <50 X LOQ prior to dilution.	Recovery within 80-120%.	No specific CA, unless required by the project. For the specific analyte(s) in the parent sample, apply J-qualifier if acceptance criteria are not met and explain in the case narrative.		Accuracy, Precision	
Field QA/QC Samples						
Field Duplicate (for SB, SS)	One per 10 normal field samples per matrix.	% Relative Percent Difference (RPD) < 30%.	Assess laboratory homogenization procedures and precision. Examine laboratory replicate. Assess field homogenization procedures. Qualify as per Worksheet #36.	PM/FTL, Data Validator	Precision	
Equipment Blank	One per day per equipment type (when decontaminated). One per event per equipment type (when disposable).	Same as method blank (see above).	Assess decontamination procedures. Consider recollection if the exceedance may cause data rejection. Qualify as per Worksheet #36.	Laboratory PM, PM/FTL, Data Validator	Contamination	

SAP Worksheet #28-5—Laboratory QC Samples Table (continued)

Matrix: SB, SS
Analytical Group: METAL
Analytical Method/SOP Reference: SW-846 6010C / ANA6010

QC Sample	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field QA/QC Samples						
Matrix Spike/Matrix Spike Duplicate	One per 20 normal field samples per matrix.	See above.				
Temperature Blank	One per cooler.	≤ 6°C but not frozen.	Notify project chemist. Assess sample packaging and shipment procedures. Consider recollection if the exceedance may cause data rejection. Qualify as per Worksheet #36.	Laboratory PM, PM/FTL, Data Validator	Representativeness	Same as Method/SOP QC Acceptance Limits

Notes:
The specifications in this table meet the requirements of DoD QSM v5.0.

SAP Worksheet #28-6—Laboratory QC Samples Table

Matrix: SB, SS
Analytical Group: METAL
Analytical Method/SOP Reference: SW-846 6020A / ANA6020

QC Sample	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory QA/QC Samples						
Internal Standards (IS)	Every field sample, standard, and QC sample.	IS intensity in the samples within 30-120% of intensity of the IS in the ICAL blank.	If recoveries are acceptable for QC samples, but not field samples, the field samples may be considered to suffer from a matrix effect. Reanalyze sample at 5- fold dilutions until criteria is met. For failed QC samples, correct problem, and rerun all associated failed field samples.	Analyst/Supervisor	Accuracy	Same as Method/SOP QC Acceptance Limits
Method Blank (MB)	One per preparatory batch.	No analytes detected > 1/2 LOQ or > 1/10 the amount measured in any sample or 1/10 the regulatory limit, whichever is greater.	Correct problem. If required, re-prep and reanalyze method blank and all samples processed with the contaminated blank. Results may not be reported without a valid method blank. Flagging is only appropriate in cases where the samples cannot be reanalyzed.		Contamination	
Laboratory Control Sample (LCS)	One per preparatory batch.	See Worksheet #15.	Correct problem, then re-prep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. Must contain all reported analytes. Results may not be reported without a valid LCS. Flagging is only appropriate in cases where the samples cannot be reanalyzed.		Accuracy	
Matrix Spike (MS)	One per preparatory batch.	See Worksheet #15.	Examine the project- specific requirements. Contact the client as to additional measures to be taken. For the specific analyte(s) in the parent sample, apply J-qualifier if acceptance criteria are not met and explain in the case narrative. Perform dilution test or PDS addition.		Accuracy	
Matrix Spike Duplicate (MSD) or Matrix Duplicate (MD)	One per preparatory batch.	See Worksheet #15.			Accuracy, Precision	
Dilution Test	One per preparatory batch if MS or MSD fails.	Five-fold dilution must agree within ± 10% of the original measurement.	No specific CA, unless required by the project. For the specific analyte(s) in the parent sample, apply J-qualifier if acceptance criteria are not met and explain in the case narrative.		Accuracy, Precision	
Post Digestion Spike (PDS) Addition	One per preparatory batch if MS or MSD fails (using the same sample as used for the MS/MSD if possible).	Recovery within 80-120%.	No specific CA, unless required by the project. For the specific analyte(s) in the parent sample, apply J-qualifier if acceptance criteria are not met and explain in the case narrative.		Accuracy, Precision	
Field QA/QC Samples						
Field Duplicate (for SB, SS)	One per 10 normal field samples per matrix.	% Relative Percent Difference (RPD) < 30%.	Assess laboratory homogenization procedures and precision. Examine laboratory replicate. Assess field homogenization procedures. Qualify as per Worksheet #36.	PM/FTL, Data Validator	Precision	

SAP Worksheet #28-6—Laboratory QC Samples Table (continued)

Matrix: SB, SS
Analytical Group: METAL
Analytical Method/SOP Reference: SW-846 6020A / ANA6020

QC Sample	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field QA/QC Samples						
Equipment Blank	One per day per equipment type (when decontaminated). One per event per equipment type (when disposable).	Same as method blank (see above).	Assess decontamination procedures. Consider recollection if the exceedance may cause data rejection. Qualify as per Worksheet #36.	Laboratory PM, PM/FTL, Data Validator	Contamination	
Matrix Spike/Matrix Spike Duplicate	One per 20 normal field samples per matrix.	See above.				
Temperature Blank	One per cooler.	≤ 6°C but not frozen.	Notify project chemist. Assess sample packaging and shipment procedures. Consider recollection if the exceedance may cause data rejection. Qualify as per Worksheet #36.	Laboratory PM, PM/FTL, Data Validator	Representativeness	Same as Method/SOP QC Acceptance Limits

Notes:
The specifications in this table meet the requirements of DoD QSM v5.0.

SAP Worksheet #28-7—Laboratory QC Samples Table

Matrix: SB, SS
Analytical Group: METAL
Analytical Method/SOP Reference: SW-846 7199 / ANA218.6-7199

QC Sample	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory QA/QC Samples						
Method blank	One per preparatory batch of up to 20 samples.	No analytes detected >1/2 LOQ and >1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not otherwise effect sample results for common laboratory contaminants no analytes >LOQ.	Correct problem, then re-prep and reanalyze the MB and all samples in the associated batch for failed analytes, except when sample results are below the LOD if sufficient material is available.	Analyst/Supervisor		Same as Method/SOP QC Acceptance Limits
Laboratory Control Sample (LCS)	One per preparatory batch of up to 20 samples.	See Worksheet #15.	Correct problem, then re-prep and reanalyze the LCS and all samples in the associated batch for failed analytes, if sufficient material is available. Results may not be reported without a valid LCS. Flagging is only appropriate in cases where the samples cannot be reanalyzed.			
Matrix Spike (MS)	One per preparatory batch of up to 20 samples.	See Worksheet #15.	Dilute and reanalyze sample; persistent interference indicates the need to use the method of standard addition, alternative analytical conditions, or an alternative method.			
Matrix Spike Duplicate (MSD) or Matrix Duplicate	One per preparatory batch.	See Worksheet #15.				
Pre-digestion matrix spikes (solid matrix samples only, Method 3060)	One soluble and insoluble pre-digestion MS analyzed per preparatory batch prior to analysis.	Spike recovery within 75–125%.	Correct problem and re-homogenize, re-digest, and reanalyze samples. If that fails, evaluate against LCS results.			
Post-digestion matrix spike (solid matrix samples only)	One per preparatory batch.	Spike recovery between 85–115%.	Examine project-specific DQOs. Contact the client as to additional measures to be taken. If requested, correct problem and re-homogenize, re-digest, and reanalyze samples.			
Field QA/QC Samples						
Field Duplicate (for SB, SS)	One per 10 normal field samples per matrix.	% Relative Percent Difference (RPD) < 30%.	Assess laboratory homogenization procedures and precision. Examine laboratory replicate. Assess field homogenization procedures. Qualify as per Worksheet #36.	PM/FTL, Data Validator	Precision	
Equipment Blank	One per day per equipment type (when decontaminated). One per event per equipment type (when disposable).	Same as method blank (see above).	Assess decontamination procedures. Consider recollection if the exceedance may cause data rejection. Qualify as per Worksheet #36.	Laboratory PM, PM/FTL, Data Validator	Contamination	
Matrix Spike/Matrix Spike Duplicate	One per 20 normal field samples per matrix.	See above.				
Temperature Blank	One per cooler.	≤ 6°C but not frozen.	Notify project chemist. Assess sample packaging and shipment procedures. Consider recollection if the exceedance may cause data rejection. Qualify as per Worksheet #36.	Laboratory PM, PM/FTL, Data Validator	Representativeness	Same as Method/SOP QC Acceptance Limits

Notes:
The specifications in this table meet the requirements of DoD QSM v5.0.

SAP Worksheet #28-8—Laboratory QC Samples Table

Matrix: SB, SS
Analytical Group: WCHEM (pH)
Analytical Method/SOP Reference: SW-846 9045D / ANA9045

QC Sample	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory QA/QC Samples						
Laboratory Replicate	One per every 10 samples.	%D ≤ 3% (between sample and laboratory replicate).	Correct problem and reanalyze sample and duplicate.	Analyst/Supervisor	Precision	Same as Method/SOP QC Acceptance Limits
Field QA/QC Samples						
Temperature Blank	One per cooler.	≤ 6°C but not frozen.	Notify project chemist. Assess sample packaging and shipment procedures. Consider recollection if the exceedance may cause data rejection. Qualify as per Worksheet #36.	Laboratory PM, PM/FTL, Data Validator	Representativeness	Same as Method/SOP QC Acceptance Limits

SAP Worksheet #28-9—Laboratory QC Samples Table

Matrix: SB, SS
Analytical Group: WCHEM (TOC)
Analytical Method/SOP Reference: Walkley Black / ANAWALKLEY

QC Sample	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory QA/QC Samples						
Method Blank	One per preparation batch.	No target analytes ≥ ½ LOQ in accordance with DoD QSM requirements.	Correct problem, then re-extract and reanalyze method blank and all samples processed with the contaminated blank in accordance with DoD QSM requirements.	Analyst/Supervisor	Contamination	Same as Method/SOP QC Acceptance Limits
LCS	One LCS per analytical/preparation batch	See Worksheet #15.	Correct problem, re-analyze or re-extract the LCS and all associated batch samples in accordance with DoD QSM requirements.		Accuracy	
MS/MSD	One MS/MSD pair per analytical/preparation batch of 20 samples or less	See Worksheet #15.	Examine the project- specific requirements. Contact the client as to additional measures to be taken. For the specific analyte(s) in the parent sample, apply J-qualifier if acceptance criteria are not met and explain in the case narrative.		Accuracy, Precision	
Field QA/QC Samples						
Temperature Blank	One per cooler	≤ 6°C but not frozen.	Notify project chemist. Assess sample packaging and shipment procedures. Consider recollection if the exceedance may cause data rejection. Qualify as per Worksheet #36.	Laboratory PM, PM/FTL, Data Validator	Representativeness	Same as Method/SOP QC Acceptance Limits

SAP Worksheet #28-10—Laboratory QC Samples Table

Matrix: SB, SS
Analytical Group: WCHEM (ORP)
Analytical Method/SOP Reference: ASTM D1498

QC Sample	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory QA/QC Samples						
Laboratory Replicate	One per batch of 20 or fewer samples	≤ 30% RPD	Repeat until QC acceptance limits are met. Narrate as "difficult sample matrix" if the system is slow to stabilize and thus will not yield a meaningful result.	Analyst/Supervisor	Precision	Same as Method/SOP QC Acceptance Limits
Field QA/QC Samples						
Temperature Blank	One per cooler.	≤ 6°C but not frozen.	Notify project chemist. Assess sample packaging and shipment procedures. Consider recollection if the exceedance may cause data rejection. Qualify as per Worksheet #36.	Laboratory PM, PM/FTL, Data Validator	Representativeness	Same as Method/SOP QC Acceptance Limits

SAP Worksheet #30—Analytical Services Table

Matrix	Analytical Group	Sample Locations/ID Number	Analytical SOP	Data Package Turnaround Time	Laboratory / Organization[1]	Backup Laboratory / Organization
SB, SS,	SVOC (SS, SB)	See Worksheet #18	SW-846 8270D, 8270D_SIM / SON009, ANA8270, ANA8270SIM	Standard 28 Calendar-day TAT	APPL, Inc. 908 North Temperance Avenue Clovis, CA 559 275-2175 POC: Cynthia Clark	TBD
	EXPLO		SW-846 8330B / MSE018 , HPL8330			
	EXPLO (Picric Acid)		SW-846 8321A / MSE018, HPL8321			
	EXPLO (Perchlorate)		SW-846 6850 / HPL6850			
	METAL		SW-846 6010C, 6020A / PRE3050B, ANA6010, ANA6020			
	METAL (Hexavalent Chromium)		SW-846 7199 / NA3060A, ANA218.6-7199			
	WCHEM (pH)		SW-846 9045D / ANA9045D			
	WCHEM (TOC)		Walkley Black / ANAWALKLEY			
	WCHEM (ORP)		ASTM D1498		ALS - Kelso 1317 South 13th Avenue Kelso, WA 98626 360-577-7222 POC: Howard Holmes	

Notes:

[1] All samples will be shipped from the field to APPL. APPL will ship ORP to ALS-Kelso.

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Tables

Table 1
MEC/MPPEH Identified at PAOC EE
UXO 17 Master SAP Addendum
Former Vieques Naval Training Range
Vieques, Puerto Rico

Item Group	Item Class	Item Category	Filler	Fuze	Quantity	Depth Inches	Estimated Weight pounds	Comment	Coordinates	Grid
Preliminary Assessment/Site Inspection of Punta Conejo										
DMM	Projectiles/Mortars	40mm Projectile	Smoke	Unfuzed	1	4	1	40-mm flare	20Q 248407.80 E 2004023.50 N	H2A1H5
	MEC Component	Other (see comments)	Unknown	Unfuzed	1	47	1	Canister containing propellant	20Q 248473.80 E 2003992.8 N	H2B1A4
Second Munitions Investigation of Playa La Chiva										
MPPEH	MEC Component	Other (see comments)	Smoke	Fuzed	1	6	10	M1 Practice Landmine	20Q 248024.62 E 2004355.73 N	G2J2F6
	Bombs	MK-76 - BDU 33	Empty	N/A	1	12	25	BDU 33	20Q 247491.61 E 2004397.36 N	G2H2H8
	Flares-Pyrotechnics	Other (see comments)	N/A	N/A	1	12	2	Slap flare (signal, ground, illumination)	20Q 247096.8 E 2004371.4 N	G2G2E7
	Projectiles/Mortars	Other (see comments)	HE	Unknown	1	6	1	bulk explosives	20Q 247158.1 E 2004460.0 N	G2G2G0
	Flares-Pyrotechnics	Other (see comments)	Illum	Unfuz	1	12	2	Slap flare (signal, ground, illumination)	20Q 247108.3 E 2004483.0 N	G2G3E1
	Flares-Pyrotechnics	Other (see comments)	Illum	Unknown	2	12	2	Slap flare (signal, ground, illumination)	20Q 247107.6 E 2004490.0 N	G2G2E1
DMM	MEC Component	Other (see comments)	HE	Fuzed	1	12	3	Rocket fuze in shipping container	20Q 248349.73 E 2004097.44 N	H2A1F8
	Grenades	Other (see comments)	Illum	N/A	1	12	2	Illum rifle grenade	20Q 247345.40 E 2004593.80 N	G2H3Cr
	Flares-Pyrotechnics	Other (see comments)	Illum	Fuzed	1	1	1	Trip flare	20Q 246998.8 E 2004441.2 N	G2G2A9
Time Critical Removal Action										
DMM	Flares-Pyrotechnics	Other (see comments)	Illum	N/A	1	0	2	Slap flare (signal, ground, illumination) (model number unknown)	20Q 246803.85 E 2004236.72 N	G2F2E2
	MEC Component	Other (see comments)	HE	N/A	14	12	2	Electric blasting caps, shunt still connected	20Q 246876.83 E 2004234.79 N	G2F2G2
	Flares-Pyrotechnics	Unknown	Illum	N/A	1	1	1	Slap Flare parts	20Q 248128.20 E 2004466.54 N	G2J2I0
	Projectiles / Mortars	60mm Mortar	HE	Fuzed	1	4	10	Unfired mortar	20Q 247802.70 E 2004288.77 N	G2I2H4
MPPEH	MEC Component	Other (see comments)	Unknown	Unfuzed	3	1	1	Unknown MEC component	20Q 247209.05 E 2004510.44 N	G2G3H2
	Flares-Pyrotechnics	Hand Grenade	Smoke	Unfuzed	1	1	1	M18 Smoke Grenade	20Q 247166.91 E 2004381.52 N	G2G2G7
	Grenades	Hand Grenade	Smoke	Unfuzed	1	12	5	Smoke grenade was the "burning type"	20Q 247571.11 E 2004326.14 N	G2I2A5
UXO	Grenades	Other (see comments)	Other (see comments)	Unfuzed	1	12	2	Tear gas (CS) cartridge	20Q 246844.65 E 2004247.29 N	G2F2F3
	Flares-Pyrotechnics	Other (see comments)	Illum	Unfuzed	4	12	8	Marking flare	20Q 247283.17 E 2004356.38 N	G2H2A6
	MEC Component	Other (see comments)	N/A	Fuzed	1	1	5	M12 Practice AT Mine with Fuze M604	20Q 247553.50 E 2004636.56 N	G2H3J6
	Flares-Pyrotechnics	Other (see comments)	Illum	N/A	1	12	4	Slap Flare Illum (Fuze N/A)	20Q 247123.34 E 2004492.87 N	G2G3F1

Figures

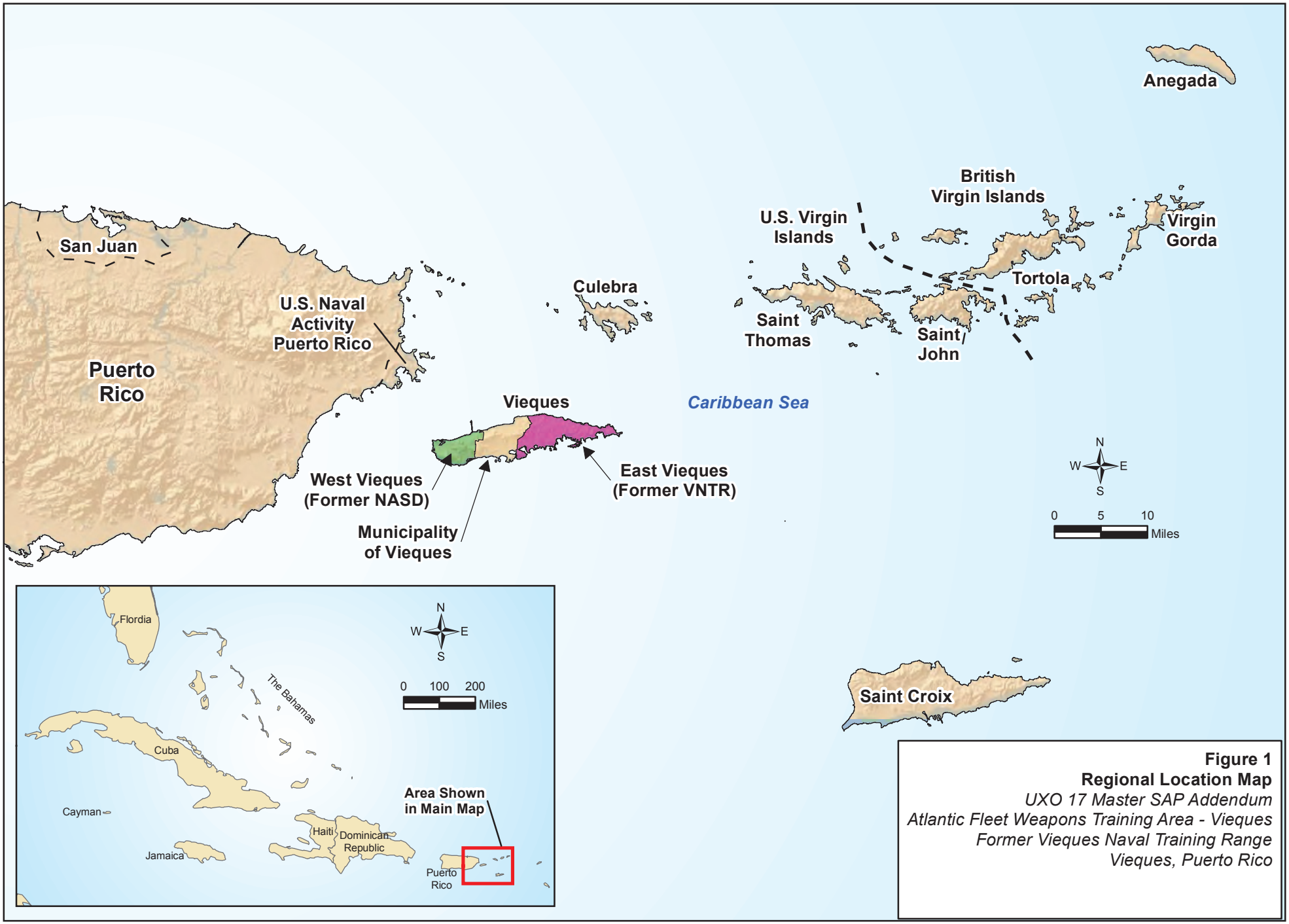

Figure 1
Regional Location Map
UXO 17 Master SAP Addendum
Atlantic Fleet Weapons Training Area - Vieques
Former Vieques Naval Training Range
Vieques, Puerto Rico

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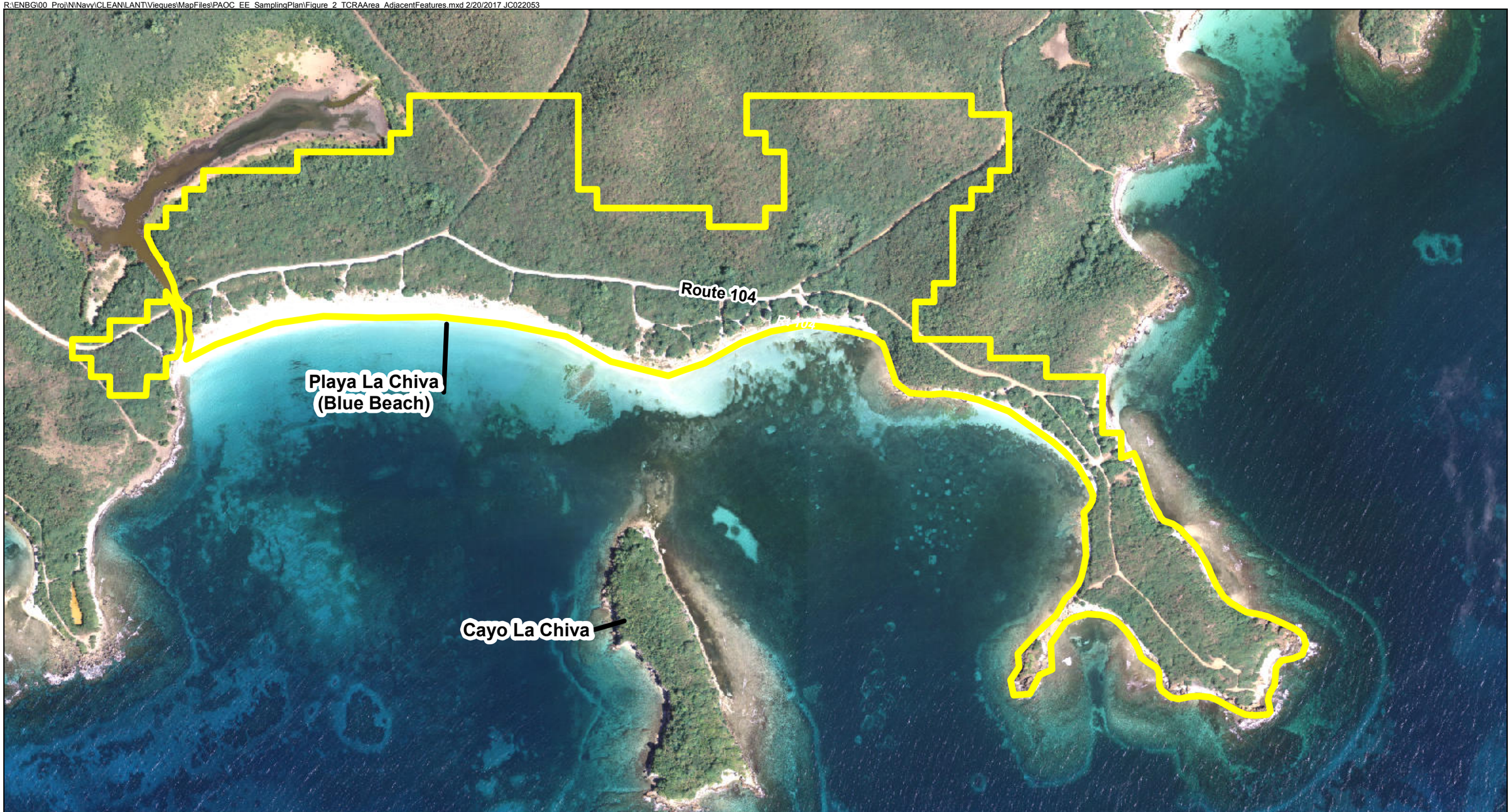

Legend

PAOC EE Site Boundary

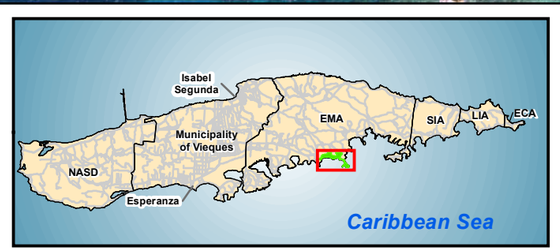

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Figure 2
PAOC EE Boundary
UXO 17 Master SAP Addendum
Atlantic Fleet Weapons Training Area - Vieques
Former Vieques Naval Training Range
Vieques, Puerto Rico

