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FINAL ADDENDUM 3 MASTER SAMPLING AND ANALYSIS PLAN UXO 13 REMEDIAL
INVESTIGATION ATLANTIC FLEET WEAPONS TRAINING AREA FORMER VIEQUES NAVAL
TRAINING RANGE VIEQUES ISLAND PUERTO RICO

10/01/2015
CH2M HILL

Final

Addendum 3
Master Sampling and Analysis Plan
UXO 13 Remedial Investigation

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

Contract Task Order 005

October 2015

Prepared for

Department of the Navy
Naval Facilities Engineering Command
Atlantic Division

Under the

NAVFAC CLEAN 8012 Program
Contract N62470-11-D-8012

Prepared by



CH2MHILL

Virginia Beach, Virginia

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Executive Summary

The Final Master Sampling and Analysis Plan (SAP), East Vieques Terrestrial UXO Sites, Former Vieques Naval Training Range, Vieques, Puerto Rico (CH2M HILL, 2013a), hereafter referred to as the Master SAP, was prepared to guide Remedial Investigation (RI) activities at multiple UXO sites within the former Vieques Naval Training Range (VNTR) that will take place over multiple years. Because of the robust and long-term nature of the activities covered by the Master SAP, it intentionally does not identify a specific laboratory but instead includes the protocols any selected laboratory is requested to meet. It is therefore designed to be used in conjunction with site-specific addenda that provide laboratory-specific chemistry-related worksheets and any update to the planned activities based on information gathered since the Master SAP was issued.

This is Addendum 3 to the Master SAP and it includes an update of the conceptual site model, additional and revised sampling locations, and all the laboratory-specific worksheets for analysis of discrete soil, incremental soil, surface water, and sediment samples to be collected from UXO 13. For all other worksheets (i.e., those unchanged or unchanged substantively by selection of the specific laboratories), please refer to the Master SAP (CH2M HILL, 2013a). **Figure ES-1** shows the location of UXO 13 and the historical features relevant to the planned investigation, respectively.

The original sampling approach for UXO 13 was established in the Master SAP (CH2M HILL, 2013a), which includes the sample collection techniques, analyses, and locations. The locations were based on the munitions and explosives of concern (MEC) information that had been collected through October 2012. However, since that document was finalized, additional information has been gathered from the ongoing MEC Non-time Critical Removal Action (NTCRA) and used to adjust the sample locations, as appropriate, in order to ensure the original objective (sampling in the most conservative areas) will still be met. This approach is in accordance with the Master SAP. In total, 33 incremental surface soil, three discrete deeper surface soil (around the lagoon fringes), 60 discrete subsurface soil, six sediment, and six surface water samples will be collected from UXO 13. Sample locations are shown in **Figure ES-2**. The updated sample locations reflect a collaborative effort among the Navy, regulatory agencies, and land administrator to select sampling locations and types that ensure the RI objectives are met.

The following laboratories were selected for performing the sample analyses. Laboratory-specific worksheets contained herein demonstrate that the laboratories adhere to the Master SAP protocols or, as applicable, provide justification for deviation.

- APPL, Inc. in Clovis, CA for analysis of explosives, inorganics (metals), semi-volatile organic compounds (SVOCs), acid volatile sulfide/simultaneously extracted metals (AVS/SEM), and pH
- ALS Environmental in Keslo, WA for analysis of soil oxidation reduction potential (ORP)
- TestAmerica, Inc. in South