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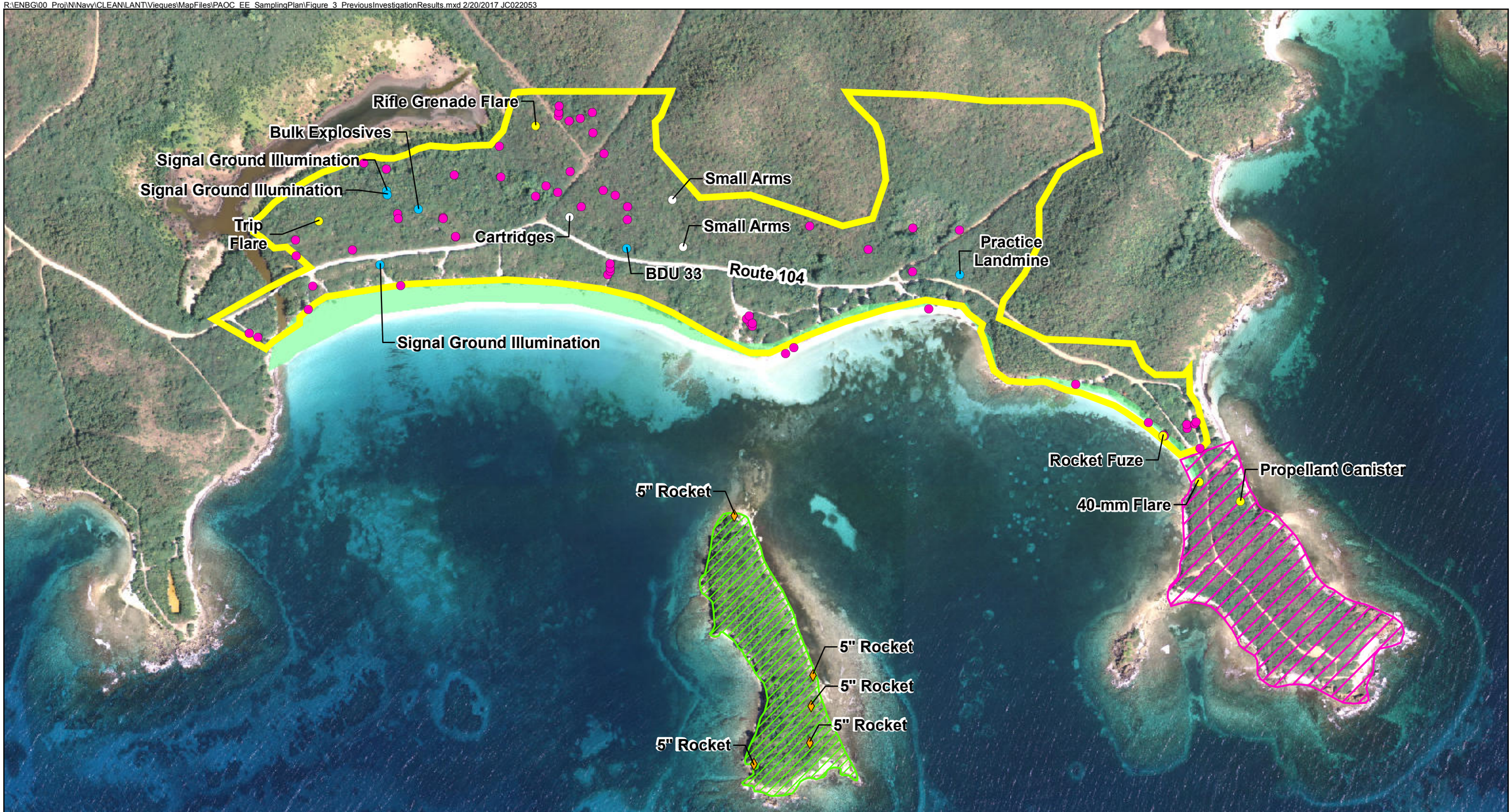

Legend

Surface Munitions Related Items

- MEC

Subsurface Munitions Related Items

- MPPEH
- DMM
- Small Arms
- MD

- First Munitions Investigation Area at Playa La Chiva
- Preliminary Assessment/Site Inspection of Punta Conejo Area
- Cayo La Chiva UXO 18
- Second Munitions Investigation Area of Playa La Chiva

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Figure 3
Previous Investigation Results in the Vicinity of PAOC EE
UXO 17 Master SAP Addendum
Atlantic Fleet Weapons Training Area - Vieques
Former Vieques Naval Training Range
Vieques, Puerto Rico

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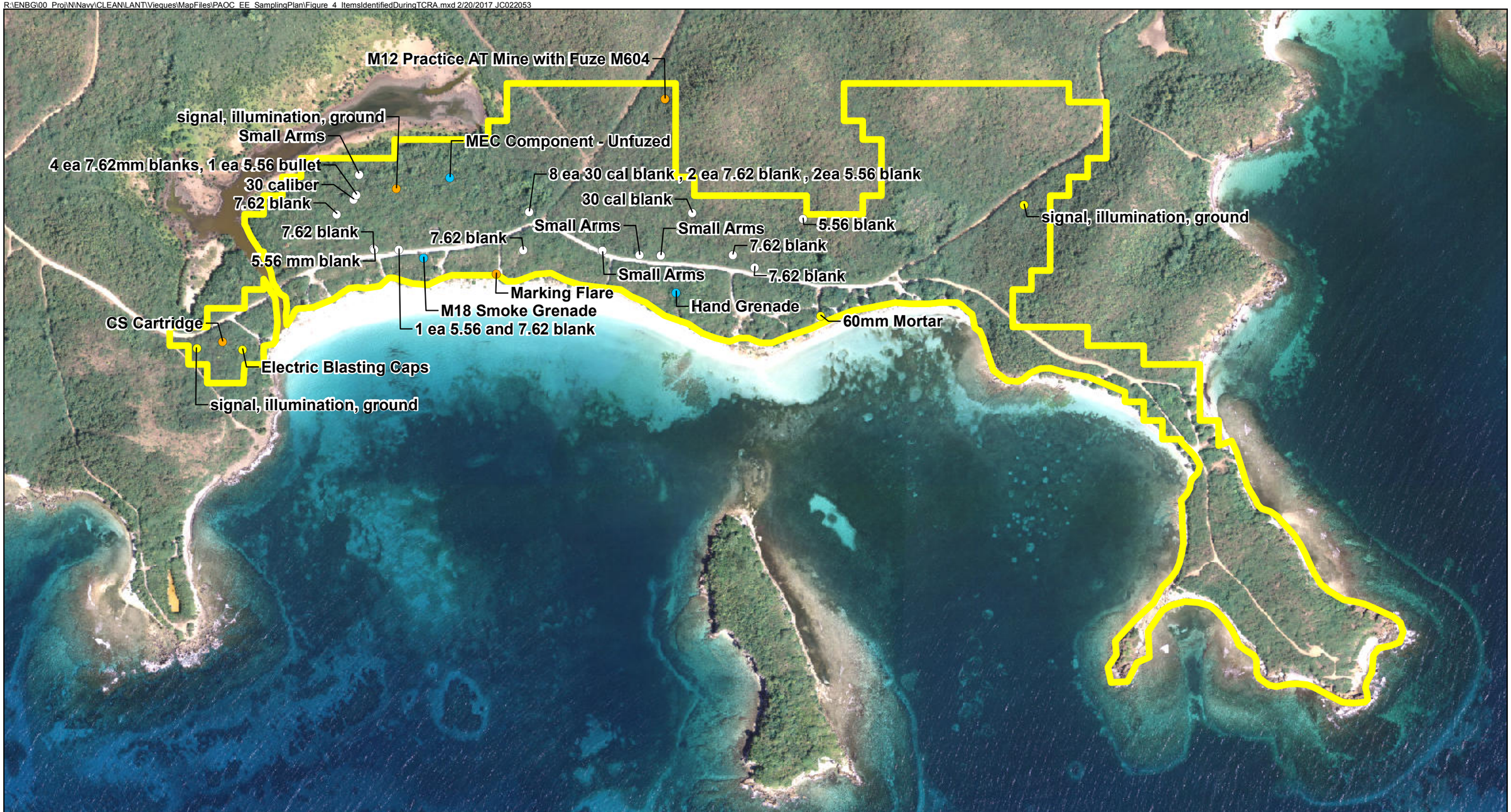

Legend

PAOC EE TCRA Area

MRP Data File

- DMM
- MPPEH
- Small Arms
- UXO

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Figure 4
Items Identified During TCRA
UXO 17 Master SAP Addendum
Atlantic Fleet Weapons Training Area - Vieques
Former Vieques Naval Training Range
Vieques, Puerto Rico

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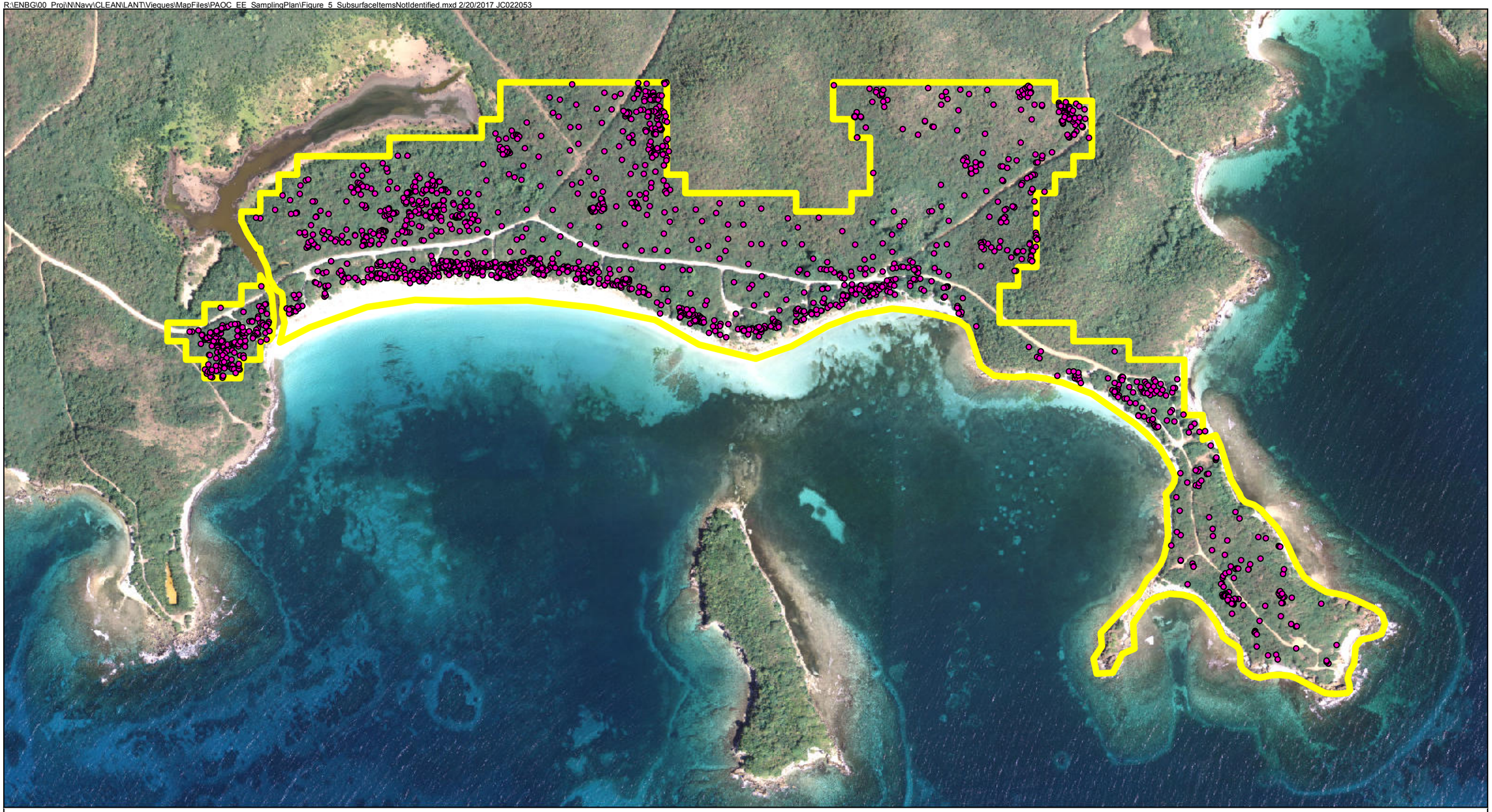

Legend

- Locations of Subsurface Anomalies Not Identified
- PAOC EE Site Boundary

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Figure 5
Locations of Subsurface Anomalies Not Identified
UXO 17 Master SAP Addendum
Atlantic Fleet Weapons Training Area - Vieques
Former Vieques Naval Training Range
Vieques, Puerto Rico

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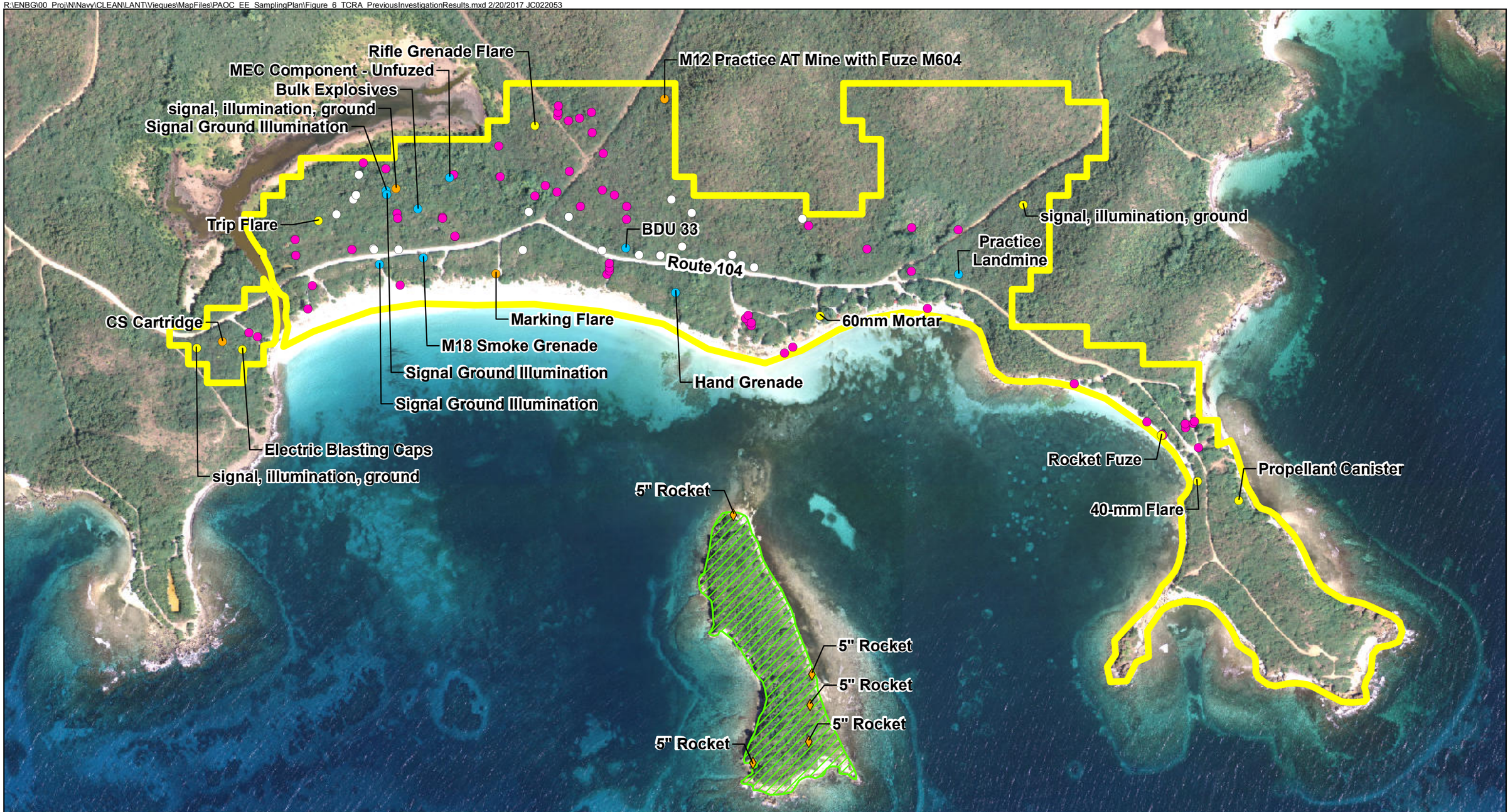

Legend

- MEC
- UXO
- MPPEH
- DMM
- Small Arms
- MD
- Cayo La Chiva UXO 18
- PAOC EE Site Boundary

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Figure 6
Items Identified During TCRA and Previous Investigations
UXO 17 Master SAP Addendum
Atlantic Fleet Weapons Training Area - Vieques
Former Vieques Naval Training Range
Vieques, Puerto Rico

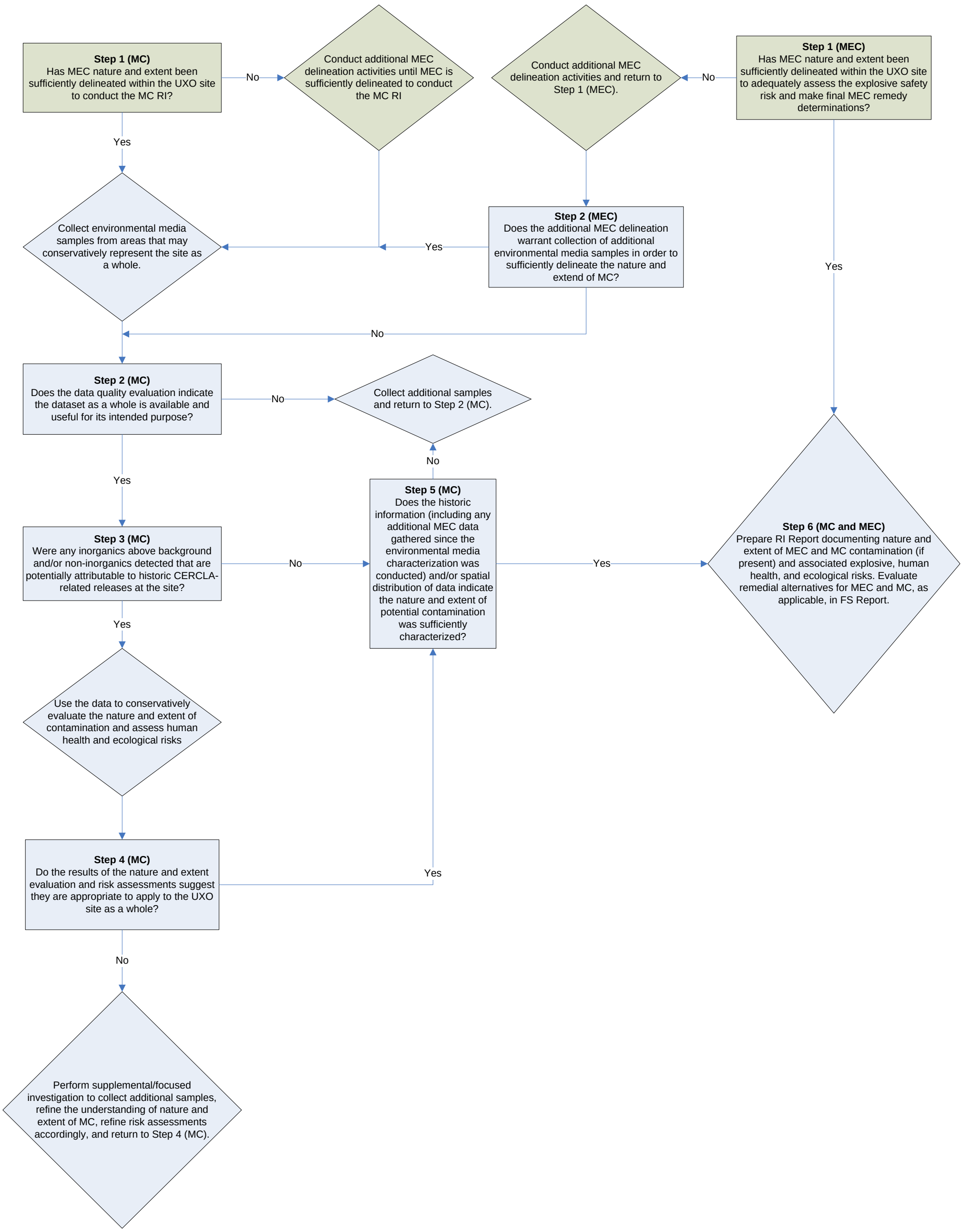

FIGURE 7
MEC and MC Remedial Investigation Decision Process
UXO 17 Master SAP Addendum
Former Vieques Naval Training Range
Vieques, Puerto Rico

Notes:
The decision makers associated with this decision tree are the Navy, USEPA, PREQB, and USFWS.

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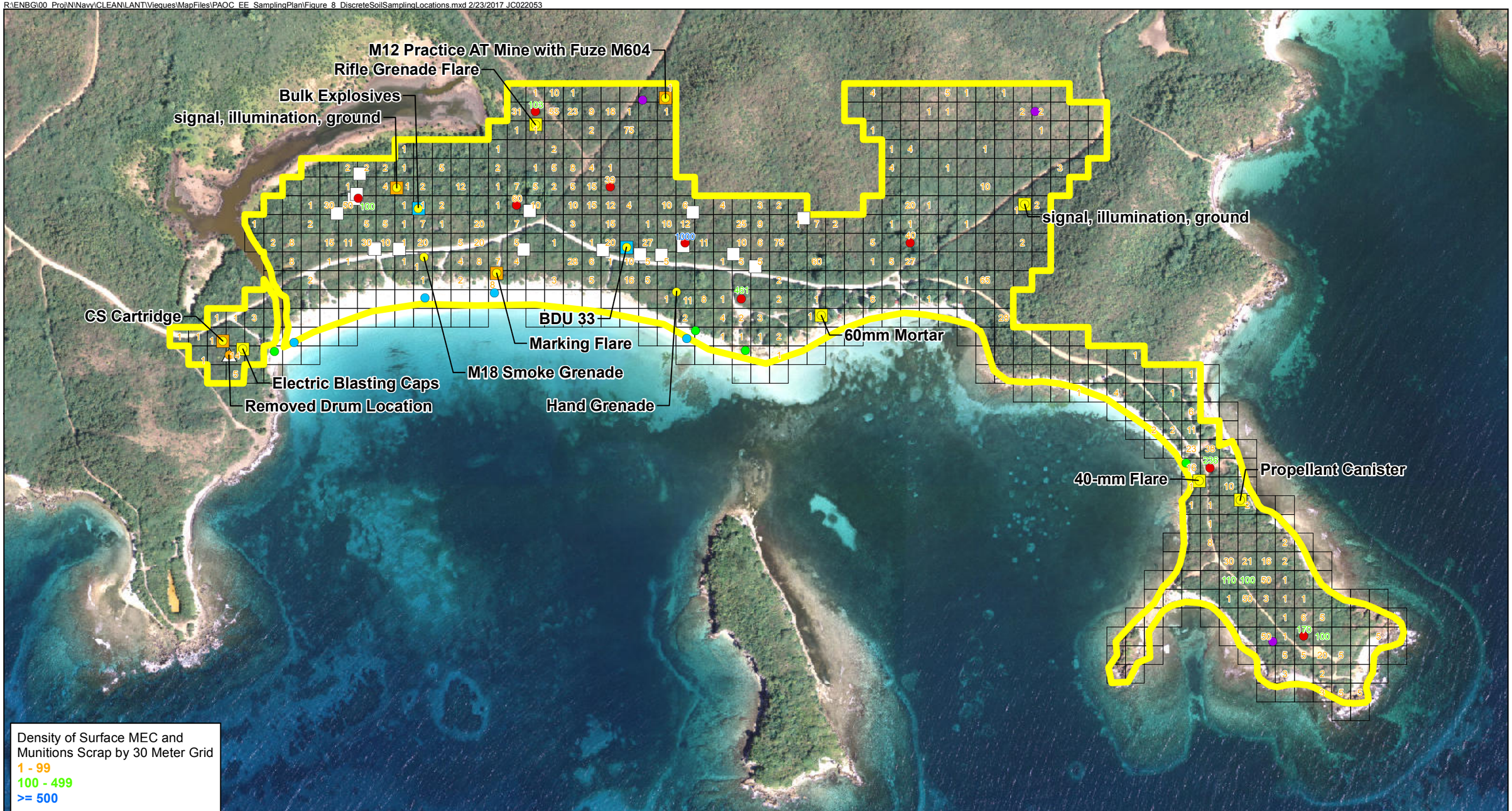

Legend

- PAOC EE Site Boundary
- Former Drum Location

MEC/UXO/DMM

- DMM
- MPPEH
- UXO
- Small Arms

- Discrete Soil Samples at Anomalies left in Place
- Discrete Soil Samples at former location of high densities of MD and/or Small Arms
- Discrete Soil Samples at former location of MEC/DMM/UXO
- Discrete Soil Samples at former drum location
- Discrete Deeper Surface Soil Sample at Hawksbill Turtle Nesting Habitat
- Discrete Deeper Surface Soil Sample at Leatherback Turtle Nesting Habitat

N
W E
S

0 250 500 Feet

Figure 8
RI Soil Sampling Locations
UXO 17 Master SAP Addendum
Atlantic Fleet Weapons Training Area - Vieques
Former Vieques Naval Training Range
Vieques, Puerto Rico

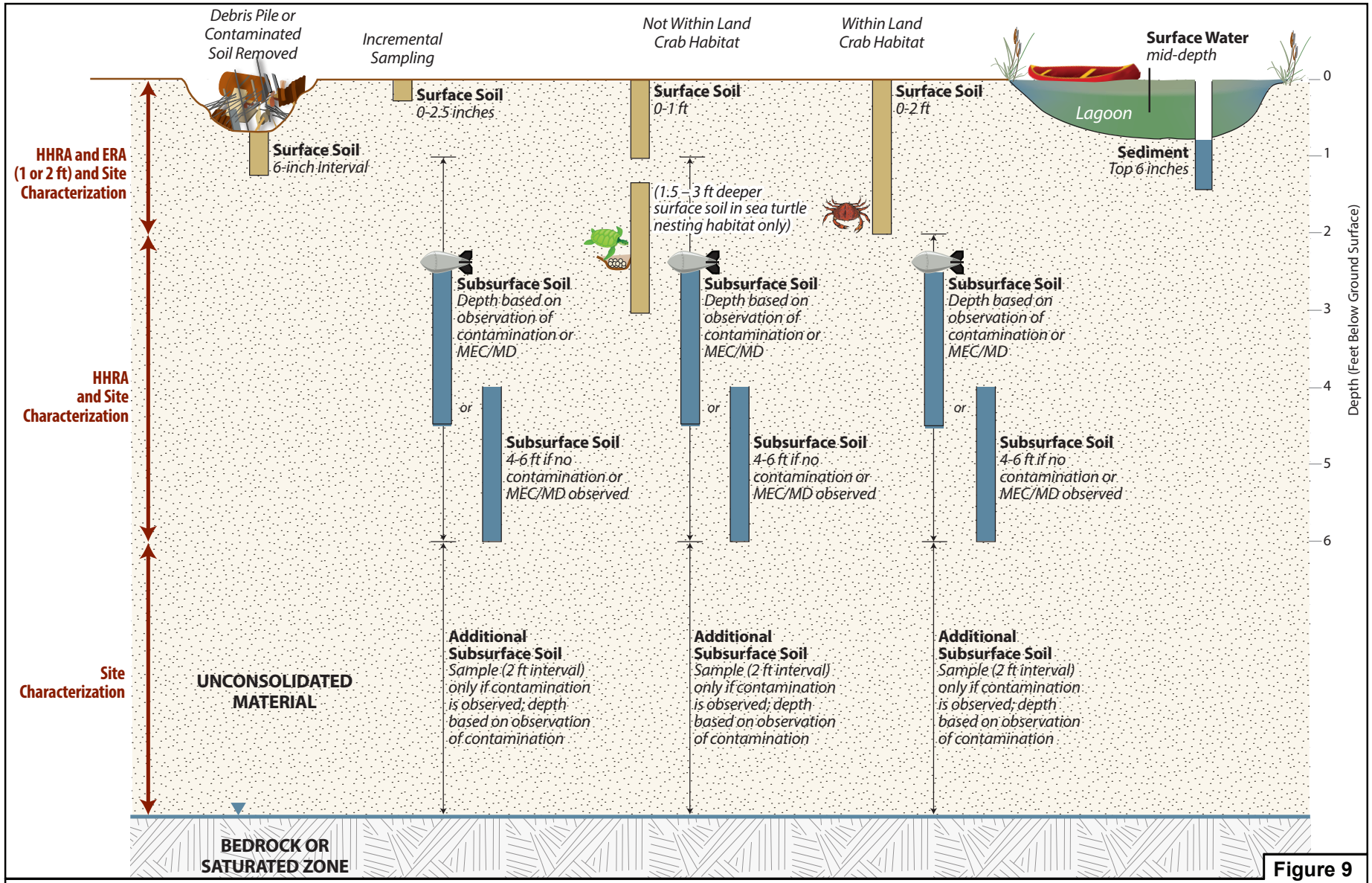

Figure 9

Vieques Sampling Protocol Cross Section

UXO 17 Master SAP Addendum

Atlantic Fleet Weapons Training Area - Vieques

Former Vieques Naval Training Range

Vieques, Puerto Rico

LEGEND

Water Table

MEC Munitions and Explosives of Concern

MC Munitions Constituents

HHRA Human Health Risk Assessment

ERA Ecological Risk Assessment

NOTE

If groundwater or bedrock is encountered within any of the intervals, the depth of sampling will be adjusted accordingly

Attachment A
DoD ELAP Letters

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

AGRICULTURE & PRIORITY POLLUTANTS LABORATORIES, INC. (APPL, INC.)
908 N. Temperance Ave.
Clovis, CA 93611
Contact: Diane Anderson Phone: 559-275-2175

ENVIRONMENTAL

Valid To: June 30, 2017 Certificate Number: 4064.01

In recognition of the successful completion of the A2LA evaluation process, (including an assessment of the laboratory's compliance with ISO IEC 17025:2005, the 2009 TNI Standard, and the requirements of the DoD Environmental Laboratory Accreditation Program (DoD ELAP) as detailed in version 5.0 of the DoD Quality Systems Manual for Environmental Laboratories) accreditation is granted to this laboratory to perform recognized EPA methods using the following testing technologies and in the analyte categories identified below:

Testing Technologies

High Resolution Gas Chromatography/Mass Spectormetry, ICP-OES, ICP-Mass Spectrometry, Atomic Absorption Spectrometry, Gas Chromatography/ECD/FID, Liquid Chromatography- Mass Spectometry, High Performance Liquid Chromatography, Ion Chromatography, Titrimetry

			Solid Hazardous Waste	
Parameter/Analyte	Potable Water	Non-potable Water	Aqueous	Solid/Chemical
PCB Congeners				
2,2',3,4,4',5,5'-Heptachlorobiphenyl (PCB 180)	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
2,2',3,4,4',5'-Hexachlorobiphenyl (PCB 138)	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
2,2',4,4',5,5'-Hexachlorobiphenyl (PCB 153)	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
2,2',4,5,5'-Pentachlorobiphenyl (PCB 101)	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
2,2',5,5'-Tetrachlorobiphenyl (PCB 52)	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
2,3,3',4,4',5,5'-Heptachlorobiphenyl (PCB 189)	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
2,3,3',4,4',5-Hexachlorobiphenyl (PCB 156)	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
2,3,3',4,4',5'-Hexachlorobiphenyl (PCB 157)	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
2,3,3',4,4'-Pentachlorobiphenyl (PCB 105)	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
2,3',4,4',5,5'-Hexachlorobiphenyl (PCB 167)	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
2,3,4,4',5-Pentachlorobiphenyl (PCB 114)	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
2,3',4,4',5-Pentachlorobiphenyl (PCB 118)	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
2,3',4,4',5'-Pentachlorobiphenyl (PCB 123)	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
2,4,4'-Trichlorobiphenyl (PCB 28)	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A

			Solid Hazardous Waste	
Parameter/Analyte	Potable Water	Non-potable Water	Aqueous	Solid/Chemical
3,3',4,4',5,5'-Hexachlorobiphenyl (PCB 169)	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
3,3',4,4',5-Pentachlorobiphenyl (PCB 126)	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
3,3',4,4'-Tetrachlorobiphenyl (PCB 77)	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
2,3'-Dichlorobiphenyl (PCB 6)	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
2,2',3,3',4,4',5,6-Octachlorobiphenyl (PCB 195)	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
2,2',3,5'-Tetrachlorobiphenyl (PCB 44)	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
2,2',5-Trichlorobiphenyl (PCB 18)	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
2,2',3,3',4,4'-Hexachlorobiphenyl (PCB 128)	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
2,3',4,4'-Tetrachlorobiphenyl (PCB 66)	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
Decachlorobiphenyl (PCB 209)	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
3,4,4',5-Tetrachlorobiphenyl (PCB 81)	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
PCB 129 + 138 + 163	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
PCB 153 + 168	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
PCB 156 + 157	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
PCB 180 + 193	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
PCB 20 + 28	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
PCB 90 + 101 + 113	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
PCBs, total	----------	EPA 1668/1668A	EPA 1668/1668A	EPA 1668/1668A
Metals				
Aluminum	----------	EPA 6010B/6010C	EPA 6010B/6010C	EPA 6010B/6010C
Antimony	----------	EPA 6010B/6010C	EPA 6010B/6010C	EPA 6010B/6010C
Arsenic	----------	EPA 6010B/6010C	EPA 6010B/6010C	EPA 6010B/6010C
Barium	----------	EPA 6010B/6010C	EPA 6010B/6010C	EPA 6010B/6010C
Beryllium	----------	EPA 6010B/6010C	EPA 6010B/6010C	EPA 6010B/6010C
Boron	----------	EPA 6010B/6010C	EPA 6010B/6010C	EPA 6010B/6010C
Cadmium	----------	EPA 6010B/6010C	EPA 6010B/6010C	EPA 6010B/6010C
Calcium	----------	EPA 6010B/6010C	EPA 6010B/6010C	EPA 6010B/6010C
Chromium	----------	EPA 6010B/6010C	EPA 6010B/6010C	EPA 6010B/6010C
Cobalt	----------	EPA 6010B/6010C	EPA 6010B/6010C	EPA 6010B/6010C
Copper	----------	EPA 6010B/6010C	EPA 6010B/6010C	EPA 6010B/6010C
Iron	----------	EPA 6010B/6010C	EPA 6010B/6010C	EPA 6010B/6010C
Lead	----------	EPA 6010B/6010C	EPA 6010B/6010C	EPA 6010B/6010C
Magnesium	----------	EPA 6010B/6010C	EPA 6010B/6010C	EPA 6010B/6010C
Manganese	----------	EPA 6010B/6010C	EPA 6010B/6010C	EPA 6010B/6010C
Molybdenum	----------	EPA 6010B/6010C	EPA 6010B/6010C	EPA 6010B/6010C
Nickel	----------	EPA 6010B/6010C	EPA 6010B/6010C	EPA 6010B/6010C
Potassium	----------	EPA 6010B/6010C	EPA 6010B/6010C	EPA 6010B/6010C
Selenium	----------	EPA 6010B/6010C	EPA 6010B/6010C	EPA 6010B/6010C
Silver	----------	EPA 6010B/6010C	EPA 6010B/6010C	EPA 6010B/6010C
Sodium	----------	EPA 6010B/6010C	EPA 6010B/6010C	EPA 6010B/6010C
Strontium	----------	EPA 6010B/6010C	EPA 6010B/6010C	EPA 6010B/6010C
Thallium	----------	EPA 6010B/6010C	EPA 6010B/6010C	EPA 6010B/6010C
Tin	----------	EPA 6010B/6010C	EPA 6010B/6010C	EPA 6010B/6010C
Titanium	----------	EPA 6010B/6010C	EPA 6010B/6010C	EPA 6010B/6010C

			Solid Hazardous Waste	
Parameter/Analyte	Potable Water	Non-potable Water	Aqueous	Solid/Chemical
Total Phosphorus	----------	EPA 6010B/6010C	EPA 6010B/6010C	EPA 6010B/6010C
Vanadium	----------	EPA 6010B/6010C	EPA 6010B/6010C	EPA 6010B/6010C
Zinc	----------	EPA 6010B/6010C	EPA 6010B/6010C	EPA 6010B/6010C
Aluminum	----------	EPA 6020/6020A	EPA 6020/6020A	EPA 6020/6020A
Antimony	----------	EPA 6020/6020A	EPA 6020/6020A	EPA 6020/6020A
Arsenic	----------	EPA 6020/6020A	EPA 6020/6020A	EPA 6020/6020A
Barium	----------	EPA 6020/6020A	EPA 6020/6020A	EPA 6020/6020A
Beryllium	----------	EPA 6020/6020A	EPA 6020/6020A	EPA 6020/6020A
Boron	----------	EPA 6020/6020A	EPA 6020/6020A	EPA 6020/6020A
Cadmium	----------	EPA 6020/6020A	EPA 6020/6020A	EPA 6020/6020A
Calcium	----------	EPA 6020/6020A	EPA 6020/6020A	EPA 6020/6020A
Chromium	----------	EPA 6020/6020A	EPA 6020/6020A	EPA 6020/6020A
Cobalt	----------	EPA 6020/6020A	EPA 6020/6020A	EPA 6020/6020A
Copper	----------	EPA 6020/6020A	EPA 6020/6020A	EPA 6020/6020A
Iron	----------	EPA 6020/6020A	EPA 6020/6020A	EPA 6020/6020A
Lead	----------	EPA 6020/6020A	EPA 6020/6020A	EPA 6020/6020A
Magnesium	----------	EPA 6020/6020A	EPA 6020/6020A	EPA 6020/6020A
Manganese	----------	EPA 6020/6020A	EPA 6020/6020A	EPA 6020/6020A
Molybdenum	----------	EPA 6020/6020A	EPA 6020/6020A	EPA 6020/6020A
Nickel	----------	EPA 6020/6020A	EPA 6020/6020A	EPA 6020/6020A
Potassium	----------	EPA 6020/6020A	EPA 6020/6020A	EPA 6020/6020A
Selenium	----------	EPA 6020/6020A	EPA 6020/6020A	EPA 6020/6020A
Silver	----------	EPA 6020/6020A	EPA 6020/6020A	EPA 6020/6020A
Sodium	----------	EPA 6020/6020A	EPA 6020/6020A	EPA 6020/6020A
Strontium	----------	EPA 6020/6020A	EPA 6020/6020A	EPA 6020/6020A
Thallium	----------	EPA 6020/6020A	EPA 6020/6020A	EPA 6020/6020A
Tin	----------	EPA 6020/6020A	EPA 6020/6020A	EPA 6020/6020A
Titanium	----------	EPA 6020/6020A	EPA 6020/6020A	EPA 6020/6020A
Vanadium	----------	EPA 6020/6020A	EPA 6020/6020A	EPA 6020/6020A
Zinc	----------	EPA 6020/6020A	EPA 6020/6020A	EPA 6020/6020A
Mercury	EPA 245.1	EPA 245.1/7470A	EPA 7471A/7471B	EPA 7471A/7471B
Pesticides/Herbicides/PCBs/TPH/ Fumigants				
1,2,3-Trichloropropane	----------	EPA 8011	----------	----------
1,2-Dibromo-3-chloropropane (DBCP)	----------	EPA 8011	----------	----------
1,2-Dibromomethane (EDB, Ethylene dibromide)	----------	EPA 8011	----------	----------
DRO (Diesel Range Organics), C10-C28	----------	EPA 8015B/8015C/ 8015D	EPA 8015B/8015C/ 8015D	EPA 8015B/8015C/ 8015D
RRO (Residual Range Organics), C25-C36	----------	EPA 8015B/8015C/8015D	EPA 8015B/8015C/8015D	EPA 8015B/8015C/8015D
DRO (Diesel Range Organics), C10-C25	----------	AK102	AK102	AK102
RRO (Residual Range Organics), C25-C36	----------	AK103	AK103	AK103
GRO (Gasoline Range Organics), C6-C10	----------	EPA 8015B/8015C/ 8015D	EPA 8015B/8015C/ 8015D	EPA 8015B/8015C/ 8015D

			Solid Hazardous Waste	
Parameter/Analyte	Potable Water	Non-potable Water	Aqueous	Solid/Chemical
GRO (Gasoline Range Organics), C6-C10	----------	AK101	AK101	AK101
GRO (Gasoline Range Organics), C6-C10	----------	EPA 8260B/8260C	EPA 8260B/8260C 8260B/8260C	EPA 8260B/8260C
GRO (Gasoline Range Organics), C6-C10	----------	AK101-MS	AK101-MS	AK101-MS
Methane	----------	RSK-175	RSK-175	RSK-175
Ethane	----------	RSK-175	RSK-175	RSK-175
Ethene	----------	RSK-175	RSK-175	RSK-175
4,4'-DDD	----------	EPA 8081A/8081B	EPA 8081A/8081B	EPA 8081A/8081B
4,4'-DDE	----------	EPA 8081A/8081B	EPA 8081A/8081B	EPA 8081A/8081B
4,4'-DDT	----------	EPA 8081A/8081B	EPA 8081A/8081B	EPA 8081A/8081B
a-BHC	----------	EPA 8081A/8081B	EPA 8081A/8081B	EPA 8081A/8081B
a-Chlordane	----------	EPA 8081A/8081B	EPA 8081A/8081B	EPA 8081A/8081B
Aldrin	----------	EPA 8081A/8081B	EPA 8081A/8081B	EPA 8081A/8081B
b-BHC	----------	EPA 8081A/8081B	EPA 8081A/8081B	EPA 8081A/8081B
Chlordane	----------	EPA 8081A/8081B	EPA 8081A/8081B	EPA 8081A/8081B
d-BHC	----------	EPA 8081A/8081B	EPA 8081A/8081B	EPA 8081A/8081B
Dieldrin	----------	EPA 8081A/8081B	EPA 8081A/8081B	EPA 8081A/8081B
Endosulfan I	----------	EPA 8081A/8081B	EPA 8081A/8081B	EPA 8081A/8081B
Endosulfan II	----------	EPA 8081A/8081B	EPA 8081A/8081B	EPA 8081A/8081B
Endosulfan sulfate	----------	EPA 8081A/8081B	EPA 8081A/8081B	EPA 8081A/8081B
Endrin	----------	EPA 8081A/8081B	EPA 8081A/8081B	EPA 8081A/8081B
Endrin aldehyde	----------	EPA 8081A/8081B	EPA 8081A/8081B	EPA 8081A/8081B
Endrin ketone	----------	EPA 8081A/8081B	EPA 8081A/8081B	EPA 8081A/8081B
g-BHC (Lindane)	----------	EPA 8081A/8081B	EPA 8081A/8081B	EPA 8081A/8081B
g-Chlordane	----------	EPA 8081A/8081B	EPA 8081A/8081B	EPA 8081A/8081B
Heptachlor	----------	EPA 8081A/8081B	EPA 8081A/8081B	EPA 8081A/8081B
Heptachlor epoxide	----------	EPA 8081A/8081B	EPA 8081A/8081B	EPA 8081A/8081B
Hexachlorobenzene	----------	EPA 8081A/8081B	EPA 8081A/8081B	EPA 8081A/8081B
Methoxychlor	----------	EPA 8081A/8081B	EPA 8081A/8081B	EPA 8081A/8081B
Toxaphene	----------	EPA 8081A/8081B	EPA 8081A/8081B	EPA 8081A/8081B
2,2',3,4,4',5,5'-Heptachlorobiphenyl (PCB 180)	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
2,2',3,4,4',5'-Hexachlorobiphenyl (PCB 138)	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
2,2',4,4',5,5'-Hexachlorobiphenyl (PCB 153)	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
2,2',4,5,5'-Pentachlorobiphenyl (PCB 101)	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
2,2',5,5'-Tetrachlorobiphenyl (PCB 52)	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
2,3,3',4,4',5,5'-Heptachlorobiphenyl (PCB 189)	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
2,3,3',4,4',5-Hexachlorobiphenyl (PCB 156)	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
2,3,3',4,4',5'-Hexachlorobiphenyl (PCB 157)	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
2,3,3',4,4'-Pentachlorobiphenyl (PCB 105)	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
2,3',4,4',5,5'-Hexachlorobiphenyl (PCB 167)	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
2,3,4,4',5-Pentachlorobiphenyl (PCB 114)	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
2,3',4,4',5-Pentachlorobiphenyl (PCB 118)	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
2,3',4,4',5'-Pentachlorobiphenyl (PCB 123)	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
2,4,4'-Trichlorobiphenyl (PCB 28)	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A

			Solid Hazardous Waste	
Parameter/Analyte	Potable Water	Non-potable Water	Aqueous	Solid/Chemical
3,3',4,4',5,5'-Hexachlorobiphenyl (PCB 169)	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
3,3',4,4',5-Pentachlorobiphenyl (PCB 126)	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
3,3',4,4'-Tetrachlorobiphenyl (PCB 77)	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
3,4,4',5-Tetrachlorobiphenyl (PCB 81)	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
Aroclor-1016/1242	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
Aroclor-1016 (PCB-1016)	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
Aroclor-1221 (PCB-1221)	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
Aroclor-1232 (PCB-1232)	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
Aroclor-1242 (PCB-1242)	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
Aroclor-1248 (PCB-1248)	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
Aroclor-1254 (PCB-1254)	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
Aroclor-1260 (PCB-1260)	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
Aroclor-1260 (PCB-1262)	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
Aroclor-1260 (PCB-1268)	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
PCB 129 + 138 + 163	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
PCB 153 + 168	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
PCB 156 + 157	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
PCB 180 + 193	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
PCB 20 + 28	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
PCB 90 + 101 + 113	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
PCBs, total	----------	EPA 8082/8082A	EPA 8082/8082A	EPA 8082/8082A
2,4,5-T	----------	EPA 8151A	EPA 8151A	EPA 8151A
2,4,5-TP	----------	EPA 8151A	EPA 8151A	EPA 8151A
2,4-D (2,4-Dichlorophenoxyacetic acid)	----------	EPA 8151A	EPA 8151A	EPA 8151A
2,4-DB	----------	EPA 8151A	EPA 8151A	EPA 8151A
Dalapon	----------	EPA 8151A	EPA 8151A	EPA 8151A
Dicamba	----------	EPA 8151A	EPA 8151A	EPA 8151A
Dichlorprop	----------	EPA 8151A	EPA 8151A	EPA 8151A
Dinoseb	----------	EPA 8151A	EPA 8151A	EPA 8151A
Pentachlorophenol	----------	EPA 8151A	EPA 8151A	EPA 8151A
Silvex (2,4,5-TP)	----------	EPA 8151A	EPA 8151A	EPA 8151A
MCPA	----------	EPA 8151A	EPA 8151A	EPA 8151A
MCPP	----------	EPA 8151A	EPA 8151A	EPA 8151A
Pugeable Organics (volatiles-VOC)				
1,1,1,2-Tetrachloroethane	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
1,1,1-Trichloroethane	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
1,1,2,2-Tetrachloroethane	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
1,1,2-Trichloroethane	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
1,1,2-Trichlorotrifluoroethane	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
1,1-Dichloroethane	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
1,1-Dichloroethene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
1,1-Dichloropropene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
1,2,3-Trichlorobenzene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
1,2,3-Trichloropropane	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C

			Solid Hazardous Waste	
Parameter/Analyte	Potable Water	Non-potable Water	Aqueous	Solid/Chemical
1,2,4-Trichlorobenzene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
1,2,4-Trimethylbenzene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
1,2-Dibromo-3-chloropropane	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
1,2-Dibromoethane	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
1,2-Dichlorobenzene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
1,2-Dichloroethane	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
1,2-Dichloropropane	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
1,3,5-Trimethylbenzene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
1,3-Dichlorobenzene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
1,3-Dichloropropane	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
1,4-Dichlorobenzene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
2,2-Dichloropropane	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
2-Butanone (Methyl ethyl ketone)	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
2-Chloroethyl vinyl ether	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
2-Chlorotoluene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
2-Hexanone	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
4-Chlorotoluene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
4-methyl-2-pentanone	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Acetone	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Acetonitrile	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Acrolein	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Acrylonitrile	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Benzene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Bromobenzene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Bromochloromethane	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Bromodichloromethane	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Bromoform	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Bromomethane	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Carbon disulphide	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Carbon tetrachloride	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Chlorobenzene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Chloroethane	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Chloroform	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Chloromethane	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
cis-1,2-Dichloroethene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
cis-1,3-Dichloropropene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Cyclohexane	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Dibromochloromethane	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Dibromomethane	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Dichlorodifluoromethane	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Ethyl benzene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Ethyl tert-butyl ether (ETBE)	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Hexachlorobutadiene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Hexachloroethane	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Iodomethane	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Isopropyl ether (DIPE)	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C

			Solid Hazardous Waste	
Parameter/Analyte	Potable Water	Non-potable Water	Aqueous	Solid/Chemical
Isopropylbenzene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
m+p-Xylene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Methylacetate	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Methylcyclohexane	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Methyl tert-butyl ether (MTBE)	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Methylene chloride (Dichloromethane)	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Naphthalene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
n-Butyl benzene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
n-Propylbenzene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
o-Xylene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
p-isopropyl toluene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
sec-Butyl benzene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Styrene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
tert-Amyl methyl ether (TAME)	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
tert-Butyl alcohol (t-Butanol)	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
tert-Butyl benzene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
tert-Butyl ethyl ether (ETBE)	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Tetrachloroethene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Toluene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Total Xylenes	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
trans-1,2-Dichloroethene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
trans-1,3-Dichloropropene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Trichloroethene	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Trichlorofluoromethane	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Vinyl Acetate	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Vinyl chloride	----------	EPA 8260B/8260C	EPA 8260B/8260C	EPA 8260B/8260C
Extractable Organics (semivolatiles-SVOC)				
1,1'-Biphenyl	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
1,2,4,5-Tetrachlorobenzene	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
1,2,4-Trichlorbenzene	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
1,2-Dichlorobenzene	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
1,3-Dichlorobenzene	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
1,4-Dichlorobenzene	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
1,4-Dioxane	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
2,3,4,6-Tetrachlorophenol	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
2,4,5-Trichlorophenol	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
2,4,6-Trichlorophenol	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
2,4-Dichlorophenol	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
2,4-Dimethylphenol	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
2,4-Dinitrophenol	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
2,4-Dinitrotoluene (2,4-DNT)	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
2,6-Dichlorophenol	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
2,6-Dinitrotoluene (2,6-DNT)	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
2-Chloronaphthalene	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D

			Solid Hazardous Waste	
Parameter/Analyte	Potable Water	Non-potable Water	Aqueous	Solid/Chemical
2-Chlorophenol	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
2-Methyl-4,6-Dinitrophenol	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
2-Methylnaphthalene	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
2-Methylphenol (o-Cresol)	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
2-Nitroaniline	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
2-Nitrophenol	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
3, 4-Methylphenol (m+p-Cresol)	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
3,3'-Dichlorobenzidine	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
3-Nitroaniline	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
4-Bromophenyl phenyl ether	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
4-Chloro-3-methylphenol	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
4-Chloroaniline	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
4-Chlorophenyl phenylether	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
4-Methylphenol (p-Cresol)	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
4-Nitroaniline	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
4-Nitrophenol	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Acenaphthene	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Acenaphthylene	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Acetophenone	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Aniline	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Anthracene	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Atrazine	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Benzaldehyde	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Benzidine	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Benzo(a)anthracene	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Benzo(a)pyrene	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Benzo(b)fluoranthene	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Benzo(g,h,i)perylene	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Benzo(k)fluoranthene	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Benzoic acid	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Benzyl alcohol	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Benzyl butyl phthalate	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Biphenyl	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
bis(2-Chloroethoxy) methane	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
bis(2-Chloroethyl) ether	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
bis(2-Chloroisopropyl) ether	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
bis(2-Ethylhexyl) phthalate (DEHP)	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Butyl benzyl phthalate	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Caprolactam	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Carbazole	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Chrysene	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Dibenz(a,h) anthracene	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Dibenzofuran	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Diethyl phthalate	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Dimethyl phthalate	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Di-n-butyl phthalate	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D

			Solid Hazardous Waste	
Parameter/Analyte	Potable Water	Non-potable Water	Aqueous	Solid/Chemical
Di-n-octyl phthalate	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Fluoranthene	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Fluorene	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Hexachlorobenzene	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Hexachlorobutadiene	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Hexachlorocyclopentadiene	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Hexachloroehane	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Indeno(1,2,3-cd) pyrene	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Isophorone	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Naphthalene	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Nitrobenzene	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
N-nitrosodimethylamine	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
N-nitrosodi-n-propylamine	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
N-nitrosodiphenylamine	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Pentachlorophenol	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Phenanthrene	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Phenol	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Pyrene	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
Pyridine	----------	EPA 8270C/8270D	EPA 8270C/8270D	EPA 8270C/8270D
1-Methylnaphthalene	----------	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM
2-Methylnaphthalene	----------	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM
Acenaphthene	----------	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM
Acenaphthylene	----------	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM
Anthracene	----------	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM
Benzo(a)anthracene	----------	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM
Benzo(a)pyrene	----------	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM
Benzo(b)fluoranthene	----------	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM
Benzo(b+k)fluoranthene	----------	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM
Benzo(g,h,I)perylene	----------	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM
Benzo(k)fluoranthene	----------	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM
Chrysene	----------	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM
Dibenzo(a,h)anthracene	----------	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM
Fluoranthene	----------	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM

			Solid Hazardous Waste	
Parameter/Analyte	Potable Water	Non-potable Water	Aqueous	Solid/Chemical
Fluorene	----------	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM
Indeno(1,2,3-cd) pyrene	----------	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM
Naphthalene	----------	EPA 8270C SIM/8270D SIM	EPA 8270C SIM /8270D SIM	EPA 8270C SIM/8270D SIM
Phenanthrene	----------	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM
Pyrene	----------	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM	EPA 8270C SIM/8270D SIM
Dioxins/Furans				
1,2,3,4,6,7,8,9-OCDD	----------	EPA 8290/8290A	EPA 8290/8290A	EPA 8290/8290A
1,2,3,4,6,7,8,9-OCDF	----------	EPA 8290/8290A	EPA 8290/8290A	EPA 8290/8290A
1,2,3,4,6,7,8-Hpcdd	----------	EPA 8290/8290A	EPA 8290/8290A	EPA 8290/8290A
1,2,3,4,6,7,8-Hpcdf	----------	EPA 8290/8290A	EPA 8290/8290A	EPA 8290/8290A
1,2,3,4,7,8,9-Hpcdf	----------	EPA 8290/8290A	EPA 8290/8290A	EPA 8290/8290A
1,2,3,4,7,8-Hxcdd	----------	EPA 8290/8290A	EPA 8290/8290A	EPA 8290/8290A
1,2,3,4,7,8-Hxcdf	----------	EPA 8290/8290A	EPA 8290/8290A	EPA 8290/8290A
1,2,3,6,7,8-Hxcdd	----------	EPA 8290/8290A	EPA 8290/8290A	EPA 8290/8290A
1,2,3,6,7,8-Hxcdf	----------	EPA 8290/8290A	EPA 8290/8290A	EPA 8290/8290A
1,2,3,7,8,9-Hxcdd	----------	EPA 8290/8290A	EPA 8290/8290A	EPA 8290/8290A
1,2,3,7,8,9-Hxcdf	----------	EPA 8290/8290A	EPA 8290/8290A	EPA 8290/8290A
1,2,3,7,8-Pecdd	----------	EPA 8290/8290A	EPA 8290/8290A	EPA 8290/8290A
1,2,3,7,8-Pecdf	----------	EPA 8290/8290A	EPA 8290/8290A	EPA 8290/8290A
2,3,4,6,7,8-Hxcdf	----------	EPA 8290/8290A	EPA 8290/8290A	EPA 8290/8290A
2,3,4,7,8-Pecdf	----------	EPA 8290/8290A	EPA 8290/8290A	EPA 8290/8290A
2,3,7,8-TCDD	----------	EPA 8290/8290A	EPA 8290/8290A	EPA 8290/8290A
2,3,7,8-TCDF	----------	EPA 8290/8290A	EPA 8290/8290A	EPA 8290/8290A
Hpcdd, total	----------	EPA 8290/8290A	EPA 8290/8290A	EPA 8290/8290A
Hpcdf, total	----------	EPA 8290/8290A	EPA 8290/8290A	EPA 8290/8290A
Hxcdd, total	----------	EPA 8290/8290A	EPA 8290/8290A	EPA 8290/8290A
Hxcdf, total	----------	EPA 8290/8290A	EPA 8290/8290A	EPA 8290/8290A
PCDD + PCDF, total	----------	EPA 8290/8290A	EPA 8290/8290A	EPA 8290/8290A
PCDD, total	----------	EPA 8290/8290A	EPA 8290/8290A	EPA 8290/8290A
PCDF, total	----------	EPA 8290/8290A	EPA 8290/8290A	EPA 8290/8290A
Pecdd, total	----------	EPA 8290/8290A	EPA 8290/8290A	EPA 8290/8290A
Pecdf, total	----------	EPA 8290/8290A	EPA 8290/8290A	EPA 8290/8290A
TCDD, total	----------	EPA 8290/8290A	EPA 8290/8290A	EPA 8290/8290A
TCDF, total	----------	EPA 8290/8290A	EPA 8290/8290A	EPA 8290/8290A
Carbamates/Energetics				
Aldicarb	----------	EPA 8321A	EPA 8321A	EPA 8321A
Ammonium Picrate	----------	EPA 8321A	EPA 8321A	EPA 8321A
Barban	----------	EPA 8321A	EPA 8321A	EPA 8321A
Baygon (Propoxur)	----------	EPA 8321A	EPA 8321A	EPA 8321A

			Solid Hazardous Waste	
Parameter/Analyte	Potable Water	Non-potable Water	Aqueous	Solid/Chemical
Bromacil	----------	EPA 8321A	EPA 8321A	EPA 8321A
Carbaryl	----------	EPA 8321A	EPA 8321A	EPA 8321A
Carbofuran	----------	EPA 8321A	EPA 8321A	EPA 8321A
Chloroxuron	----------	EPA 8321A	EPA 8321A	EPA 8321A
Diuron	----------	EPA 8321A	EPA 8321A	EPA 8321A
Linuron	----------	EPA 8321A	EPA 8321A	EPA 8321A
Methiocarb	----------	EPA 8321A	EPA 8321A	EPA 8321A
Methomyl	----------	EPA 8321A	EPA 8321A	EPA 8321A
Oxamyl	----------	EPA 8321A	EPA 8321A	EPA 8321A
Picric Acid	----------	EPA 8321A	EPA 8321A	EPA 8321A
Propham	----------	EPA 8321A	EPA 8321A	EPA 8321A
Siduron	----------	EPA 8321A	EPA 8321A	EPA 8321A
Nitroguanidine	----------	EPA 8321A	EPA 8321A	EPA 8321A
Guanidine Nitrate	----------	EPA 8321A	EPA 8321A	EPA 8321A
Perchlorate	----------	EPA 6850	EPA 6851	EPA 6851
1,3,5-Trinitrobenzene	----------	EPA 8330A/8330B	EPA 8330A/8330B	EPA 8330A/8330B
1,3-Dinitrobenzene	----------	EPA 8330A/8330B	EPA 8330A/8330B	EPA 8330A/8330B
2,4,6-Trinitrotoluene	----------	EPA 8330A/8330B	EPA 8330A/8330B	EPA 8330A/8330B
2,4-Dinitrotoluene	----------	EPA 8330A/8330B	EPA 8330A/8330B	EPA 8330A/8330B
2,6-Dinitrotoluene	----------	EPA 8330A/8330B	EPA 8330A/8330B	EPA 8330A/8330B
2-Amino-4,6-dinitrotoluene	----------	EPA 8330A/8330B	EPA 8330A/8330B	EPA 8330A/8330B
2-Nitrotoluene	----------	EPA 8330A/8330B	EPA 8330A/8330B	EPA 8330A/8330B
3-Nitrotoluene	----------	EPA 8330A/8330B	EPA 8330A/8330B	EPA 8330A/8330B
4-Amino-2,6-dinitrotoluene	----------	EPA 8330A/8330B	EPA 8330A/8330B	EPA 8330A/8330B
4-Nitrotoluene	----------	EPA 8330A/8330B	EPA 8330A/8330B	EPA 8330A/8330B
HMX (Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine)	----------	EPA 8330A/8330B	EPA 8330A/8330B	EPA 8330A/8330B
Nitrobenzene	----------	EPA 8330A/8330B	EPA 8330A/8330B	EPA 8330A/8330B
Nitroglycerin	----------	EPA 8330A/8330B	EPA 8330A/8330B	EPA 8330A/8330B
Pentaerythritoltetranitrate (PETN)	----------	EPA 8330A/8330B	EPA 8330A/8330B	EPA 8330A/8330B
RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine)	----------	EPA 8330A/8330B	EPA 8330A/8330B	EPA 8330A/8330B
Tetryl (Methyl-2,4,6-trinitrophenylnitramine)	----------	EPA 8330A/8330B	EPA 8330A/8330B	EPA 8330A/8330B
Inorganics				
Ignitability	----------	----------	EPA 1030	EPA 1030
pH / Corrosivity	----------	EPA 9040C	----------	----------
pH / Corrosivity	----------	----------	EPA 9045C/D	EPA 9045C/D
Chromium VI	EPA 218.6/ 218.7	EPA 218.6/218.7	----------	----------
Chromium VI	----------	EPA 7199	EPA 7199	EPA 7199
Chromium VI	----------	EPA 7196A	EPA 7196A	EPA 7196A
Bromide	EPA 300.0	EPA 300.0	EPA 300.0	EPA 300.0
Chloride	EPA 300.0	EPA 300.0	EPA 300.0	EPA 300.0
Fluoride	EPA 300.0	EPA 300.0	EPA 300.0	EPA 300.0
Nitrate as N	EPA 300.0	EPA 300.0	EPA 300.0	EPA 300.0
Nitrite + Nitrate as N	EPA 300.0	EPA 300.0	EPA 300.0	EPA 300.0

			Solid Hazardous Waste	
Parameter/Analyte	Potable Water	Non-potable Water	Aqueous	Solid/Chemical
Nitrite as N	EPA 300.0	EPA 300.0	EPA 300.0	EPA 300.0
Orthophosphate as P	EPA 300.0	EPA 300.0	EPA 300.0	EPA 300.0
Phosphate and Orthophosphate - as P	EPA 300.0	EPA 300.0	EPA 300.0	EPA 300.0
Sulfate	EPA 300.0	EPA 300.0	EPA 300.0	EPA 300.0
Bromide	----------	EPA 9056/9056A	EPA 9056/9056A	EPA 9056/9056A
Chloride	----------	EPA 9056/9056A	EPA 9056/9056A	EPA 9056/9056A
Fluoride	----------	EPA 9056/9056A	EPA 9056/9056A	EPA 9056/9056A
Nitrate as N (NO3- as N)	----------	EPA 9056/9056A	EPA 9056/9056A	EPA 9056/9056A
Nitrite + Nitrate as N	----------	EPA 9056/9056A	EPA 9056/9056A	EPA 9056/9056A
Nitrite as N	----------	EPA 9056/9056A	EPA 9056/9056A	EPA 9056/9056A
Sulfate	----------	EPA 9056/9056A	EPA 9056/9056A	EPA 9056/9056A
Phosphate and Orthophosphate - as P	----------	EPA 9056/9056A	EPA 9056/9056A	EPA 9056/9056A
Phosphate / Orthophosphate / Total Phosphorus	SM 4500 PE	SM 4500 PE	SM 4500 PE	SM 4500 PE
Cyanide, total and Amenable	----------	EPA 9010C & 9014	EPA 9010C & 9015	EPA 9010C & 9015
Cyanide, total and Amenable	SM 4500CN B,C,E,G	SM 4500CN B,C,E,G	SM 4500CN B,C,E,G	SM 4500CN B,C,E,G
Ammonia as N	EPA 350.1	EPA 350.1	EPA 350.1	EPA 350.1
Total Kheldahl Nitrogen	EPA 351.2	EPA 351.2	EPA 351.2	EPA 351.2
Nitrate as N	EPA 353.2	EPA 353.2	EPA 353.2	EPA 353.2
Nitriate + Nitrate as N	EPA 353.2	EPA 353.2	EPA 353.2	EPA 353.2
Nitrite as N	EPA 353.2	EPA 353.2	EPA 353.2	EPA 353.2
Nitrocellulose	EPA 353.2mod	EPA 353.2mod	EPA 353.2mod	EPA 353.2mod
Nitroguanadine	EPA 8321A/B	EPA 8321A/B	EPA 8321A/B	EPA 8321A/B
Bicarbonate	SM 2320B	SM 2320B	SM 2320B	SM 2320B
Carbonate	SM 2320B	SM 2320B	SM 2320B	SM 2320B
Hydroxide	SM 2320B	SM 2320B	SM 2320B	SM 2320B
Total Alkalinity (CaCO3)	SM 2320B	SM 2320B	SM 2320B	SM 2320B
Specific conductance, Conductivity (25C)	SM 2510B	SM 2510B	SM 2510B	SM 2510B
Total Dissolved Solids (TDS)	EPA 160.1	EPA 160.1	EPA 160.1	EPA 160.1
Total Dissolved Solids (TDS)	----------	SM 2540C	SM 2540C	SM 2540C
Non-Filterable Residue (TSS)	----------	SM 2540D	SM 2540D	SM 2540D
Ferrous Iron	SM 3500-Fe Bc	SM 3500-Fe Bc	SM 3500-Fe Bc	SM 3500-Fe Bc
Sulphide	SM 4500-S_2F	SM 4500-S_2F	SM 4500-S_2F	SM 4500-S_2F
Oil & Grease	SM 5520B	SM 5520B	SM 5520B	SM 5520B
TPH (Gravimetric)	SM 5520BF	SM 5520BF	SM 5520BF	SM 5520BF
n-Hexane Extractable Material (O&G)	----------	EPA 1664A	EPA 1664A	EPA 1664A
TPH (SGT-HEM)	----------	EPA 1664A	EPA 1664A	EPA 1664A
Total Organic Carbon (TOC)	----------	----------	WALKLEY-BLACK	WALKLEY-BLACK
Sample Preparation				
TCLP Extraction	----------	----------	EPA 1311	EPA 1311
SPLP Extraction	----------	----------	EPA 1312	EPA 1312
Acid digestion for metals analysis	----------	EPA 3010A	EPA 3010A	----------

			Solid Hazardous Waste	
Parameter/Analyte	Potable Water	Non-potable Water	Aqueous	Solid/Chemical
Microwave assisted acid digestion for metals analysis	----------	EPA 3015A	EPA 3015A	----------
Acid digestion for metals analysis	----------	----------	EPA 3050B	EPA 3050B
Microwave assisted acid digestion for metals analysis	----------	----------	EPA 3051A	EPA 3051A
Alkaline digestion for hexavalent chromium	----------	----------	EPA 3060A	EPA 3060A
Separatory funnel extraction	----------	EPA 3510C	EPA 3510C	----------
Liquid-Liquid extraction	----------	EPA 3520C	EPA 3520C	----------
Soxhlet extraction	----------	----------	EPA 3540C	EPA 3540C
SPE extraction for explosives	----------	EPA 3535A	EPA 3535A	----------
Ultrasonic extraction	----------	----------	EPA 3550B	EPA 3550B
Silica gel cleanup	----------	EPA 3630C	EPA 3630C	EPA 3630C
Sulfuric acid cleanup	----------	EPA 3660B	EPA 3660B	EPA 3660B
Sulfuric acid - Permanganate cleanup	----------	EPA 3665A	EPA 3665A	EPA 3665A
Purge and trap	----------	EPA 5030B/5030C	EPA 5030B/5030C	EPA 5030B/5030C
Closed-system purge and trap extraction	----------	EPA 5035/5035A	EPA 5035/5035A	EPA 5035/5035A
Mercury digestion	EPA 245.1	EPA 7470A	EPA 7470A	EPA 7470A
Mercury digestion	----------	EPA 7471A/7470B	EPA 7471A/7470B	EPA 7471A/7470B
Herbicide extraction	----------	EPA 8151A	EPA 8151A	EPA 8151A
Incremental sampling	----------	----------	EPA 8330B, Appendix A	EPA 8330B, Appendix A
Waste Extraction test (WET) (STLC)	----------	----------	CCR Chapter 11, Article 5, Appendix II	CCR Chapter 11, Article 5, Appendix II

Accredited Laboratory

A2LA has accredited

AGRICULTURE & PRIORITY POLLUTANTS LABORATORIES, INC. (APPL, INC.)

Clovis, CA

for technical competence in the field of

Environmental Testing

In recognition of the successful completion of the A2LA evaluation process that includes an assessment of the laboratory's compliance with ISO/IEC 17025:2005, the 2009 TNI Environmental Testing Laboratory Standard, and the requirements of the Department of Defense Environmental Laboratory Accreditation Program (DoD ELAP) as detailed in version 5.0 of the DoD Quality System Manual for Environmental Laboratories (QSM), accreditation is granted to this laboratory to perform recognized EPA methods as defined on the associated A2LA Environmental Scope of Accreditation. This accreditation demonstrates technical competence for this defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009).

AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION
CORPORATE SEAL 1978
DISTRICT OF COLUMBIA
A2LA

Presented this 3rd day of March 2016.

Senior Director of Quality and Communications
For the Accreditation Council
Certificate Number 4064.01
Valid to June 30, 2017

For the tests to which this accreditation applies, please refer to the laboratory's Environmental Scope of Accreditation.

PERRY JOHNSON LABORATORY ACCREDITATION, INC.

Certificate of Accreditation

Perry Johnson Laboratory Accreditation, Inc. has assessed the Laboratory of:

ALS Environmental-Kelso

1317 South 13th Avenue, Kelso, WA 98626

(Hereinafter called the Organization) and hereby declares that Organization has met the requirements of ISO/IEC 17025:2005 "General Requirements for the competence of Testing and Calibration Laboratories" and the DoD Quality Systems Manual for Environmental Laboratories Version 5.0 July 2013 and is accredited is accordance with the:

United States Department of Defense
Environmental Laboratory Accreditation Program
(DoD-ELAP)

This accreditation demonstrates technical competence for the defined scope:

Environmental Testing

(As detailed in the supplement)

Accreditation claims for such testing and/or calibration services shall only be made from addresses referenced within this certificate. This Accreditation is granted subject to the system rules governing the Accreditation referred to above, and the Organization hereby covenants with the Accreditation body's duty to observe and comply with the said rules.

For PJLA:

Initial Accreditation Date:	*Issue Date:*	*Expiration Date:*
July 19, 2011	February 13, 2016	February 28, 2018

Accreditation No.:	*Certificate No.:*
65188	L16-58

Tracy Szerszen
President/Operations Manager

Perry Johnson Laboratory
Accreditation, Inc. (PJLA)
755 W. Big Beaver, Suite 1325
Troy, Michigan 48084

The validity of this certificate is maintained through ongoing assessments based on a continuous accreditation cycle. The validity of this certificate should be confirmed through the PJLA website: www.pjlabs.com

Certificate of Accreditation: Supplement

ISO/IEC 17025:2005 and DoD-ELAP

ALS Environmental-Kelso

1317 South 13th Avenue, Kelso, WA 98626
Contact Name: Carl Degner Phone: 360-577-7222

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard/Method	Technology	Analyte
Aqueous	EPA 1631E	CVAFS	Mercury (Low level)
Aqueous	EPA 1664A	Gravimetry	Hexane Extractable Material (HEM)
Aqueous	EPA 1664A	Gravimetry	Total Petroleum Hydrocarbons (TPH)
Aqueous	EPA 180.1	Nephelometer	Turbidity
Aqueous	EPA 2340B	Calculation by 6010	Hardness as $CaCO_{3)}$
Aqueous	EPA 245.1	CVAA	Mercury
Aqueous	EPA 300.0	IC	Bromide
Aqueous	EPA 300.0	IC	Chloride
Aqueous	EPA 300.0	IC	Fluoride
Aqueous	EPA 300.0	IC	Nitrate + Nitrite as N
Aqueous	EPA 300.0	IC	Nitrate as N
Aqueous	EPA 300.0	IC	Nitrite as N
Aqueous	EPA 300.0	IC	Sulfate
Aqueous	EPA 353.2	Automated Colorimetry	Nitrate + Nitrite as N
Aqueous	EPA 1632	HG-CT-GC-AAS	Arsenic (III)
Aqueous	EPA 1632	HG-CT-GC-AAS	Arsenic (V)
Aqueous	EPA 1632	HG-CT-GC-AAS	Total Inorganic Arsenic
Aqueous	EPA 7196A	Colorimetry	Chromium VI
Aqueous	EPA 7470A	CVAA	Mercury
Aqueous	EPA 8260C SIM	GC-MS	1,1,2,2-Tetrachloroethane
Aqueous	EPA 8260C SIM	GC-MS	1,1,2-Trichloroethane
Aqueous	EPA 8260C SIM	GC-MS	1,1-Dichloroethene
Aqueous	EPA 8260C SIM	GC-MS	1,2-Dibromoethane
Aqueous	EPA 8260C SIM	GC-MS	1,2-Dichloroethane
Aqueous	EPA 8260C SIM	GC-MS	1,3 Butadine
Aqueous	EPA 8260C SIM	GC-MS	1,4-Dichlorobenzene
Aqueous	EPA 8260C SIM	GC-MS	Bromodichloromethane
Aqueous	EPA 8260C SIM	GC-MS	Carbon Tetrachloride
Aqueous	EPA 8260C SIM	GC-MS	Chlorodibromomethane
Aqueous	EPA 8260C SIM	GC-MS	Chloroform
Aqueous	EPA 8260C SIM	GC-MS	Chloromethane
Aqueous	EPA 8260C SIM	GC-MS	cis-1,2-Dichloroethene
Aqueous	EPA 8260C SIM	GC-MS	Dichloromethane (Methylene Chloride)
Aqueous	EPA 8260C SIM	GC-MS	Tetrachloroethene
Aqueous	EPA 8260C SIM	GC-MS	trans-1,2-Dichloroethene

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Contact Name: Carl Degner Phone: 360-577-7222

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard/Method	Technology	Analyte
Aqueous	EPA 8260C SIM	GC-MS	Trichloroethene
Aqueous	EPA 8260C SIM	GC-MS	Vinyl chloride
Aqueous	EPA 9020B	Microcoulometric-titration detector	Total Organic Halides (TOX)
Aqueous	EPA 9040C	pH Meter	pH
Aqueous	EPA 9060A	TOC Meter	Total Organic Carbons (TOC)
Aqueous	SM 10200 H	Colorimetry	Chlorophyll-A
Aqueous	SM 2130B	Nephelometer	Turbidity
Aqueous	SM 2320B	Titrimetry	Total Alkalinity (as $CaCO_3$)
Aqueous	SM 2510B	Conductivity Meter	Specific Conductance
Aqueous	SM 2540B	Balance	Solids, Total
Aqueous	SM 2540C	Balance	Solids, Total Dissolved
Aqueous	SM 2540D	Balance	Solids, Total Suspended
Aqueous	SM 4500-CN- G	Colorimetry	Cyanide, Amenable
Aqueous	SM 4500-P-E	Colorimetry	ortho-phosphorous
Aqueous	SM 4500-S2 D	Distillation Unit	Sulfide
Aqueous	SM 4500-CN E	Colorimetry	Total Cyanide
Aqueous	SM4500-NH3 G	Colorimetry	Ammonia
Aqueous	SM5220C	Titrimetry	Chemical Oxygen Demand (COD)
Aqueous	SM5310C	TOC Meter	Total Organic Carbons (TOC)
Aqueous	SOP-LCP-PFC	HPLC/MS/MS	6:2 Fluorotelomersulfonate
Aqueous	SOP-LCP-PFC	HPLC/MS/MS	8:2 Fluorotelomersulfonate
Aqueous	SOP-LCP-PFC	HPLC/MS/MS	N-Ethylperfluorooctanesulfonamide
Aqueous	SOP-LCP-PFC	HPLC/MS/MS	N-Ethylperfluorooctanesulfonamidoethanol
Aqueous	SOP-LCP-PFC	HPLC/MS/MS	N-Methylperfluorooctanesulfonamide
Aqueous	SOP-LCP-PFC	HPLC/MS/MS	N-Methylperfluorooctanesulfonamidoethanol
Aqueous	SOP-LCP-PFC	HPLC/MS/MS	Perfluoroheptanesulfonate
Aqueous	SOP-LCP-PFC	HPLC/MS/MS	Perfluorooctane Sulfonamide
Aqueous	SOP-LCP-PFC	HPLC/MS/MS	Perfluorotetradecanoic acid
Aqueous	SOP-LCP-PFC	HPLC/MS/MS	Perfluorotridecanoic
Drinking Water	EPA 504.1	GC-ECD	1,2-Dibromo-3-chloropropane (DBCP)
Drinking Water	EPA 504.1	GC-ECD	1,2-Dibromoethane (EDB)
Drinking Water	EPA 524.2	GC-MS	1,1,1,2-Tetrachloroethane
Drinking Water	EPA 524.2	GC-MS	1,1,1-Trichloroethane
Drinking Water	EPA 524.2	GC-MS	1,1,2,2-Tetrachloroethane
Drinking Water	EPA 524.2	GC-MS	1,1-Dichloroethane

Certificate of Accreditation: Supplement

ISO/IEC 17025:2005 and DoD-ELAP

ALS Environmental-Kelso
1317 South 13th Avenue, Kelso, WA 98626
Contact Name: Carl Degner Phone: 360-577-7222

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard/Method	Technology	Analyte
Drinking Water	EPA 524.2	GC-MS	1,1-Dichloroethene
Drinking Water	EPA 524.2	GC-MS	1,1-Dichloropropene
Drinking Water	EPA 524.2	GC-MS	1,2,3-Trichlorobenzene
Drinking Water	EPA 524.2	GC-MS	1,2,3-Trichloropropane
Drinking Water	EPA 524.2	GC-MS	1,2,4-Trichlorobenzene
Drinking Water	EPA 524.2	GC-MS	1,2,4-Trimethylbenzene
Drinking Water	EPA 524.2	GC-MS	1,2-Dibromoethane (EDB)
Drinking Water	EPA 524.2	GC-MS	1,2-Dichlorobenzene
Drinking Water	EPA 524.2	GC-MS	1,2-Dichloroethane
Drinking Water	EPA 524.2	GC-MS	1,2-Dichloropropane
Drinking Water	EPA 524.2	GC-MS	1,3,5-Trimethylbenzene
Drinking Water	EPA 524.2	GC-MS	1,3-Dichlorobenzene
Drinking Water	EPA 524.2	GC-MS	1,3-Dichloropropane
Drinking Water	EPA 524.2	GC-MS	1,4-Dichlorobenzene
Drinking Water	EPA 524.2	GC-MS	2,2-Dichloropropane
Drinking Water	EPA 524.2	GC-MS	2-Chlorotoluene
Drinking Water	EPA 524.2	GC-MS	4-Chlorotoluene
Drinking Water	EPA 524.2	GC-MS	4-Isopropyltoluene
Drinking Water	EPA 524.2	GC-MS	Benzene
Drinking Water	EPA 524.2	GC-MS	Bromobenzene
Drinking Water	EPA 524.2	GC-MS	Bromochloromethane
Drinking Water	EPA 524.2	GC-MS	Bromodichloromethane
Drinking Water	EPA 524.2	GC-MS	Bromoform
Drinking Water	EPA 524.2	GC-MS	Bromomethane
Drinking Water	EPA 524.2	GC-MS	Carbon Tetrachloride
Drinking Water	EPA 524.2	GC-MS	Chlorobenzene
Drinking Water	EPA 524.2	GC-MS	Chlorodibromomethane
Drinking Water	EPA 524.2	GC-MS	Chloroethane
Drinking Water	EPA 524.2	GC-MS	Chloroform
Drinking Water	EPA 524.2	GC-MS	Chloromethane
Drinking Water	EPA 524.2	GC-MS	cis-1,2-Dichloroethene
Drinking Water	EPA 524.2	GC-MS	cis-1,3-Dichloropropene
Drinking Water	EPA 524.2	GC-MS	Dibromomethane
Drinking Water	EPA 524.2	GC-MS	Dichlorodifluoromethane
Drinking Water	EPA 524.2	GC-MS	Dichloromethane (Methylene Chloride)
Drinking Water	EPA 524.2	GC-MS	Ethylbenzene

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ISO/IEC 17025:2005 and DoD-ELAP

ALS Environmental-Kelso
1317 South 13th Avenue, Kelso, WA 98626
Contact Name: Carl Degner Phone: 360-577-7222

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard/Method	Technology	Analyte
Drinking Water	EPA 524.2	GC-MS	Hexachlorobutadiene
Drinking Water	EPA 524.2	GC-MS	Isopropylbenzene
Drinking Water	EPA 524.2	GC-MS	m+p-Xylene
Drinking Water	EPA 524.2	GC-MS	Naphthalene
Drinking Water	EPA 524.2	GC-MS	n-Butylbenzene
Drinking Water	EPA 524.2	GC-MS	n-Propylbenzene
Drinking Water	EPA 524.2	GC-MS	o-Xylene
Drinking Water	EPA 524.2	GC-MS	sec-Butylbenzene
Drinking Water	EPA 524.2	GC-MS	Styrene
Drinking Water	EPA 524.2	GC-MS	tert-butylbenzene
Drinking Water	EPA 524.2	GC-MS	Tetrachloroethene
Drinking Water	EPA 524.2	GC-MS	Toluene
Drinking Water	EPA 524.2	GC-MS	trans-1,2-Dichloroethene
Drinking Water	EPA 524.2	GC-MS	trans-1,3-Dichloropropene
Drinking Water	EPA 524.2	GC-MS	Trichloroethene
Drinking Water	EPA 524.2	GC-MS	Trichlorofluoromethane (Freon 11)
Drinking Water	EPA 524.2	GC-MS	Vinyl chloride
Drinking Water	EPA 524.2	GC-MS	Xylenes, total
Solid	ASTM D4129-92M, Lloyd Kahn	TOC Meter	Total Organic Carbons (TOC)
Solid	EPA 160.3M	Gravimetry	Solids, Total
Solid	EPA 1631E	CVFAS	Mercury (low level)
Solid	EPA 7471A, B	CVAA	Mercury
Solid	EPA 9045D	pH Meter	pH
Solid	EPA 9056A	IC	Nitrate as N
Solid	EPA 9056A	IC	Nitrite as N
Solid	EPA 9071B	Gravimetry	Hexane Extractable Material (HEM)
Solid	GEN-AVS	Colorimetry	Acid Volatile Sulfides
Solid	GEN-NCEL	Colorimetry	Nitrocellulose
Solid	LCP-LCMS4	HPLC/MS/MS	1,3,5-Trinitrobenzene
Solid	LCP-LCMS4	HPLC/MS/MS	1,3-Dinitrobenzene
Solid	LCP-LCMS4	HPLC/MS/MS	2,4,6-Trinitrotoluene
Solid	LCP-LCMS4	HPLC/MS/MS	2,4-Dinitrotoluene
Solid	LCP-LCMS4	HPLC/MS/MS	2,6-Dinitrotoluene
Solid	LCP-LCMS4	HPLC/MS/MS	2-Amino-4,6-dinitrotoluene
Solid	LCP-LCMS4	HPLC/MS/MS	3,5-Dinitroaniline
Solid	LCP-LCMS4	HPLC/MS/MS	4-Amino-2,6-dinitrotoluene

Certificate of Accreditation: Supplement

ISO/IEC 17025:2005 and DoD-ELAP

ALS Environmental-Kelso

1317 South 13th Avenue, Kelso, WA 98626

Contact Name: Carl Degner Phone: 360-577-7222

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard/Method	Technology	Analyte
Solid	LCP-LCMS4	HPLC/MS/MS	HMX (Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine)
Solid	LCP-LCMS4	HPLC/MS/MS	Pentaerythritoltetranitrate
Solid	LCP-LCMS4	HPLC/MS/MS	RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine)
Solid	LCP-LCMS4	HPLC/MS/MS	Tetryl (methyl-2,4,6-trinitrophenylnitramine)
Solid	LCP-Nitro	HPLC/MS/MS	2,4-Dinitrophenol
Solid	LCP-Nitro	HPLC/MS/MS	Picramic Acid
Solid	LCP-Nitro	HPLC/MS/MS	Picric Acid
Solid	PSEP	Gravimetry	Particle Size
Solid	SOP-GEN-AVS	Colorimetry	Acid Volatile Sulfides
Tissue	EPA 1631E	CVAFS	Mercury (low level)
Tissue	EPA 1632	HG-CT-GC-AAS	Arsenic (III)
Tissue	EPA 1632	HG-CT-GC-AAS	Arsenic (V)
Tissue	EPA 1632	HG-CT-GC-AAS	Total Inorganic Arsenic
Tissue	EPA 6010B, C/200.7	ICP	Aluminum
Tissue	EPA 6010B, C/200.7	ICP	Antimony
Tissue	EPA 6010B, C/200.7	ICP	Arsenic
Tissue	EPA 6010B, C/200.7	ICP	Barium
Tissue	EPA 6010B, C/200.7	ICP	Beryllium
Tissue	EPA 6010B, C/200.7	ICP	Boron
Tissue	EPA 6010B, C/200.7	ICP	Cadmium
Tissue	EPA 6010B, C/200.7	ICP	Calcium
Tissue	EPA 6010B, C/200.7	ICP	Chromium, total
Tissue	EPA 6010B, C/200.7	ICP	Cobalt
Tissue	EPA 6010B, C/200.7	ICP	Copper
Tissue	EPA 6010B, C/200.7	ICP	Iron
Tissue	EPA 6010B, C/200.7	ICP	Lead
Tissue	EPA 6010B, C/200.7	ICP	Magnesium
Tissue	EPA 6010B, C/200.7	ICP	Manganese
Tissue	EPA 6010B, C/200.7	ICP	Molybdenum
Tissue	EPA 6010B, C/200.7	ICP	Nickel
Tissue	EPA 6010B, C/200.7	ICP	Potassium
Tissue	EPA 6010B, C/200.7	ICP	Selenium
Tissue	EPA 6010B, C/200.7	ICP	Silver
Tissue	EPA 6010B, C/200.7	ICP	Sodium

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ALS Environmental-Kelso

1317 South 13th Avenue, Kelso, WA 98626
Contact Name: Carl Degner Phone: 360-577-7222

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard/Method	Technology	Analyte
Tissue	EPA 6010B, C/200.7	ICP	Strontium
Tissue	EPA 6010B, C/200.7	ICP	Thallium
Tissue	EPA 6010B, C/200.7	ICP	Tin
Tissue	EPA 6010B, C/200.7	ICP	Titanium
Tissue	EPA 6010B, C/200.7	ICP	Vanadium
Tissue	EPA 6010B, C/200.7	ICP	Zinc
Tissue	EPA 6020A/200.8	ICP-MS	Aluminum
Tissue	EPA 6020A/200.8	ICP-MS	Antimony
Tissue	EPA 6020A/200.8	ICP-MS	Arsenic
Tissue	EPA 6020A/200.8	ICP-MS	Barium
Tissue	EPA 6020A/200.8	ICP-MS	Beryllium
Tissue	EPA 6020A/200.8	ICP-MS	Boron
Tissue	EPA 6020A/200.8	ICP-MS	Cadmium
Tissue	EPA 6020A/200.8	ICP-MS	Chromium, total
Tissue	EPA 6020A/200.8	ICP-MS	Cobalt
Tissue	EPA 6020A/200.8	ICP-MS	Copper
Tissue	EPA 6020A/200.8	ICP-MS	Iron
Tissue	EPA 6020A/200.8	ICP-MS	Lead
Tissue	EPA 6020A/200.8	ICP-MS	Manganese
Tissue	EPA 6020A/200.8	ICP-MS	Molybdenum
Tissue	EPA 6020A/200.8	ICP-MS	Nickel
Tissue	EPA 6020A/200.8	ICP-MS	Selenium
Tissue	EPA 6020A/200.8	ICP-MS	Silver
Tissue	EPA 6020A/200.8	ICP-MS	Strontium
Tissue	EPA 6020A/200.8	ICP-MS	Thallium
Tissue	EPA 6020A/200.8	ICP-MS	Tin
Tissue	EPA 6020A/200.8	ICP-MS	Titanium
Tissue	EPA 6020A/200.8	ICP-MS	Vanadium
Tissue	EPA 6020A/200.8	ICP-MS	Zinc
Tissue	EPA 7471A, B	CVAA	Mercury
Tissue	EPA 7742	AA, Borohydride Reduction; GFAA	Selenium
Tissue	EPA 8081A, B	GC-ECD	Aldrin
Tissue	EPA 8081A, B	GC-ECD	alpha-BHC
Tissue	EPA 8081A, B	GC-ECD	alpha-Chlordane
Tissue	EPA 8081A, B	GC-ECD	Chlordane (total)

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ALS Environmental-Kelso
1317 South 13th Avenue, Kelso, WA 98626
Contact Name: Carl Degner Phone: 360-577-7222

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard/Method	Technology	Analyte
Tissue	EPA 8081A, B	GC-ECD	DDD (4,4)
Tissue	EPA 8081A, B	GC-ECD	DDE (4,4)
Tissue	EPA 8081A, B	GC-ECD	DDT (4,4)
Tissue	EPA 8081A, B	GC-ECD	delta-BHC
Tissue	EPA 8081A, B	GC-ECD	Dieldrin
Tissue	EPA 8081A, B	GC-ECD	Endosulfan I
Tissue	EPA 8081A, B	GC-ECD	Endosulfan II
Tissue	EPA 8081A, B	GC-ECD	Endosulfan sulfate
Tissue	EPA 8081A, B	GC-ECD	Endrin
Tissue	EPA 8081A, B	GC-ECD	Endrin aldehyde
Tissue	EPA 8081A, B	GC-ECD	Endrin ketone
Tissue	EPA 8081A, B	GC-ECD	gamma-BHC
Tissue	EPA 8081A, B	GC-ECD	gamma-Chlordane
Tissue	EPA 8081A, B	GC-ECD	Heptachlor
Tissue	EPA 8081A, B	GC-ECD	Heptachlor Epoxide (beta)
Tissue	EPA 8081A, B	GC-ECD	Methoxychlor
Tissue	EPA 8081A, B	GC-ECD	Toxaphene (total)
Tissue	EPA 8081B	GC-ECD	2,4-DDD
Tissue	EPA 8081B	GC-ECD	2,4-DDE
Tissue	EPA 8081B	GC-ECD	2,4-DDT
Tissue	EPA 8081B	GC-ECD	Chlorpyrifos
Tissue	EPA 8081B	GC-ECD	cis-Nonachlor
Tissue	EPA 8081B	GC-ECD	Hexachlorobenzene
Tissue	EPA 8081B	GC-ECD	Hexachloroethane
Tissue	EPA 8081B	GC-ECD	Hexchlorobutadiene
Tissue	EPA 8081B	GC-ECD	Isodrin
Tissue	EPA 8081B	GC-ECD	Mirex
Tissue	EPA 8081B	GC-ECD	Oxychlordane
Tissue	EPA 8081B	GC-ECD	trans-Nonachlor
Tissue	EPA 8082A	GC-ECD	2,2',3,3',4,4',5,5',6,6' Decachlorobiphenyl (PCB 209)
Tissue	EPA 8082A	GC-ECD	2,2’,3,3’,4,4’,5,5’,6-Nonachlorobiphenyl (PCB 206)
Tissue	EPA 8082A	GC-ECD	2,2’,3,3’,4,4’,5,6-Octachlorobiphenyl (PCB 195)
Tissue	EPA 8082A	GC-ECD	2,2’,3,3’,4,4’,5-Heptachlorobiphenyl (PCB 170)
Tissue	EPA 8082A	GC-ECD	2,2’,3,3’,4,4’-Hexachlorobiphenyl (PCB 128)
Tissue	EPA 8082A	GC-ECD	2,2’,3,4,4’,5,5’-Heptachlorobiphenyl (PCB 180)
Tissue	EPA 8082A	GC-ECD	2,2’,3,4,4’,5’,6-Heptachlorobiphenyl (PCB 183)

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ALS Environmental-Kelso
1317 South 13th Avenue, Kelso, WA 98626
Contact Name: Carl Degner Phone: 360-577-7222

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard/Method	Technology	Analyte
Tissue	EPA 8082A	GC-ECD	2,2',3,4,4',5'-Hexachlorobiphenyl (PCB 138)
Tissue	EPA 8082A	GC-ECD	2,2',3,4,4',6,6'-Heptachlorobiphenyl (PCB 184)
Tissue	EPA 8082A	GC-ECD	2,2',3,4,5'-Pentachlorobiphenyl (PCB 87)
Tissue	EPA 8082A	GC-ECD	2,2',3,4',5,5',6-Heptachlorobiphenyl (PCB 187)
Tissue	EPA 8082A	GC-ECD	2,2',3,4',5-Pentachlorobiphenyl (PCB 90)
Tissue	EPA 8082A	GC-ECD	2,2',3,5'-Tetrachlorobiphenyl (PCB 44)
Tissue	EPA 8082A	GC-ECD	2,2',4,4',5,5'-Hexachlorobiphenyl (PCB 153)
Tissue	EPA 8082A	GC-ECD	2,2',4,5,5'-Pentachlorobiphenyl (PCB 101)
Tissue	EPA 8082A	GC-ECD	2,2',5,6'-Tetrachlorbiphenyl (PCB 53)
Tissue	EPA 8082A	GC-ECD	2,2',5-Trichlorobiphenyl (PCB 18)
Tissue	EPA 8082A	GC-ECD	2,3,3',4,4',5,5'-Heptachlorobiphenyl (PCB 189)
Tissue	EPA 8082A	GC-ECD	2,3,3',4,4',5'-Hexachlorobiphenyl (PCB 157)
Tissue	EPA 8082A	GC-ECD	2,3,3',4,4',5-Hexachlorobiphenyl (PCB 156)
Tissue	EPA 8082A	GC-ECD	2,3,3',4,4',6-Hexachlorobiphenyl (PCB 158)
Tissue	EPA 8082A	GC-ECD	2,3,3',4,4'-Pentachlorobiphenyl (PCB 105)
Tissue	EPA 8082A	GC-ECD	2,3,4,4',5-Pentachlorobiphenyl (PCB 114)
Tissue	EPA 8082A	GC-ECD	2,3,4,4'-Tetrachlorobiphenyl (PCB 60)
Tissue	EPA 8082A	GC-ECD	2,3',4,4',5,5' Hexachlorobiphenyl (PCB 167)
Tissue	EPA 8082A	GC-ECD	2,3',4,4',5',6-Hexachlorobiphenyl (PCB 168)
Tissue	EPA 8082A	GC-ECD	2,3',4,4',5-Pentachlorobiphenyl (PCB 118)
Tissue	EPA 8082A	GC-ECD	2,3',4,4',5-Pentachlorobiphenyl (PCB 123)
Tissue	EPA 8082A	GC-ECD	2,3',4,4'-Tetrachlorobiphenyl (PCB 66)
Tissue	EPA 8082A	GC-ECD	2,4,4'-Trichlorobiphenyl (PCB 28)
Tissue	EPA 8082A	GC-ECD	2,4'-Dichlorobiphenyl (PCB 8)
Tissue	EPA 8082A	GC-ECD	3,3',4,4',5,5'-Hexachlorobiphenyl (PCB 169)
Tissue	EPA 8082A	GC-ECD	3,3',4,4',5-Pentachlorobiphenyl (PCB 126)
Tissue	EPA 8082A	GC-ECD	3,3',4,4'-Tetrachlorobiphenyl (PCB 77)
Tissue	EPA 8082A	GC-ECD	3,4,4',5-Tetrachlorobiphenyl (PCB 81)
Tissue	EPA 8082A	GC-ECD	Aroclor 1016
Tissue	EPA 8082A	GC-ECD	Aroclor 1221
Tissue	EPA 8082A	GC-ECD	Aroclor 1232
Tissue	EPA 8082A	GC-ECD	Aroclor 1242
Tissue	EPA 8082A	GC-ECD	Aroclor 1248
Tissue	EPA 8082A	GC-ECD	Aroclor 1254
Tissue	EPA 8082A	GC-ECD	Aroclor 1260
Tissue	EPA 8082A	GC-ECD	Aroclor 1262

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ALS Environmental-Kelso
1317 South 13th Avenue, Kelso, WA 98626
Contact Name: Carl Degner Phone: 360-577-7222

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard/Method	Technology	Analyte
Tissue	EPA 8082A	GC-ECD	Aroclor 1268
Tissue	EPA 8270 SIM	GC-MS	PBDE 100
Tissue	EPA 8270 SIM	GC-MS	PBDE 128
Tissue	EPA 8270 SIM	GC-MS	PBDE 138
Tissue	EPA 8270 SIM	GC-MS	PBDE 153
Tissue	EPA 8270 SIM	GC-MS	PBDE 154
Tissue	EPA 8270 SIM	GC-MS	PBDE 17
Tissue	EPA 8270 SIM	GC-MS	PBDE 183
Tissue	EPA 8270 SIM	GC-MS	PBDE 190
Tissue	EPA 8270 SIM	GC-MS	PBDE 203
Tissue	EPA 8270 SIM	GC-MS	PBDE 206
Tissue	EPA 8270 SIM	GC-MS	PBDE 209
Tissue	EPA 8270 SIM	GC-MS	PBDE 28
Tissue	EPA 8270 SIM	GC-MS	PBDE 47
Tissue	EPA 8270 SIM	GC-MS	PBDE 66
Tissue	EPA 8270 SIM	GC-MS	PBDE 71
Tissue	EPA 8270 SIM	GC-MS	PBDE 85
Tissue	EPA 8270 SIM	GC-MS	PBDE 99
Tissue	EPA 8270 SIM PAH	GC-MS	2-Methylnaphthalene
Tissue	EPA 8270 SIM PAH	GC-MS	Acenaphthene
Tissue	EPA 8270 SIM PAH	GC-MS	Acenaphthylene
Tissue	EPA 8270 SIM PAH	GC-MS	Anthracene
Tissue	EPA 8270 SIM PAH	GC-MS	Benzo(a)anthracene
Tissue	EPA 8270 SIM PAH	GC-MS	Benzo(a)pyrene
Tissue	EPA 8270 SIM PAH	GC-MS	Benzo(b)fluoranthene
Tissue	EPA 8270 SIM PAH	GC-MS	Benzo(g,h,i)perylene
Tissue	EPA 8270 SIM PAH	GC-MS	Benzo(k)fluoranthene
Tissue	EPA 8270 SIM PAH	GC-MS	Chrysene
Tissue	EPA 8270 SIM PAH	GC-MS	Dibenzo(a,h)anthracene
Tissue	EPA 8270 SIM PAH	GC-MS	Fluoranthene
Tissue	EPA 8270 SIM PAH	GC-MS	Fluorene
Tissue	EPA 8270 SIM PAH	GC-MS	Indeno(1,2,3, cd)pyrene
Tissue	EPA 8270 SIM PAH	GC-MS	Naphthalene
Tissue	EPA 8270 SIM PAH	GC-MS	Phenanthrene
Tissue	EPA 8270 SIM PAH	GC-MS	Pyrene
Tissue	EPA 8270D SIM	GC-MS	1,2,4,5-Tetrachlorobenzene

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ALS Environmental-Kelso
1317 South 13th Avenue, Kelso, WA 98626
Contact Name: Carl Degner Phone: 360-577-7222

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard/Method	Technology	Analyte
Tissue	EPA 8270D SIM	GC-MS	1,2,4-Trichlorobenzene
Tissue	EPA 8270D SIM	GC-MS	1,2-Dichlorobenzene
Tissue	EPA 8270D SIM	GC-MS	1,3-Dichlorobenzene
Tissue	EPA 8270D SIM	GC-MS	1,4-Dichlorobenzene
Tissue	EPA 8270D SIM	GC-MS	2,3,4,6-Tetrachlorophenol
Tissue	EPA 8270D SIM	GC-MS	2,4,5-Trichlorophenol
Tissue	EPA 8270D SIM	GC-MS	2,4,6-Trichlorophenol
Tissue	EPA 8270D SIM	GC-MS	2,4-Dichlorophenol
Tissue	EPA 8270D SIM	GC-MS	2,4-Dimethylphenol
Tissue	EPA 8270D SIM	GC-MS	2,4-Dinitrophenol
Tissue	EPA 8270D SIM	GC-MS	2,4-Dinitrotoluene
Tissue	EPA 8270D SIM	GC-MS	2,6-Dinitrotoluene
Tissue	EPA 8270D SIM	GC-MS	2-Chloronaphthalene
Tissue	EPA 8270D SIM	GC-MS	2-Chlorophenol
Tissue	EPA 8270D SIM	GC-MS	2-Methyl-4,6-Dinitrophenol
Tissue	EPA 8270D SIM	GC-MS	2-Methylnaphthalene
Tissue	EPA 8270D SIM	GC-MS	2-Methylphenol
Tissue	EPA 8270D SIM	GC-MS	2-Nitroaniline
Tissue	EPA 8270D SIM	GC-MS	2-Nitrophenol
Tissue	EPA 8270D SIM	GC-MS	3,3-Dichlorobenzidine
Tissue	EPA 8270D SIM	GC-MS	3-Nitroaniline
Tissue	EPA 8270D SIM	GC-MS	4-Bromophenyl-phenylether
Tissue	EPA 8270D SIM	GC-MS	4-Chloro-3-methylphenol
Tissue	EPA 8270D SIM	GC-MS	4-Chloroaniline
Tissue	EPA 8270D SIM	GC-MS	4-Chlorophenyl-phenylether
Tissue	EPA 8270D SIM	GC-MS	4-Methylphenol (and/or 3-Methylphenol)
Tissue	EPA 8270D SIM	GC-MS	4-Nitroaniline
Tissue	EPA 8270D SIM	GC-MS	4-Nitrophenol
Tissue	EPA 8270D SIM	GC-MS	Acenaphthene
Tissue	EPA 8270D SIM	GC-MS	Acenaphthylene
Tissue	EPA 8270D SIM	GC-MS	Anthracene
Tissue	EPA 8270D SIM	GC-MS	Benzo(a)anthracene
Tissue	EPA 8270D SIM	GC-MS	Benzo(a)pyrene
Tissue	EPA 8270D SIM	GC-MS	Benzo(b)fluoranthene
Tissue	EPA 8270D SIM	GC-MS	Benzo(g,h,i)perylene
Tissue	EPA 8270D SIM	GC-MS	Benzo(k)fluoranthene

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ALS Environmental-Kelso
1317 South 13th Avenue, Kelso, WA 98626
Contact Name: Carl Degner Phone: 360-577-7222

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard/Method	Technology	Analyte
Tissue	EPA 8270D SIM	GC-MS	Benzoic acid
Tissue	EPA 8270D SIM	GC-MS	Benzyl alcohol
Tissue	EPA 8270D SIM	GC-MS	bis(2-Chloroethoxy)methane
Tissue	EPA 8270D SIM	GC-MS	bis(2-Chloroethyl)ether
Tissue	EPA 8270D SIM	GC-MS	bis(2-Chloroisopropyl)ether
Tissue	EPA 8270D SIM	GC-MS	bis(2-ethylhexy)phthalate
Tissue	EPA 8270D SIM	GC-MS	Butyl benzyl phthalate
Tissue	EPA 8270D SIM	GC-MS	Carbazole
Tissue	EPA 8270D SIM	GC-MS	Chrysene
Tissue	EPA 8270D SIM	GC-MS	Dibenzo(a,h)anthracene
Tissue	EPA 8270D SIM	GC-MS	Dibenzofuran
Tissue	EPA 8270D SIM	GC-MS	Diethyl phthalate
Tissue	EPA 8270D SIM	GC-MS	Dimethylphthalate
Tissue	EPA 8270D SIM	GC-MS	di-n-butylphthalate
Tissue	EPA 8270D SIM	GC-MS	Di-n-octylphthalate
Tissue	EPA 8270D SIM	GC-MS	Fluoranthene
Tissue	EPA 8270D SIM	GC-MS	Fluorene
Tissue	EPA 8270D SIM	GC-MS	Hexachlorobenzene
Tissue	EPA 8270D SIM	GC-MS	Hexachlorobutadiene
Tissue	EPA 8270D SIM	GC-MS	Hexachlorocyclopentadiene
Tissue	EPA 8270D SIM	GC-MS	Hexachloroethane
Tissue	EPA 8270D SIM	GC-MS	Indeno(1,2,3, cd)pyrene
Tissue	EPA 8270D SIM	GC-MS	Isophorone
Tissue	EPA 8270D SIM	GC-MS	Naphthalene
Tissue	EPA 8270D SIM	GC-MS	Nitrobenzene
Tissue	EPA 8270D SIM	GC-MS	N-Nitrosodimethylamine
Tissue	EPA 8270D SIM	GC-MS	N-Nitroso-di-n-propylamine
Tissue	EPA 8270D SIM	GC-MS	N-Nitrosodiphenylamine
Tissue	EPA 8270D SIM	GC-MS	Pentachlorophenol
Tissue	EPA 8270D SIM	GC-MS	Phenanthrene
Tissue	EPA 8270D SIM	GC-MS	Phenol
Tissue	EPA 8270D SIM	GC-MS	Pyrene
Tissue	EPA 8330B	HPLC	1,3,5-Trinitrobenzene
Tissue	EPA 8330B	HPLC	1,3-Dinitrobenzene
Tissue	EPA 8330B	HPLC	2,4,6-Trinitrotoluene
Tissue	EPA 8330B	HPLC	2,4-Dinitrotoluene

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Accreditation is granted to the facility to perform the following testing:

Matrix	Standard/Method	Technology	Analyte
Tissue	EPA 8330B	HPLC	2,6-Dinitrotoluene
Tissue	EPA 8330B	HPLC	2-Amino-4,6-dinitrotoluene
Tissue	EPA 8330B	HPLC	2-Nitrotoluene
Tissue	EPA 8330B	HPLC	3,5-Dinitroaniline
Tissue	EPA 8330B	HPLC	3-Nitrotoluene
Tissue	EPA 8330B	HPLC	4-Amino-2,6-dinitrotoluene
Tissue	EPA 8330B	HPLC	4-Nitrotoluene
Tissue	EPA 8330B	HPLC	HMX (octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine)
Tissue	EPA 8330B	HPLC	Nitrobenzene
Tissue	EPA 8330B	HPLC	Nitroglycerin
Tissue	EPA 8330B	HPLC	Pentachloronitrobenzene
Tissue	EPA 8330B	HPLC	Pentaerythritoltetranitrate
Tissue	EPA 8330B	HPLC	RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine)
Tissue	EPA 8330B	HPLC	Tetryl (methyl-2,4,6-trinitrophenylnitramine)
Tissue	OPPMS2	GC/MS/MS	Azinphos-methyl (Guthion)
Tissue	OPPMS2	GC/MS/MS	Chlorpyrifos
Tissue	OPPMS2	GC/MS/MS	Demeton O & S
Tissue	OPPMS2	GC/MS/MS	Diazinon
Tissue	OPPMS2	GC/MS/MS	Dichlorvos
Tissue	OPPMS2	GC/MS/MS	dimethoate
Tissue	OPPMS2	GC/MS/MS	Disulfoton
Tissue	OPPMS2	GC/MS/MS	Ethoprop
Tissue	OPPMS2	GC/MS/MS	Parathion, ethyl
Tissue	OPPMS2	GC/MS/MS	Parathion, methyl
Tissue	OPPMS2	GC/MS/MS	Phorate
Tissue	OPPMS2	GC/MS/MS	Ronnel
Tissue	OPPMS2	GC/MS/MS	Stirophos
Tissue	OPPMS2	GC/MS/MS	Sulfotepp
Tissue	SOC-Butyl	GC-FPD	Di-n-butyltin
Tissue	SOC-Butyl	GC-FPD	n-Butyltin
Tissue	SOC-Butyl	GC-FPD	Tetra-n-butyltin
Tissue	SOC-Butyl	GC-FPD	Tri-n-butyltin
Tissue	SOC-PESTMS2	GC/MS/MS	Aldrin
Tissue	SOC-PESTMS2	GC/MS/MS	Alpha-BHC
Tissue	SOC-PESTMS2	GC/MS/MS	beta-BHC
Tissue	SOC-PESTMS2	GC/MS/MS	DDD (4,4)

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ALS Environmental-Kelso
1317 South 13th Avenue, Kelso, WA 98626
Contact Name: Carl Degner Phone: 360-577-7222

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard/Method	Technology	Analyte
Tissue	SOC-PESTMS2	GC/MS/MS	DDE (4,4)
Tissue	SOC-PESTMS2	GC/MS/MS	DDT (4,4)
Tissue	SOC-PESTMS2	GC/MS/MS	delta-BHC
Tissue	SOC-PESTMS2	GC/MS/MS	Dieldrin
Tissue	SOC-PESTMS2	GC/MS/MS	Endosulfan I
Tissue	SOC-PESTMS2	GC/MS/MS	Endosulfan II
Tissue	SOC-PESTMS2	GC/MS/MS	Endosulfan sulfate
Tissue	SOC-PESTMS2	GC/MS/MS	Endrin
Tissue	SOC-PESTMS2	GC/MS/MS	Endrin aldehyde
Tissue	SOC-PESTMS2	GC/MS/MS	Endrin ketone
Tissue	SOC-PESTMS2	GC/MS/MS	gamma-BHC
Tissue	SOC-PESTMS2	GC/MS/MS	Heptachlor
Tissue	SOC-PESTMS2	GC/MS/MS	Heptachlor Epoxide (beta)
Tissue	SOC-PESTMS2	GC/MS/MS	Methoxychlor
Tissue	SOP LCP-LCMS4	HPLC/MS/MS	1,3,5-Trinitrobenzene
Tissue	SOP LCP-LCMS4	HPLC/MS/MS	1,3-Dinitrobenzene
Tissue	SOP LCP-LCMS4	HPLC/MS/MS	2,4,6-Trinitrotoluene
Tissue	SOP LCP-LCMS4	HPLC/MS/MS	2,4-Dinitrotoluene
Tissue	SOP LCP-LCMS4	HPLC/MS/MS	2,6-Dinitrotoluene
Tissue	SOP LCP-LCMS4	HPLC/MS/MS	2-Amino-4,6-dinitrtoluene
Tissue	SOP LCP-LCMS4	HPLC/MS/MS	3,5-Dinitroaniline
Tissue	SOP LCP-LCMS4	HPLC/MS/MS	4-Amino-2,6-dinitrotoluene
Tissue	SOP LCP-LCMS4	HPLC/MS/MS	HMX (octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine)
Tissue	SOP LCP-LCMS4	HPLC/MS/MS	Pentaerythritoltetranitrate
Tissue	SOP LCP-LCMS4	HPLC/MS/MS	RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine)
Tissue	SOP LCP-LCMS4	HPLC/MS/MS	Tetryl (methyl-2,4,6-trinitrophenylnitramine)
Tissue	SOP LCP-Nitro	HPLC/MS/MS	2,4-Dinitrophenol
Tissue	SOP LCP-Nitro	HPLC/MS/MS	Picramic Acid
Tissue	SOP LCP-Nitro	HPLC/MS/MS	Picric Acid
Tissue	SOP-LCP-PFC	HPLC/MS/MS	Perfluorobutane Sulfonate
Tissue	SOP-LCP-PFC	HPLC/MS/MS	Perfluorobutanoic Acid
Tissue	SOP-LCP-PFC	HPLC/MS/MS	Perfluorodecane Sulfonate
Tissue	SOP-LCP-PFC	HPLC/MS/MS	Perfluorodecanoic Acid
Tissue	SOP-LCP-PFC	HPLC/MS/MS	Perfluorododecanoic Acid
Tissue	SOP-LCP-PFC	HPLC/MS/MS	Perfluoroheptanoic Acid
Tissue	SOP-LCP-PFC	HPLC/MS/MS	Perfluorohexane Sulfonate

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Accreditation is granted to the facility to perform the following testing:

Matrix	Standard/Method	Technology	Analyte
Tissue	SOP-LCP-PFC	HPLC/MS/MS	Perfluorohexanoic Acid
Tissue	SOP-LCP-PFC	HPLC/MS/MS	Perfluorononanoic Acid
Tissue	SOP-LCP-PFC	HPLC/MS/MS	Perfluorooctane Sulfonate
Tissue	SOP-LCP-PFC	HPLC/MS/MS	Perfluorooctanoic Acid
Tissue	SOP-LCP-PFC	HPLC/MS/MS	Perfluoropentanoic Acid
Tissue	SOP-LCP-PFC	HPLC/MS/MS	Perfluoroundecanoic Acid
Aqueous/Drinking Water	EPA 537	HPLC/MS/MS	Perfluorobutanesulfonic Acid
Aqueous/Drinking Water	EPA 537	HPLC/MS/MS	Perfluoroheptanoic Acid
Aqueous/Drinking Water	EPA 537	HPLC/MS/MS	Perfluorohexanesulfonic Acid
Aqueous/Drinking Water	EPA 537	HPLC/MS/MS	Perfluorononanoic Acid
Aqueous/Drinking Water	EPA 537	HPLC/MS/MS	Perfluorooctanesulfonic Acid
Aqueous/Drinking Water	EPA 537	HPLC/MS/MS	Perfluorooctanoic Acid
Aqueous/Solid	ASTM D 1426-93B	ISE	Nitrogen, Total Kjeldahl (TKN)
Aqueous/Solid	EPA 1020A	Closed Cup Flashpoint	Ignitability
Aqueous/Solid	EPA 1630	CVAFS	Methyl Mercury
Aqueous/Solid	EPA 314.0	IC	Perchlorate
Aqueous/Solid	EPA 350.1	Colorimetry	Ammonia
Aqueous/Solid	EPA 365.3	Colorimetry	Total Phosphorus
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Aluminum
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Antimony
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Arsenic
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Barium
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Beryllium
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Boron
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Cadmium
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Calcium
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Chromium, total
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Cobalt
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Copper
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Iron
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Lead
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Magnesium
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Manganese
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Molybdenum
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Nickel
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Potassium

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ALS Environmental-Kelso
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Accreditation is granted to the facility to perform the following testing:

Matrix	Standard/Method	Technology	Analyte
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Selenium
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Silver
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Sodium
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Strontium
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Thallium
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Tin
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Titanium
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Vanadium
Aqueous/Solid	EPA 6010B, C/200.7	ICP	Zinc
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Aluminum
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Antimony
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Arsenic
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Barium
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Beryllium
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Boron
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Cadmium
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Chromium, total
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Cobalt
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Copper
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Iron
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Lead
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Manganese
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Molybdenum
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Nickel
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Selenium
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Silver
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Strontium
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Thallium
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Tin
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Titanium
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Vanadium
Aqueous/Solid	EPA 6020, A/200.8	ICP-MS	Zinc
Aqueous/Solid	EPA 6850	HPLC/MS/MS	Perchlorate
Aqueous/Solid	EPA 7742	AA, Borohydride Reduction; GFAA	Selenium
Aqueous/Solid	EPA 8011	GC-ECD	Ethylene Dibromide

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ALS Environmental-Kelso
1317 South 13th Avenue, Kelso, WA 98626
Contact Name: Carl Degner Phone: 360-577-7222

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard/Method	Technology	Analyte
Aqueous/Solid	EPA 8011	GC-ECD	1,2-Dibrom-3-chloropropane
Aqueous/Solid	EPA 8015C/AK103-RRO	GC-FID	Residual Range Organics (RRO)
Aqueous/Solid	EPA 8015C; AK101-GRO; NWTPH-Gx	GC-FID	Gasoline Range Organics (GRO)
Aqueous/Solid	EPA 8015C; AK102-DRO; NWTPH-Dx	GC-FID	Diesel Range Organics (DRO)
Aqueous/Solid	EPA 8081A, B	GC-ECD	Aldrin
Aqueous/Solid	EPA 8081A, B	GC-ECD	Alpha-BHC
Aqueous/Solid	EPA 8081A, B	GC-ECD	alpha-Chlordane
Aqueous/Solid	EPA 8081A, B	GC-ECD	Chlordane (total)
Aqueous/Solid	EPA 8081A, B	GC-ECD	DDD (4,4)
Aqueous/Solid	EPA 8081A, B	GC-ECD	DDE (4,4)
Aqueous/Solid	EPA 8081A, B	GC-ECD	DDT (4,4)
Aqueous/Solid	EPA 8081A, B	GC-ECD	delta-BHC
Aqueous/Solid	EPA 8081A, B	GC-ECD	Dieldrin
Aqueous/Solid	EPA 8081A, B	GC-ECD	Endosulfan I
Aqueous/Solid	EPA 8081A, B	GC-ECD	Endosulfan II
Aqueous/Solid	EPA 8081A, B	GC-ECD	Endosulfan sulfate
Aqueous/Solid	EPA 8081A, B	GC-ECD	Endrin
Aqueous/Solid	EPA 8081A, B	GC-ECD	Endrin aldehyde
Aqueous/Solid	EPA 8081A, B	GC-ECD	Endrin ketone
Aqueous/Solid	EPA 8081A, B	GC-ECD	gamma-BHC
Aqueous/Solid	EPA 8081A, B	GC-ECD	gamma-Chlordane
Aqueous/Solid	EPA 8081A, B	GC-ECD	Heptachlor
Aqueous/Solid	EPA 8081A, B	GC-ECD	Heptachlor Epoxide (beta)
Aqueous/Solid	EPA 8081A, B	GC-ECD	Methoxychlor
Aqueous/Solid	EPA 8081A, B	GC-ECD	Toxaphene (total)
Aqueous/Solid	EPA 8081B	GC-ECD	2,4-DDD
Aqueous/Solid	EPA 8081B	GC-ECD	2,4-DDE
Aqueous/Solid	EPA 8081B	GC-ECD	2,4-DDT
Aqueous/Solid	EPA 8081B	GC-ECD	Chlorpyrifos
Aqueous/Solid	EPA 8081B	GC-ECD	cis-Nonachlor
Aqueous/Solid	EPA 8081B	GC-ECD	Hexachlorobenzene
Aqueous/Solid	EPA 8081B	GC-ECD	Hexachlorobutadiene
Aqueous/Solid	EPA 8081B	GC-ECD	Hexachloroethane
Aqueous/Solid	EPA 8081B	GC-ECD	Isodrin

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Accreditation is granted to the facility to perform the following testing:

Matrix	Standard/Method	Technology	Analyte
Aqueous/Solid	EPA 8081B	GC-ECD	Mirex
Aqueous/Solid	EPA 8081B	GC-ECD	Oxychlordane
Aqueous/Solid	EPA 8081B	GC-ECD	trans-Nonachlor
Aqueous/Solid	EPA 8082A	GC-ECD	2,2’,3,3’,4,4’,5,5’,6-Nonachlorobiphenyl (PCB 206)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2’,3,3’,4,4’,5,6-Octachlorobiphenyl (PCB 195)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2',3,3',4,4',5,5',6,6' Decachlorobiphenyl (PCB 209)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2’,3,3’,4,4’,5-Heptachlorobiphenyl (PCB 170)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2’,3,3’,4,4’-Hexachlorobiphenyl (PCB 128)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2’,3,4,4’,5,5’-Heptachlorobiphenyl (PCB 180)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2’,3,4,4’,5’,6-Heptachlorobiphenyl (PCB 183)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2’,3,4,4’,5’-Hexachlorobiphenyl (PCB 138)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2’,3,4,4’,6,6’-Heptachlorobiphenyl (PCB 184)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2’,3,4’,5,5’,6-Heptachlorobiphenyl (PCB 187)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2’,3,4,5’-Pentachlorobiphenyl (PCB 87)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2’,3,4’,5-Pentachlorobiphenyl (PCB 90)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2’,3,5’-Tetrachlorobiphenyl (PCB 44)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2’,4,4’,5,5’-Hexachlorobiphenyl (PCB 153)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2’,4,5,5’-Pentachlorobiphenyl (PCB 101)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2’,5,6’-Tetrachlorbiphenyl (PCB 53)
Aqueous/Solid	EPA 8082A	GC-ECD	2,2’,5-Trichlorobiphenyl (PCB 18)
Aqueous/Solid	EPA 8082A	GC-ECD	2,3,3’,4,4’,5,5’-Heptachlorobiphenyl (PCB 189)
Aqueous/Solid	EPA 8082A	GC-ECD	2,3,3’,4,4’,5-Hexachlorobiphenyl (PCB 156)
Aqueous/Solid	EPA 8082A	GC-ECD	2,3,3’,4,4’,5’-Hexachlorobiphenyl (PCB 157)
Aqueous/Solid	EPA 8082A	GC-ECD	2,3,3’,4,4’,6-Hexachlorobiphenyl (PCB 158)
Aqueous/Solid	EPA 8082A	GC-ECD	2,3,3’,4,4’-Pentachlorobiphenyl (PCB 105)
Aqueous/Solid	EPA 8082A	GC-ECD	2,3’,4,4’,5,5’ Hexachlorobiphenyl (PCB 167)
Aqueous/Solid	EPA 8082A	GC-ECD	2,3’,4,4’,5’,6-Hexachlorobiphenyl (PCB 168)
Aqueous/Solid	EPA 8082A	GC-ECD	2,3,4,4’,5-Pentachlorobiphenyl (PCB 114)
Aqueous/Solid	EPA 8082A	GC-ECD	2,3’,4,4’,5-Pentachlorobiphenyl (PCB 118)
Aqueous/Solid	EPA 8082A	GC-ECD	2,3’,4,4’,5-Pentachlorobiphenyl (PCB 123)
Aqueous/Solid	EPA 8082A	GC-ECD	2,3,4,4’-Tetrachlorobiphenyl (PCB 60)
Aqueous/Solid	EPA 8082A	GC-ECD	2,3’,4,4’-Tetrachlorobiphenyl (PCB 66)
Aqueous/Solid	EPA 8082A	GC-ECD	2,4,4’-Trichlorobiphenyl (PCB 28)
Aqueous/Solid	EPA 8082A	GC-ECD	2,4’-Dichlorobiphenyl (PCB 8)
Aqueous/Solid	EPA 8082A	GC-ECD	3,3’,4,4’,5,5’-Hexachlorobiphenyl (PCB 169)
Aqueous/Solid	EPA 8082A	GC-ECD	3,3’,4,4’,5-Pentachlorobiphenyl (PCB 126)

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ALS Environmental-Kelso
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Accreditation is granted to the facility to perform the following testing:

Matrix	Standard/Method	Technology	Analyte
Aqueous/Solid	EPA 8082A	GC-ECD	3,3',4,4'-Tetrachlorobiphenyl (PCB 77)
Aqueous/Solid	EPA 8082A	GC-ECD	3,4,4',5-Tetrachlorobiphenyl (PCB 81)
Aqueous/Solid	EPA 8082A	GC-ECD	Aroclor 1016
Aqueous/Solid	EPA 8082A	GC-ECD	Aroclor 1221
Aqueous/Solid	EPA 8082A	GC-ECD	Aroclor 1232
Aqueous/Solid	EPA 8082A	GC-ECD	Aroclor 1242
Aqueous/Solid	EPA 8082A	GC-ECD	Aroclor 1248
Aqueous/Solid	EPA 8082A	GC-ECD	Aroclor 1254
Aqueous/Solid	EPA 8082A	GC-ECD	Aroclor 1260
Aqueous/Solid	EPA 8082A	GC-ECD	Aroclor 1262
Aqueous/Solid	EPA 8082A	GC-ECD	Aroclor 1268
Aqueous/Solid	EPA 8151A	GC-ECD	2,4,5-T
Aqueous/Solid	EPA 8151A	GC-ECD	2,4,5-TP (Silvex)
Aqueous/Solid	EPA 8151A	GC-ECD	2,4-D
Aqueous/Solid	EPA 8151A	GC-ECD	2,4-DB
Aqueous/Solid	EPA 8151A	GC-ECD	Dalapon
Aqueous/Solid	EPA 8151A	GC-ECD	Dicamba
Aqueous/Solid	EPA 8151A	GC-ECD	Dichloroprop
Aqueous/Solid	EPA 8151A	GC-ECD	Dinoseb
Aqueous/Solid	EPA 8151A	GC-ECD	MCPA
Aqueous/Solid	EPA 8151A	GC-ECD	MCPP
Aqueous/Solid	EPA 8260B, C	GC-MS	1,1,1,2-Tetrachloroethane
Aqueous/Solid	EPA 8260B, C	GC-MS	1,1,1-Trichloroethane
Aqueous/Solid	EPA 8260B, C	GC-MS	1,1,2,2-Tetrachloroethane
Aqueous/Solid	EPA 8260B, C	GC-MS	1,1,2-Trichloroethane
Aqueous/Solid	EPA 8260B, C	GC-MS	1,1-Dichloroethane
Aqueous/Solid	EPA 8260B, C	GC-MS	1,2-Dibromoethane
Aqueous/Solid	EPA 8260B, C	GC-MS	1,2-Dichlorobenzene
Aqueous/Solid	EPA 8260B, C	GC-MS	1,2-Dichloroethane
Aqueous/Solid	EPA 8260B, C	GC-MS	1,2-Dichloropropane
Aqueous/Solid	EPA 8260B, C	GC-MS	1,3,5-Trimethylbenzene
Aqueous/Solid	EPA 8260B, C	GC-MS	1,3-Dichlorobenzene
Aqueous/Solid	EPA 8260B, C	GC-MS	1,3-Dichloropropane
Aqueous/Solid	EPA 8260B, C	GC-MS	1,4-Dichlorobenzene
Aqueous/Solid	EPA 8260B, C	GC-MS	1-phenylpropane
Aqueous/Solid	EPA 8260B, C	GC-MS	2,2-Dichloropropane

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ALS Environmental-Kelso
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Accreditation is granted to the facility to perform the following testing:

Matrix	Standard/Method	Technology	Analyte
Aqueous/Solid	EPA 8260B, C	GC-MS	2-Butanone (MEK)
Aqueous/Solid	EPA 8260B, C	GC-MS	2-Chloroethylvinylether
Aqueous/Solid	EPA 8260B, C	GC-MS	2-Chlorotoluene
Aqueous/Solid	EPA 8260B, C	GC-MS	2-Hexanone
Aqueous/Solid	EPA 8260B, C	GC-MS	4-Chlorotoluene
Aqueous/Solid	EPA 8260B, C	GC-MS	4-Isopropyltoluene
Aqueous/Solid	EPA 8260B, C	GC-MS	4-Methyl-2-pentanone (MIBK)
Aqueous/Solid	EPA 8260B, C	GC-MS	Acetone
Aqueous/Solid	EPA 8260B, C	GC-MS	Acetonitrile
Aqueous/Solid	EPA 8260B, C	GC-MS	Acrolein
Aqueous/Solid	EPA 8260B, C	GC-MS	Acrylonitrile
Aqueous/Solid	EPA 8260B, C	GC-MS	Benzene
Aqueous/Solid	EPA 8260B, C	GC-MS	Bromobenzene
Aqueous/Solid	EPA 8260B, C	GC-MS	Bromochloromethane
Aqueous/Solid	EPA 8260B, C	GC-MS	Bromodichloromethane
Aqueous/Solid	EPA 8260B, C	GC-MS	Bromoform
Aqueous/Solid	EPA 8260B, C	GC-MS	Bromomethane
Aqueous/Solid	EPA 8260B, C	GC-MS	Carbon disulfide
Aqueous/Solid	EPA 8260B, C	GC-MS	Carbon Tetrachloride
Aqueous/Solid	EPA 8260B, C	GC-MS	Chlorobenzene
Aqueous/Solid	EPA 8260B, C	GC-MS	Chlorodibromomethane
Aqueous/Solid	EPA 8260B, C	GC-MS	Chloroethane
Aqueous/Solid	EPA 8260B, C	GC-MS	Chloroform
Aqueous/Solid	EPA 8260B, C	GC-MS	Chloromethane
Aqueous/Solid	EPA 8260B, C	GC-MS	cis-1,2-Dichloroethene
Aqueous/Solid	EPA 8260B, C	GC-MS	cis-1,3-Dichloropropene
Aqueous/Solid	EPA 8260B, C	GC-MS	Dibromomethane
Aqueous/Solid	EPA 8260B, C	GC-MS	Dichlorodifluoromethane
Aqueous/Solid	EPA 8260B, C	GC-MS	Dichloromethane (Methylene Chloride)
Aqueous/Solid	EPA 8260B, C	GC-MS	Di-isopropylether (DIPE)
Aqueous/Solid	EPA 8260B, C	GC-MS	DIPE
Aqueous/Solid	EPA 8260B, C	GC-MS	ETBE
Aqueous/Solid	EPA 8260B, C	GC-MS	Ethyl Benzene
Aqueous/Solid	EPA 8260B, C	GC-MS	Ethylbenzene
Aqueous/Solid	EPA 8260B, C	GC-MS	Freon 11
Aqueous/Solid	EPA 8260B, C	GC-MS	Freon 113

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ALS Environmental-Kelso
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Contact Name: Carl Degner Phone: 360-577-7222

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard/Method	Technology	Analyte
Aqueous/Solid	EPA 8260B, C	GC-MS	Hexachlorobutadiene
Aqueous/Solid	EPA 8260B, C	GC-MS	Isopropylbenzene
Aqueous/Solid	EPA 8260B, C	GC-MS	Methyl-tert-butylether (MTBE)
Aqueous/Solid	EPA 8260B, C	GC-MS	Naphthalene
Aqueous/Solid	EPA 8260B, C	GC-MS	n-Butylbenzene
Aqueous/Solid	EPA 8260B, C	GC-MS	n-Propylbenzene
Aqueous/Solid	EPA 8260B, C	GC-MS	sec-Butylbenzene
Aqueous/Solid	EPA 8260B, C	GC-MS	Styrene
Aqueous/Solid	EPA 8260B, C	GC-MS	tert-amylmethylether (TAME)
Aqueous/Solid	EPA 8260B, C	GC-MS	tert-Butyl alcohol
Aqueous/Solid	EPA 8260B, C	GC-MS	tert-butylbenzene
Aqueous/Solid	EPA 8260B, C	GC-MS	Tetrachloroethene
Aqueous/Solid	EPA 8260B, C	GC-MS	Toluene
Aqueous/Solid	EPA 8260B, C	GC-MS	trans-1,2-Dichloroethene
Aqueous/Solid	EPA 8260B, C	GC-MS	trans-1,3-Dichloropropene
Aqueous/Solid	EPA 8260B, C	GC-MS	Trichloroethene
Aqueous/Solid	EPA 8260B, C	GC-MS	Trichlorofluoromethane (Freon 11)
Aqueous/Solid	EPA 8260B, C	GC-MS	Vinyl acetate
Aqueous/Solid	EPA 8260B, C	GC-MS	Vinyl chloride
Aqueous/Solid	EPA 8260B, C	GC-MS	Xylene, total
Aqueous/Solid	EPA 8260B, C	GC-MS	1,1-Dichloroethene
Aqueous/Solid	EPA 8260B, C	GC-MS	1,1-Dichloropropene
Aqueous/Solid	EPA 8260B, C	GC-MS	1,2,3-Trichlorobenzene
Aqueous/Solid	EPA 8260B, C	GC-MS	1,2,3-Trichloropropane
Aqueous/Solid	EPA 8260B, C	GC-MS	1,2,4-Trichlorobenzene
Aqueous/Solid	EPA 8260B, C	GC-MS	1,2,4-Trimethylbenzene
Aqueous/Solid	EPA 8270C, D	GC-MS	1,2,4-Trichlorobenzene
Aqueous/Solid	EPA 8270C, D	GC-MS	1,2-Dichlorobenzene
Aqueous/Solid	EPA 8270C, D	GC-MS	1,3-Dichlorobenzene
Aqueous/Solid	EPA 8270C, D	GC-MS	1,4-Dichlorobenzene
Aqueous/Solid	EPA 8270C, D	GC-MS	2,4,5-Trichlorophenol
Aqueous/Solid	EPA 8270C, D	GC-MS	2,4,6-Trichlorophenol
Aqueous/Solid	EPA 8270C, D	GC-MS	2,4-Dichlorophenol
Aqueous/Solid	EPA 8270C, D	GC-MS	2,4-Dimethylphenol
Aqueous/Solid	EPA 8270C, D	GC-MS	2,4-Dinitrophenol
Aqueous/Solid	EPA 8270C, D	GC-MS	2,4-Dinitrotoluene

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Contact Name: Carl Degner Phone: 360-577-7222

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard/Method	Technology	Analyte
Aqueous/Solid	EPA 8270C, D	GC-MS	2,6-Dinitrotoluene
Aqueous/Solid	EPA 8270C, D	GC-MS	2-Chloronaphthalene
Aqueous/Solid	EPA 8270C, D	GC-MS	2-Chlorophenol
Aqueous/Solid	EPA 8270C, D	GC-MS	2-Methyl-4,6-Dinitrophenol
Aqueous/Solid	EPA 8270C, D	GC-MS	2-Methylnaphthalene
Aqueous/Solid	EPA 8270C, D	GC-MS	2-Methylphenol
Aqueous/Solid	EPA 8270C, D	GC-MS	2-Nitroaniline
Aqueous/Solid	EPA 8270C, D	GC-MS	2-Nitrophenol
Aqueous/Solid	EPA 8270C, D	GC-MS	3,3-Dichlorobenzidine
Aqueous/Solid	EPA 8270C, D	GC-MS	3-Nitroaniline
Aqueous/Solid	EPA 8270C, D	GC-MS	4-Bromophenyl-phenylether
Aqueous/Solid	EPA 8270C, D	GC-MS	4-Chloro-3-methylphenol
Aqueous/Solid	EPA 8270C, D	GC-MS	4-Chloroaniline
Aqueous/Solid	EPA 8270C, D	GC-MS	4-Chlorophenyl-phenylether
Aqueous/Solid	EPA 8270C, D	GC-MS	4-Methylphenol (and/or 3-Methylphenol)
Aqueous/Solid	EPA 8270C, D	GC-MS	4-Nitroaniline
Aqueous/Solid	EPA 8270C, D	GC-MS	4-Nitrophenol
Aqueous/Solid	EPA 8270C, D	GC-MS	Acenaphthene
Aqueous/Solid	EPA 8270C, D	GC-MS	Acenaphthylene
Aqueous/Solid	EPA 8270C, D	GC-MS	Aniline
Aqueous/Solid	EPA 8270C, D	GC-MS	Anthracene
Aqueous/Solid	EPA 8270C, D	GC-MS	Benzidine
Aqueous/Solid	EPA 8270C, D	GC-MS	Benzo(a)anthracene
Aqueous/Solid	EPA 8270C, D	GC-MS	Benzo(a)pyrene
Aqueous/Solid	EPA 8270C, D	GC-MS	Benzo(b)fluoranthene
Aqueous/Solid	EPA 8270C, D	GC-MS	Benzo(g,h,i)perylene
Aqueous/Solid	EPA 8270C, D	GC-MS	Benzo(k)fluoranthene
Aqueous/Solid	EPA 8270C, D	GC-MS	Benzoic acid
Aqueous/Solid	EPA 8270C, D	GC-MS	Benzyl alcohol
Aqueous/Solid	EPA 8270C, D	GC-MS	bis(2-Chloroethoxy)methane
Aqueous/Solid	EPA 8270C, D	GC-MS	bis(2-Chloroethyl)ether
Aqueous/Solid	EPA 8270C, D	GC-MS	bis(2-Chloroisopropyl)ether
Aqueous/Solid	EPA 8270C, D	GC-MS	bis(2-ethylhexy)phthalate
Aqueous/Solid	EPA 8270C, D	GC-MS	Butyl benzyl phthalate
Aqueous/Solid	EPA 8270C, D	GC-MS	Carbazole
Aqueous/Solid	EPA 8270C, D	GC-MS	Chrysene

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Matrix	Standard/Method	Technology	Analyte
Aqueous/Solid	EPA 8270C, D	GC-MS	Dibenzo(a,h)anthracene
Aqueous/Solid	EPA 8270C, D	GC-MS	Dibenzofuran
Aqueous/Solid	EPA 8270C, D	GC-MS	Diethyl phthalate
Aqueous/Solid	EPA 8270C, D	GC-MS	Dimethylphthalate
Aqueous/Solid	EPA 8270C, D	GC-MS	di-n-butylphthalate
Aqueous/Solid	EPA 8270C, D	GC-MS	Di-n-octylphthalate
Aqueous/Solid	EPA 8270C, D	GC-MS	Fluoranthene
Aqueous/Solid	EPA 8270C, D	GC-MS	Fluorene
Aqueous/Solid	EPA 8270C, D	GC-MS	Hexachlorobenzene
Aqueous/Solid	EPA 8270C, D	GC-MS	Hexachlorobutadiene
Aqueous/Solid	EPA 8270C, D	GC-MS	Hexachlorocyclopentadiene
Aqueous/Solid	EPA 8270C, D	GC-MS	Hexachloroethane
Aqueous/Solid	EPA 8270C, D	GC-MS	Indeno(1,2,3, cd)pyrene
Aqueous/Solid	EPA 8270C, D	GC-MS	Isophorone
Aqueous/Solid	EPA 8270C, D	GC-MS	Naphthalene
Aqueous/Solid	EPA 8270C, D	GC-MS	Nitrobenzene
Aqueous/Solid	EPA 8270C, D	GC-MS	N-Nitrosodimethylamine
Aqueous/Solid	EPA 8270C, D	GC-MS	N-Nitroso-di-n-propylamine
Aqueous/Solid	EPA 8270C, D	GC-MS	N-Nitrosodiphenylamine
Aqueous/Solid	EPA 8270C, D	GC-MS	Pentachlorobenzene
Aqueous/Solid	EPA 8270C, D	GC-MS	Pentachlorophenol
Aqueous/Solid	EPA 8270C, D	GC-MS	Phenanthrene
Aqueous/Solid	EPA 8270C, D	GC-MS	Phenol
Aqueous/Solid	EPA 8270C, D	GC-MS	Pyrene
Aqueous/Solid	EPA 8270C, D	GC-MS	Pyridine
Aqueous/Solid	EPA 8270C, D	GC-MS	2,3,4,6-Tetrachlorophenol
Aqueous/Solid	EPA 8270C,D	GC-MS	1,2,4,5-Tetrachlorobenzene
Aqueous/Solid	EPA 8270 SIM	GC-MS	2-Methylnaphthalene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Acenaphthene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Acenaphthylene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Anthracene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Benzo(a)anthracene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Benzo(a)pyrene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Benzo(b)fluoranthene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Benzo(g,h,i)perylene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Benzo(k)fluoranthene

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Matrix	Standard/Method	Technology	Analyte
Aqueous/Solid	EPA 8270 SIM	GC-MS	Chrysene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Dibenzo(a,h)anthracene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Fluoranthene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Fluorene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Indeno(1,2,3, cd)pyrene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Naphthalene
Aqueous/Solid	EPA 8270 SIM	GC-MS	PBDE 100
Aqueous/Solid	EPA 8270 SIM	GC-MS	PBDE 128
Aqueous/Solid	EPA 8270 SIM	GC-MS	PBDE 138
Aqueous/Solid	EPA 8270 SIM	GC-MS	PBDE 153
Aqueous/Solid	EPA 8270 SIM	GC-MS	PBDE 154
Aqueous/Solid	EPA 8270 SIM	GC-MS	PBDE 17
Aqueous/Solid	EPA 8270 SIM	GC-MS	PBDE 183
Aqueous/Solid	EPA 8270 SIM	GC-MS	PBDE 190
Aqueous/Solid	EPA 8270 SIM	GC-MS	PBDE 203
Aqueous/Solid	EPA 8270 SIM	GC-MS	PBDE 206
Aqueous/Solid	EPA 8270 SIM	GC-MS	PBDE 209
Aqueous/Solid	EPA 8270 SIM	GC-MS	PBDE 28
Aqueous/Solid	EPA 8270 SIM	GC-MS	PBDE 47
Aqueous/Solid	EPA 8270 SIM	GC-MS	PBDE 66
Aqueous/Solid	EPA 8270 SIM	GC-MS	PBDE 71
Aqueous/Solid	EPA 8270 SIM	GC-MS	PBDE 85
Aqueous/Solid	EPA 8270 SIM	GC-MS	PBDE 99
Aqueous/Solid	EPA 8270 SIM	GC-MS	p-Dioxane
Aqueous/Solid	EPA 8270 SIM	GC-MS	Phenanthrene
Aqueous/Solid	EPA 8270 SIM	GC-MS	Pyrene
Aqueous/Solid	EPA 8330B	HPLC	1,3,5-Trinitrobenzene
Aqueous/Solid	EPA 8330B	HPLC	1,3-Dinitrobenzene
Aqueous/Solid	EPA 8330B	HPLC	2,4,6-Trinitrotoluene
Aqueous/Solid	EPA 8330B	HPLC	2,4-Dinitrotoluene
Aqueous/Solid	EPA 8330B	HPLC	2,6-Dinitrotoluene
Aqueous/Solid	EPA 8330B	HPLC	2-Amino-4,6-dinitrotoluene
Aqueous/Solid	EPA 8330B	HPLC	2-Nitrotoluene
Aqueous/Solid	EPA 8330B	HPLC	3,5-Dinitroaniline
Aqueous/Solid	EPA 8330B	HPLC	3-Nitrotoluene
Aqueous/Solid	EPA 8330B	HPLC	4-Amino-2,6-dinitrotoluene

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Matrix	Standard/Method	Technology	Analyte
Aqueous/Solid	EPA 8330B	HPLC	4-Nitrotoluene
Aqueous/Solid	EPA 8330B	HPLC	HMX (octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine)
Aqueous/Solid	EPA 8330B	HPLC	Nitrobenzene
Aqueous/Solid	EPA 8330B	HPLC	Nitroglycerin
Aqueous/Solid	EPA 8330B	HPLC	Pentachloronitrobenzene
Aqueous/Solid	EPA 8330B	HPLC	Pentaerythritoltetranitrate
Aqueous/Solid	EPA 8330B	HPLC	RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine)
Aqueous/Solid	EPA 8330B	HPLC	Tetryl (methyl-2,4,6-trinitrophenylnitramine)
Aqueous/Solid	EPA 9012B	Colorimetry	Total Cyanide
Aqueous/Solid	EPA 9030B	Distillation Unit	Sulfide
Aqueous/Solid	EPA 9056A	IC	Bromide
Aqueous/Solid	EPA 9056A	IC	Chloride
Aqueous/Solid	EPA 9056A	IC	Fluoride
Aqueous/Solid	EPA 9056A	IC	Sulfate
Aqueous/Solid	EPA 9065	Spectrophotometer	Total Phenolics
Aqueous/Solid	LCP-NITG	HPLC/UV	Nitroguanidine
Aqueous/Solid	NWTPH-Dx	GC-FID	Residual Range Organics
Aqueous/Solid	OPPMS2	GC/MS/MS	Azinphos-methyl (Guthion)
Aqueous/Solid	OPPMS2	GC/MS/MS	Chlorpyrifos
Aqueous/Solid	OPPMS2	GC/MS/MS	Demeton O & S
Aqueous/Solid	OPPMS2	GC/MS/MS	Diazinon
Aqueous/Solid	OPPMS2	GC/MS/MS	Dichlorvos
Aqueous/Solid	OPPMS2	GC/MS/MS	dimethoate
Aqueous/Solid	OPPMS2	GC/MS/MS	Disulfoton
Aqueous/Solid	OPPMS2	GC/MS/MS	Ethoprop
Aqueous/Solid	OPPMS2	GC/MS/MS	Parathion, ethyl
Aqueous/Solid	OPPMS2	GC/MS/MS	Parathion, methyl
Aqueous/Solid	OPPMS2	GC/MS/MS	Phorate
Aqueous/Solid	OPPMS2	GC/MS/MS	Ronnel
Aqueous/Solid	OPPMS2	GC/MS/MS	Stirophos
Aqueous/Solid	OPPMS2	GC/MS/MS	Sulfotepp
Aqueous/Solid	SM4500 NH3 G	Colorimetry	Ammonia
Aqueous/Solid	SOC-Butyl	GC-FPD	Di-n-butyltin
Aqueous/Solid	SOC-Butyl	GC-FPD	n-Butyltin
Aqueous/Solid	SOC-Butyl	GC-FPD	Tetra-n-butyltin

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Matrix	Standard/Method	Technology	Analyte
Aqueous/Solid	SOC-Butyl	GC-FPD	Tri-n-butyltin
Aqueous/Solid	SOC-OTTO	GC-ECD	Otto Fuel
Aqueous/Solid	SOC-PESTMS2	GC/MS/MS/MS	Aldrin
Aqueous/Solid	SOC-PESTMS2	GC/MS/MS/MS	Alpha-BHC
Aqueous/Solid	SOC-PESTMS2	GC/MS/MS/MS	beta-BHC
Aqueous/Solid	SOC-PESTMS2	GC/MS/MS/MS	DDD (4,4)
Aqueous/Solid	SOC-PESTMS2	GC/MS/MS/MS	DDE (4,4)
Aqueous/Solid	SOC-PESTMS2	GC/MS/MS/MS	DDT (4,4)
Aqueous/Solid	SOC-PESTMS2	GC/MS/MS/MS	delta-BHC
Aqueous/Solid	SOC-PESTMS2	GC/MS/MS/MS	Dieldrin
Aqueous/Solid	SOC-PESTMS2	GC/MS/MS/MS	Endosulfan I
Aqueous/Solid	SOC-PESTMS2	GC/MS/MS/MS	Endosulfan II
Aqueous/Solid	SOC-PESTMS2	GC/MS/MS/MS	Endosulfan sulfate
Aqueous/Solid	SOC-PESTMS2	GC/MS/MS/MS	Endrin
Aqueous/Solid	SOC-PESTMS2	GC/MS/MS/MS	Endrin aldehyde
Aqueous/Solid	SOC-PESTMS2	GC/MS/MS/MS	Endrin ketone
Aqueous/Solid	SOC-PESTMS2	GC/MS/MS/MS	gamma-BHC
Aqueous/Solid	SOC-PESTMS2	GC/MS/MS/MS	Heptachlor
Aqueous/Solid	SOC-PESTMS2	GC/MS/MS/MS	Heptachlor Epoxide (beta)
Aqueous/Solid	SOC-PESTMS2	GC/MS/MS/MS	Methoxychlor
Aqueous/Solid	SOP-LCP-PFC	HPLC/MS/MS	Perfluorobutane sulfonate
Aqueous/Solid	SOP-LCP-PFC	HPLC/MS/MS	Perfluorobutanoic acid
Aqueous/Solid	SOP-LCP-PFC	HPLC/MS/MS	Perfluorodecane Sulfonate
Aqueous/Solid	SOP-LCP-PFC	HPLC/MS/MS	Perfluorodecanoic acid
Aqueous/Solid	SOP-LCP-PFC	HPLC/MS/MS	Perfluorododecanoic acid
Aqueous/Solid	SOP-LCP-PFC	HPLC/MS/MS	Perfluoroheptanoic acid
Aqueous/Solid	SOP-LCP-PFC	HPLC/MS/MS	Perfluorohexane sulfonate
Aqueous/Solid	SOP-LCP-PFC	HPLC/MS/MS	Perfluorohexanoic acid
Aqueous/Solid	SOP-LCP-PFC	HPLC/MS/MS	Perfluorononanoic acid
Aqueous/Solid	SOP-LCP-PFC	HPLC/MS/MS	Perfluorooctane sulfonate
Aqueous/Solid	SOP-LCP-PFC	HPLC/MS/MS	Perfluorooctanoic acid
Aqueous/Solid	SOP-LCP-PFC	HPLC/MS/MS	Perfluoropentanoic acid
Aqueous/Solid	SOP-LCP-PFC	HPLC/MS/MS	Perfluoroundecanoic acid

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Matrix	Standard/Method	Technology	Analyte
Aqueous	EPA 1640	Reductive Metals Precipitation	Prep Method
Aqueous	EPA 3010A	Acid Digestion	Metals Digestion
Aqueous	EPA 3020A	Acid Digestion	Metals Digestion
Aqueous	EPA 3520C	Continuous Liquid-Liquid Extraction	Extractable Prep
Aqueous	EPA 3535A	Solid Phase Extraction	Prep Method
Aqueous	EPA 5030B	Purge and Trap for Volatiles	Volatile Prep
Aqueous	SOP-MET-DIG	Acid Digestion	Metals Digestion
Solid	EPA 3050B	Acid Digestion	Metals Digestion
Solid	EPA 3060	Alkaline Digestion for Cr(VI)	Alkaline Digestion for Cr(VI) only
Solid	EPA 3541	Automated Soxhlet Extraction	Extractable Prep
Solid	EPA 3550B	Ultrasonic Extraction	Extractable Prep
Solid	EPA 5035A	Purge and Trap for Volatiles	Voc Organics
Solid	EPA 5050	Bomb Digestion	Prep Method
Solid	EPA 9013	Midi-Distillation	Cyanides
Solid	SOP-GEN-AVS	Acid Digestion	Simultaneously Extracted Metals
Aqueous/Solids	ASTM D3590-89	Digestion	TKN
Aqueous/Solids	EPA 1311	TCLP Extraction	Physical Extraction
Aqueous/Solids	EPA 3620C	Florisil clean up	Extractable Cleanup
Aqueous/Solids	EPA 3630C	Silica gel clean up	Extractable Prep
Aqueous/Solids	EPA 3640A	Gel-Permeation Clean-up	Extractable Cleanup
Aqueous/Solids	EPA 3660	Sulfur Clean-up	Extractable Prep
Aqueous/Solids	EPA 3665A	Acid clean up	Extractable Cleanup

Attachment B
Final Responses to Regulator Comments

Final Responses to EPA Comments on the Draft Master Sampling and Analysis Plan – Addendum 5 UXO 17, PAOC EE Remedial Investigation Dated May 2016

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

GENERAL COMMENTS

1. The SAP Addendum notes when project action limits (PALs) are less than the limits of detection (LODs). While is it understood that this may be due to limitations in the analytical methods, the SAP Addendum should discuss the uncertainty associated with results where the PALs are less than the limits of quantitation (LOQ). For example, when the PAL is between the LOD and LOQ, the SAP Addendum should include a discussion of sensitivity and uncertainty. This discussion should include (i.e., where applicable) why results are sufficient to meet project data quality objectives (DQOs). Further, in cases where the PAL is less than the LOQ, but above the LOD, this discussion should also include why the level of uncertainty associated with detected results less than the LOQ (i.e., results that are not quantifiably reliable) was deemed acceptable and allowed project DQOs to be met. Revise the SAP Addendum to provide a more detailed discussion on uncertainty in cases where the PAL is less than the LOQ.

Navy Response: The laboratory applies J-flags to results between the LOD and LOQ to indicate that they are estimated. Although there is some added uncertainty in the concentration of estimated results, estimated data are (and have historically been on all Vieques studies) considered usable for all purposes at their reported concentration. When the screening level is between the LOD and LOQ there is added uncertainty when the result is also between the LOD and LOQ (there is not added uncertainty when the result is detected at greater than the LOQ or is nondetect), but detections are still compared directly to screening levels. The added uncertainty is discussed in the data quality evaluation and risk assessments included in the RI Report. For clarity, when detected results and screening levels are both less than the LOQ, results are still used at their reported concentration, which may be greater than or less than the screening level. The resulting uncertainty is acceptable because the planned data set is sufficiently-large. In addition, the DQE will make an evaluation of the usability of the resulting dataset and will consider the quantity of estimated data versus unqualified data. This clarification has been added to Worksheet #11.

EPA Follow-up Comment: The response partially addresses the comment. The response indicates that there is no added uncertainty for non-detects when the screening level is between the limit of detection (LOD) and the limit of quantitation (LOQ). However, the response does not address the uncertainty and how non-detected results are treated when the screening level is less than the LOD. Revise the SAP Addendum to provide a more detailed discussion on uncertainty in with non-detects if the PAL is less than the LOD.

Navy Response to Follow-up Comment: The following bullet has been added to Worksheet #11 just prior to question #3: "Nondetect results are treated as non-exceedances. When the reporting limit (LOD) is greater than the screening level, there is added uncertainty surrounding this decision, but the uncertainty is acceptable with respect to the intended data use. This added uncertainty is discussed in the data quality evaluation included with the report."

2. The SAP Addendum indicates that the Regional Screening Levels (RSLs) from November 2015 will be used as PALs. However, the current RSLs are dated May 2016. Further, Worksheet #15 indicates there are RSLs for phenanthrene, benzo(g,h,i) perylene, and acenapthylene. However, these compounds are not listed in the current May 2016 RSL tables. Finally, the RSLs listed for phenanthrene and benzo(g,h,i) perylene are greater

than one billion parts per billion. Revise the SAP to use the most current RSLs. In addition, revise the SAP to clarify how RSLs are determined for phenanthrene, benzo(g,h,i) perylene, and acenapthylene and to correct the RSLs listed for these compounds as needed.

Navy Response: RSLs have been revised to reflect the May 2016 RSLs. Additionally, no RSLs are provided for phenanthrene and benzo(g,h,i)perylene; therefore, all values for these compounds are reported as "NC." There is a May 2016 RSL for acenaphthylene; therefore, all values have been reported for this compound.

EPA Follow-up Comment: The response partially addresses the comment. It is noted that there are no May 2016 Regional Screening Level (RSL) values for acenapthylene (Chemical Abstract Number [CAS #] 208-96-8). The values populated for acenapthylene (CAS # 208-96-8) in the Quality Assurance Project Plan (QAPP) Worksheet #15 are actually the May 2016 RSL values for acenapthene (CAS # 83-32-9). Revise the RSL values within the QAPP, as appropriate.

Navy Response to Follow-up Comment: Prior to the publishing of the May 2016 RSLs, it was acceptable to use acenaphthene as a surrogate for acenaphthylene (and hence it appeared that there were RSLs for acenaphthylene) but it was determined in May 2016 that this is no longer acceptable. Hence, the screening levels have been removed for acenaphthylene.

3. The SAP Addendum indicates that 10 percent of the soil samples will be analyzed for polycyclic aromatic hydrocarbons (PAH). However, it is unclear how these samples will be selected (e.g., randomly), or why this sampling frequency was deemed sufficient. Revise the SAP Addendum to discuss how soil samples will be selected for PAH analysis. In addition, revise the SAP Addendum to discuss why a sampling frequency of 10 percent for PAHs was deemed sufficient to meet project DQOs.

Navy Response: Other than at the one former drum location, there are no other locations where releases of PAHs are suspected. However, as determined by the Technical Subcommittee (December 2015), in addition to the drum location, 10 percent of surface and subsurface soil samples from throughout PAOC EE will be analyzed for PAHs as a conservative measure. Since there are no other known or suspected PAH sources, stations will be selected at random.

In Worksheet #17, the last sentence has be updated to the following:

"And as determined by the Vieques ERP Technical Subcommittee (see Worksheet #9), because the drum potentially containing petroleum may be representative of this type of use elsewhere at PAOC EE, as a conservative measure, PAHs will be analyzed in 10 percent of randomly selected soil samples, in addition to the former drum location."

4. The SAP Addendum does not provide the laboratory specific quality control (QC) limits for many analytes. Instead, the SAP Addendum references DoD QSM v.5 limits. While it may be acceptable to use the DoD QSM acceptance limits, the SAP Addendum should provide laboratory specific values to ensure DoD QSM values can be met. Revise the SAP Addendum to provide this information.

Navy Response: The laboratory is evaluated using the DoD QSM limits, which are statistically generated across multiple laboratories. The laboratory is evaluated, using these limits, during their DoD ELAP audit. These are the limits which will be used during analysis and not in-house limits. For example, if there is an exceedance of a DoD QSM limit, the laboratory will take corrective action as appropriate and it may be necessary for the data validator to qualify. Therefore, in-house laboratory limits are not relevant and therefore not included in the SAP.

5. The SAP Addendum often uses nomenclature for munitions that is incomplete or does not match the nomenclature found in the TM 43-0001 series of Ammunition Data Sheets. This sometimes makes it difficult to determine the specific munitions item that was recovered, which does not allow the determination of the filler and the hazards involved. Examples include:

- "40-mm flare": This does not identify the model of the flare. This could be any of six or more different models. It also is unclear as to whether this item is an unfired projectile or a complete round.
- "Cartridges": This could be any of more than 100 munitions that have a cartridge case.
- "Canister containing propellant": This could be any of a number of propelling charges in their shipping containers for land based or shipboard weapons. The chemical constituents of these charges vary from weapon to weapon.
- "Rifle grenade flare": No such munition exists in the U.S. inventory. It is likely one of the signal, ground, illumination pyrotechnics fired from a grenade launcher attached to a rifle muzzle. None of these munitions have the word "rifle" in their nomenclature.
- "Practice mine": This could be any of a number of practice antitank or practice antipersonnel mines, some of which are very dangerous (e.g., mine, antipersonnel, practice, M8, has a 1/3 pound black powder spotting charge that is propelled into the air and explodes when functioned).

Review the nomenclature used to describe the munitions items found on the site and revise them as necessary to allow for the identification of the munitions, the explosive fillers present, and the hazards they present.

Navy Response: The following additional identification is provided below and has been changed in the addendum:

- 40 mm Flare = MK 50 Decoy Flare
- Cartridges = small arms cartridge cases
- Canister containing propellant = M203 propellant for 155 mm howitzer
- Rifle Grenade Flare = Grenade, Rifle, Smoke M22
- Practice Mine = M12 Practice Anti-Tank Mine (no explosive components installed)

SPECIFIC COMMENTS

1. **SAP Worksheet #10, Conceptual Site Model (CSM), Page 9:** The fourth paragraph of the Time-Critical Removal Action section states that "The remaining items were inert metal pieces or did not otherwise present an explosive hazard, including 3,596 small arms that were identified and removed from the site." While the explosives present in U.S. small arms ammunition are generally limited to propellant, there are some small arms cartridges that contain incendiary compositions. All small arms cartridges (dummy cartridges excepted) contain propellants that are classed as explosives, and they do present a limited explosive hazard. Revise the cited statement to eliminate the inference that small arms cartridges do not present an explosive hazard.

   Navy Response: The following text has been added to the referenced paragraph:

   Although unfired small arms ammunition (SAA) do pose a very small explosive hazard, that hazard is not the same kind or as great as other military munitions or MEC for the following reasons:

   - The small amount of propellant within unfired SAA does not detonate, it deflagrates using the resulting gases to propel the projectile.
   - The consequences of a SAA initiating outside a weapon are localized. The propellant may rupture the cartridge case or eject the projectile in this scenario with the potential for likely minor injury and limited to a few feet.

- The likelihood of functioning a SAA outside a weapon is very small. The most likely cause would be that the SAA is placed or thrown into a fire. In this scenario, the SAA does not explode, rather the propellant heats up building gases that either expels the projectile or rupture the case. A projectile being expelled in this manner would not travel far because there is no obturation to the rear.

2. **SAP Worksheet #11, Project Quality Objectives/Systematic Planning Process Statements, Page 12:** Item #7 of this worksheet indicates that additional soil sampling may be necessary; however, it is unclear how it will be determined if additional soils sampling is required. Revise the SAP to include this information.

   Navy Response: The third bullet of Item #7 has been revised as follows:

   - The data will be evaluated and documented in an RI Report. If additional soil sampling is deemed necessary based on the data evaluation, such as whether data quality standards were sufficiently met or if data indicate areas warranting further evaluation, and with concurrence among the Vieques Technical Subcommittee, those additional soil samples will be collected under this SAP. It is possible additional samples may be collected at the time of the field event based on observations made during sampling. In these cases, the rationale for the additional sample collection will be provided in the RI Report.

3. **SAP Worksheet #17, Sampling Design and Rationale, Pages 27 to 28:** This worksheet does not present the rationale for why the proposed number of samples is sufficient to address project DQOs. Revise the SAP Addendum to discuss why the proposed number of samples is sufficient to address project DQOs.

   Navy Response: As currently described in Worksheet #17, the sampling approach focuses on areas with the highest potential for contamination to provide the most conservative evaluation of releases and nature and extent of contamination. The sampling design and rationale reflects the approach discussed and concurred upon in the scoping session by the Vieques ERP Technical Subcommittee in December 2015, and includes sampling in: (1) areas with the highest potential for contamination (i.e., locations with highest densities of MD, locations where MEC/UXO/DMM were identified, and a former drum location), (2) highest potential exposure areas (i.e., beach areas used by recreators and by sea turtles as nesting habitat), and (3) representative areas where subsurface anomalies were left in place. Further, within each bulleted discussion, the rationale for the number of samples focusing on each of these areas is provided.

4. **SAP Worksheet #20, Field Quality Control Sample Summary Table, Page 35:** This table indicates that one matrix spike/matrix spike duplicate (MS/MSD) will be collected for 22 surface and subsurface samples. However, since more than 20 samples will be collected, an additional MS/MSD should be collected for both surface and subsurface samples. Revise the SAP Addendum to indicate that two MS/MSDs will be collected for both surface and subsurface soil samples (i.e., the 22 samples shown in Worksheet #20) at UXO 17.

   Navy Response: The table has been revised as requested.

5. **SAP Worksheet #23, Analytical SOP References Table, Pages 37 to 39:** This worksheet does not provide the procedure for determining the percent moisture for soil samples. Revise this worksheet to provide the procedure for determining percent moisture.

   Navy Response: Worksheet#23 has been revised to include the SOP for percent moisture.

6. **SAP Worksheet #23, Analytical SOP References Table, Page 38:** This table indicates that SOP PRE3050B for acid digestion of sediments, sludges, and soils by EPA Method 3050B has been modified, but it is unclear how and why this SOP was altered. Further, this is footnoted as “4” but this footnote is not defined. Revise the SAP Addendum to indicate how and why this SOP was modified.

   Navy Response: Footnote 4 has been added to Worksheet #23 to read as follows: “Due to regulator request, APPL will digest 10g of SMI for metals rather than the typical 1g. This is intended to provide a more representative digestion."

7. **SAP Worksheets #28-2 and 28-3, Laboratory QC Samples Table, Pages 56-57:** It is unclear which results will be reported and used if the confirmation of positive results (i.e., second column confirmation results exceed the acceptance limits). Revise the SAP Addendum to discuss this for both Methods 8330B and 8321A.

   Navy Response: For Worksheet #28-2 (method 8330B), the corrective action column has been revised as follows: "Report column with the higher concentration if RPD>40% between columns." For Worksheet #28-3, the confirmation of positive results (second column) row has been deleted because Method 8321 is a mass spec method and there is no second column confirmation.

8. **SAP Worksheets #28-5 and 28-6, Laboratory QC Samples Table, Pages 61 and 63:** The corrective action for failing post digestion spikes (PDS) is not consistent with the Master SAP or the analytical methods. The Master SAP and analytical methods indicate that if the PDS exceeds the acceptance limits, associated samples should be analyzed by the method of standard additions (MSA). Revise the SAP addendum to correct this apparent discrepancy.

   Navy Response: The specifications shown are consistent with DoD QSM v. 5.0. Because there are no project-specific requirements for metals, the referenced statements have been removed. Additionally, the requirement for MSA has been removed (flagging is done with dilution and/or post-digestion spike fails).

Final Responses to PREQB Comments on the Draft Master Sampling and Analysis Plan – Addendum 5 UXO 17, PAOC EE Remedial Investigation Dated May 2016

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

GENERAL COMMENTS

1. Further information is needed on the thousands of small arms found at the site during the TCRA. The figures only show few locations were small arms were found, yet the text states that 3,984 small arms were found during the TCRA. Please provide sufficient detail relating to the small arms finds to determine the adequacy of the proposed discrete sampling approach.

Navy Response: Figure 6 shows at least 21 locations where small arms were recovered. In one instance, 1000 blank 7.62 mm cartridges were recovered in one location and 300 expended SAA cartridges in another. It is not unusual to recover numerous SAA in a single location and the Navy feels that the distribution of SAA depicted on the SAP figures is accurate and sufficient to determine sampling locations. Further, this information was provided during the SAP scoping session, during which the agencies concurred upon the sampling approach.

PREQB Evaluation of Navy Response: Please, can you provide a copy of the meeting minutes for the scoping session that documents concurrence with the specific SAA locations proposed, as our records indicate that the most recent meeting where this UXO was discussed was from June 17 - 19, 2014; and only the biological assessment was the topic of conversation. Note: Concurrence with the approach was based on the CSM developed prior to the identification of thousands of SAA being found within the UXO and the sampling approach needs to reflect the current understanding of the site.

Navy Response to Evaluation Comment: The scoping session for UXO 17 (PAOC EE) was conducted during the December 2, 2015 Technical Subcommittee Meeting, which provided the site background, summary of previous investigations/interim actions and results, potential sources and release mechanisms, potential receptors, and proposed sampling approach and locations. The portion of the meeting minutes associated with the scoping session were copied verbatim into Worksheet #9 (Project Scoping Session Participant Sheet) of the SAP provided for regulatory review. At the time of the meeting, the Navy proposed using incremental surface soil sampling (including adjacent to the SAA), but in that meeting, based on regulatory agency input, the Technical Subcommittee concurred on a discrete soil sampling approach with the justification that it was more appropriate than incremental sampling at this particular site based on historical activities conducted there. On behalf of the Navy, the draft December 2015 meeting minutes were e-mailed by Brett Doerr to the Technical Subcommittee representatives on April 10, 2016. The final December 2015 meeting minutes were e-mailed by Brett Doerr on behalf of the Navy to the Technical Subcommittee representatives on October 7, 2016.

WORKSHEET-SPECIFIC COMMENTS

1. Worksheet #9—Project Scoping Session Participants Sheet:

a. Please correct Katarina Rutkowski's phone number to 860-305-4339.

Navy Response: The requested edit has been made.

b. PREQB's understanding of the discussion that took place is that Katarina Rutkowski requested composite samples rather than discrete samples at MEC items (not drum location) and expressed concern that subsurface soil samples would just be co-located with surface soil samples rather than being located at the locations of subsurface MEC, and the Navy agreed to locate "some" of the subsurface soil samples at subsurface MEC locations. Note also that EPA requested discrete samples for this site. Please revise the text accordingly.

Navy Response: Action items in Worksheet #9 (from the meeting minutes) do not include composite sample collection, and the Navy agreed to collect subsurface soil samples at the surface soil sample locations and at locations where anomalies at depth were left in place, (which has been included in the SAP).

2. Worksheet #10—Conceptual Site Model:

a. Second Munitions Investigation of Playa La Chiva (Blue Beach): The text states, "…In addition to the MEC/MPPEH, approximately 1,000 small arms were also found in the area north of Route 104…" Please verify whether 1,000 small arms or small arms munitions items were found. This statement is repeated on the next page, where the text documents that 3,596 small arms were found.

Navy Response: The small arms mentioned in the text refers to small arms ammunition (SAA). The text has been revised accordingly.

b. Please clarify why Figure 2 only shows two small arms locations when the text indicates that approximately 1,000 small arms were found.

Navy Response: Figure 2 does not show any locations where SAA were recovered. Figure 2 is a figure showing the boundary of PAOC EE. However, Figures 3, 4, and 6 show numerous locations where SAA were recovered. Note that 1,000 SAA blank cartridges were recovered in a single location.

PREQB Evaluation of Navy Response: The original comment should have referenced Figure 3. Please clarify whether the two locations shown on Figure 3 account for the SAA finds mentioned in the text.

Navy Response to Evaluation Comment: Please see the initial response to Worksheet-specific Comment #2ci regarding the revision to Figure 8. Figures 3, 4, and 6 also show the numerous locations where SAA were recovered.

c. Conceptual Site Model:

i. This section states, "…Figure 6 and Table 1 are compilations of findings from the TCRA and previous investigations and demonstrate the nature and extent of MEC/MPPEH (and related potential contaminant sources) have been sufficiently characterized for the RI, which provide the basis for sufficiently characterizing the nature and extent of potential chemical contamination…" Please clarify if the 3,984 small arms also are sources of MC (e.g., lead) in addition to MEC and MPPEH. If so, please revise the text and include a figure showing the area over which these items were found.

Navy Response: The text has been revised to indicate that small arms ammunition are also a potential source of contamination. Note that the locations of small arms are shown in Figures 3, 4, and 6; however, Figure 8 has been revised to include the locations of small arms as well.

PREQB Evaluation of Navy Response: Please clarify the response to indicate whether the locations shown on these figures accounts for all of the SAA discussed in the text (i.e., 3,984 SAA).

Navy Response to Evaluation Comment: Figures 3, 4, and 6 and Figure 8 show all of the SAA found at the site.

ii. Prior sections have documented thousands of small arms at this site. However Figure 6 shows 18 small arms locations. Please clarify the apparent discrepancy in number of items between the figure

and the text and also clarify what was found – small arms (i.e., weapons) or small arms munitions items (and type).

Navy Response: Please see the response to Worksheet-specific Comment #2a. The 18 SAA locations are correct along with the number of SAA identified at the site. The second bullet in Worksheet #17 has been revised as follows:

- **Spatial Extent in areas with higher densities of MD and SAA** – A discrete surface and subsurface soil sample will be collected at 9 locations throughout PAOC EE to evaluate potential extent of contamination, focused within areas where higher densities of MD and/or SAA were identified (i.e., conservative representation), for a total of 18 soil samples. These sample locations represent areas where munitions constituents may have been released from corrosion of MD and/or SAA items. Two discrete soil sample locations will be collected adjacent to where the highest quantities of SAA were observed (3,105 at one location and 1,000 at another).

PREQB Evaluation of Navy Response: Please clarify the area over which SAA were found at each location, as it appears that multi incremental sampling would be more appropriate than discrete sampling in characterizing potential impacts, should SAA scattered across an area rather than contained within a small area (i.e., pile) more suitable for discrete sampling.

Navy Response to Evaluation Comment: Please refer to General Comment #1 and Worksheet #9 where the Technical Subcommittee agreed to conduct discrete sampling versus incremental sampling. Note that the Navy originally proposed incremental sampling at the site, but regulatory agency input at the scoping session resulted in the approach being changed to discrete sampling.

iii. This section states, "…The conceptual site model is generally consistent with that presented in the Master SAP (CH2M, 2013), except that the area of potential contamination is larger than the original PAOC EE boundary (i.e., Punta Conejo)…" The conceptual site model presented in the Master SAP states that 20 small arms blank ammunition were found. This appears to be significantly different than the 3,984 small arms found during the TCRA. Please clarify and provide further supporting rationale for stating that the current conceptual site model is generally consistent with what was presented in the Master UXO SAP.

Navy Response: The referenced sentence has been removed.

PREQB Evaluation of Navy Response: The response is not acceptable, as the text needs to update the CSM previously presented in the Master UXO. Please revise the text to clarify the changes to the CSM based on the significantly elevated SAA finds, which were not known at the time the CSM was developed in the Master UXO SAP.

Navy Response to Evaluation Comment: Please see the response to General Comment #1. The SAP Addendum does provide an update to the conceptual site model based on more recent findings of the TCRA and previous investigations and provides the sampling rationale and location revisions since the Master SAP. Note that sampling locations are positioned adjacent to the SAA.

iv. Please clarify why the thousands of small arms (of unknown type) found are not considered sources of MC contamination.

Navy Response: Please see the response to Worksheet-specific Comment #2c.

v. The last paragraph states "Because all surface MEC/MPPEH at AOC EE were removed, the explosive hazard has been mitigated unless uncontrolled excavation occurred." Beaches are dynamic environments that are frequently modified by erosion. Please revise the text to read "…unless uncontrolled excavation or excessive beach erosion occurs." or explain why beach erosion is not a concern.

Navy Response: The text has been modified as requested.

3. Worksheet #11—Project Quality Objectives/Systematic Planning Process Statements:

a. Please note that the PALs will be updated to the most current version at the time the data evaluation is conducted.

Navy Response: The text has been revised to state that at the time of data evaluation, soil data will be screened against the most recent version of applicable screening values.

b. Question #2: Bullet #7:

i. Please replace perchlorate with PETN, as per Worksheet #15-2.

Navy Response: The text has been modified as requested.

ii. Please remove picric acid from in the list of compounds with DLs greater than PALs, as per Worksheet #15-2.

Navy Response: The text has been modified as requested.

c. Question #4: Bullet #1: Please specify that the "current" EPA Region 2 SOPs and the "current" national functional guidelines will be used for data validation as there have been updates since the original SAP was issued.

Navy Response: The bullet in Worksheet #11 has been revised to add "current" EPA Region 2 SOPs and the "current" National Functional Guidelines.

4. Worksheet #14: Please remove the reference to sediment samples in the last paragraph.

Navy Response: The text has been modified as requested.

5. Worksheet #17—Sampling Design and Rationale:

a. This worksheet states, "…Based on the nature of potential contaminant sources at PAOC EE (i.e., site was used for maneuvering and not as an impact area), discrete soil sampling (as opposed to incremental soil sampling) was concurred upon as the appropriate approach by the Technical Subcommittee…" However, further information is needed concerning the small arms identified and removed from the site to determine the adequacy of the discrete sampling approach, as no sampling is proposed to characterize impacts related to the small arms.

Navy Response: Please see the response to Worksheet-specific Comment #2.

PREQB Evaluation of Navy Response: The response does not address the comment. Additional information on the areal extent of SAA across each area needs to be provided to determine whether discrete or incremental sampling should be conducted. Please provide this information and justification for the proposed approach. Note that concurrence with the approach was based on the CSM developed prior to the identification of thousands of SAA being found within the UXO, and the sampling approach needs to reflect the current understanding of the site.

Navy Response to Evaluation Comment: Please see the response to General Comment #1. The approach was not developed prior to the identification of the SAA; it was developed during the scoping session at the December 2015 Technical Subcommittee Meeting, which is documented in meeting minutes and Worksheet #9 of the SAP Addendum. During that scoping session, based on regulatory input on the Navy's proposed approach, the Technical Subcommittee concurred on collecting discrete soil samples instead of incremental soil samples due to the historical activities that would have occurred at the site.

b. MEC/UXO/DMM: Please clarify if subsurface soil samples will be collected at the location and depth of subsurface MEC identified and removed during the TCRA. Consistent with DoD's EM-200-1-15 manual, "…if MEC also are found in the subsurface, initial samples also should be collected from subsurface soil

near the identified MEC..." This is preferred at some locations rather than collocating all subsurface soil samples with surface soil samples located at surface MEC items.

Navy Response: The following has been added as the last sentence of the first bullet in Worksheet #17: "Subsurface soil samples will be collected at the location and depth of subsurface MEC previously identified."

c. Former drum location: Please clarify how much contaminated soil was removed as a result of the drum being punctured during removal. Please also clarify if the removal resulted in the need to backfill to grade. If so, please clarify the depth at which the subsurface soil sample will be collected to ensure that the sample results characterize soils potentially impacted by the drum contents rather than backfill material.

Navy Response: Approximately 1 cubic yard of soil was removed. The removal location was not backfilled; therefore, a subsurface soil sample will be collected as described in the SAP. This information has been added to the fourth bullet of Worksheet #17, second sentence as follows: "during removal, but approximately 1 cubic yard of the soil impacted by the release was removed along with the drum."

6. Worksheet #18—Sampling Locations and Methods/SOP Requirements Table:

a. Please complete the note for PAHs for surface & subsurface soil samples on the second page of this worksheet under Analytical Group to show only 10% of the samples will be analyzed for PAHs.

Navy Response: The note in Worksheet #18 has been revised as requested.

b. Surface Soil and Deeper Surface Soil Samples: Since there will be 2 samples collected at each location, please increase the number of samples by 1 for all locations.

Navy Response: Worksheet #18 has been revised as requested.

7. Worksheet #19—Field Sampling Requirement Table: Please correct the holding time for hexavalent chromium to show 30 days to digestion and 7 days from digestion to analysis.

Navy Response: Worksheet #19 has been revised as requested.

8. Worksheet #20—Field Quality Control Sample Summary Table:

a. Please add ORP analysis to all matrices. It is currently only shown for 2 of the 5 matrices listed.

Navy Response: ORP is not required for the soil samples; therefore, Worksheet #20 has been revised to remove the ORP analysis from all matrices.

b. Please check the total number of samples that are presented for the various parameters in this worksheet as the total number of samples does not appear to reconcile with the number of sample locations and QA/QC samples for several analytes. For example, the total number of samples listed of WCHEM parameters of pH, TOC, and ORP for subsurface samples at various depths is 20; however, there are 22 sampling locations suggesting that the total number of samples should also be 22 instead of 20. Similar discrepancies appear to exist for other matrices and sample parameters.

Navy Response: Worksheet #20 has been revised to reflect the correct total number of samples that will be sent to the lab.

9. Figure 8: Please collect a surface and subsurface sample at the location where bulk explosives associated with mortars/projectiles were found for analysis of explosives, metals, TOC, pH and ORP.

Navy Response: This sample location has been added to Figure 8 as requested, as well as associated sampling worksheets. The specific item is listed in Table 1, under Second Munitions Investigation of Playa La Chiva, fourth MPPEH item (Projectiles/Mortars, bulk explosives).

10. Attachment A, DoD ELAP Letters: The APPL Laboratory certification shows that the laboratory is certified for perchlorate analysis of solid samples using SW-846 method 6851. However, SW-846 method 6850 is proposed in the SAP. Please clarify if the laboratory is certified to analyze perchlorate in solid samples using SW-846 method 6850.

Navy Response: APPL is certified for SW-846 6850 in aqueous and solid samples. They have contacted their accrediting body regarding the EPA 6851 error, which occurred while copying cells in Excel for their original FOT spreadsheet.

Final Responses to PRDNER Comments on:
Vieques NPL, Draft Master Sampling and Analysis Plan – Addendum 5, UXO 17 PAOC EE Remedial Investigation (May 2016)
Comments Made by PRDNER on July 13, 2016

PDF Pg. #	Doc. Pg. #	Section #	Document Text / Summary of Content [Section Heading, if Applicable, in Brackets]	DNER Comments	Navy Response to Comments (RTCs)
15	7	Wks. #10	[Site Background]: The area was defined based on where historical information suggested military training activities associated with beach landings occurred and includes the area where surface/subsurface MPPEH were found. No known historical live fire activities occurred at the site, but the area was used for amphibious landings and other ship-to-shore activities.	Please revise the text to reflect that the site background includes serving as the location of Operation PORTREX, a significant joint forces exercise. From February 25th through March 11th, 1950, some 80,000 soldiers, sailors, airmen, and Marines participated in Operation PORTREX, centered on Red and Blue beaches; accounts and descriptions of the exercise are available online (e.g., see http://www.valerosos.com/PreludetoInchon.html). The exercise included naval bombardment with (among other munitions) 5-inch rounds; hundreds of landing craft were involved in assaults on Blue and Red beaches.	Please note that the text is accurate as written; naval bombardment occurred at the LIA. Blue Beach was used for amphibious landings as discussed in the text. However, reference to the PORTEX information included in the comment has been added.
36	28	Wks. #17	Four locations within habitat supportive of each of the turtle species will be sampled at the discrete deeper surface soil interval of 18 to 36 inches. In addition, discrete surface soil samples will be collected at each of these locations to evaluate potential risks to beach recreators. Therefore, a total of 16 discrete surface soil samples will be collected from the 8 locations. In general, all surface soil samples will be collected from 0 to 12 inches; if the location occurs within active land crab habitat (as observed during the sampling effort), the surface interval will instead be 0 to 24 inches. For subsurface soil samples (other than the beach deeper surface soil samples), a hand auger or continuous split spoon will be used	Please clarify or revise/resolve the apparent inconsistencies in this section regarding the description and/or distinction between surface and subsurface soils. The first paragraph defines the 18-to-36-inch depth as deeper surface soil; the second suggests that surface soil extends to a depth of 24 inches; the third implies that soil at depths greater than 1 foot are considered subsurface soils. Please revise the text to use a (more) consistent definition of surface vs. subsurface soil. For comparison, the Final Master Standard Operating Procedures, Protocols, and Plans states "the following are the criteria used to select the surface soil sampling depth at a given site under investigation: • Surface soil samples will be collected from the top 24 inches of soil when the sample location is near a surface water body and land crabs or burrowing reptiles (e.g., nesting sea turtles) are potential receptors of concern at the sample location.	Text has been adjusted to ensure clarity with regards to sample depth profiles for the various sampling locations. Note that the Master SOP is being updated to reflect the sampling interval for sea turtle nest habitat is 18 to 36 inches, as currently described in the PAOC EE SAP.

PDF Pg. #	Doc. Pg. #	Section #	Document Text / Summary of Content [Section Heading, if Applicable, in Brackets]	DNER Comments	Navy Response to Comments (RTCs)
			to collect a 2-foot interval analytical sample between 1 foot (i.e., the bottom of the surface soil interval) and 6 feet (or water table if encountered above 6 feet).	• Surface soil samples will be collected from the top 12 inches of soil when the sample location is not near a surface water body and land crabs or burrowing reptiles (e.g., nesting sea turtles) are not potential receptors of concern at the sample location. • Surface soil samples will be collected from the top 6 inches of soil when collected from under debris or contaminated soil that has been removed to determine whether a release to underlying soil has occurred."	

Final Responses to USFWS Comments on the Draft Master Sampling and Analysis Plan – Addendum 5 UXO 17, PAOC EE Remedial Investigation Dated May 2016

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

1. Page 7. Paragraph 4 in Site Background. The last sentence reads ". . . . are largely used by USFWS for general refuge management activities and by the public for recreational use; however, trespassing and less common refuge management activities also occur in the surrounding vegetated areas." The surrounding vegetated areas are not currently closed to the public, therefore entrance into these areas would not currently be trespassing. This sentence should be rephrased or we should discuss the need to "close" or "post" these areas. We do not promote entrance but I don't believe it is prohibited.

   Navy Response: The sentence was revised as follows: "however, public access and less common refuge management activities may also occur in the surrounding vegetated areas."

2. Page 9. The last paragraph refers to recreators (adolescent and adults) being potential human receptors. We recommend that this be changed to children as we do not restrict access to any particular age group.

   Navy Response: "adolescent and adults" was changed to "all ages."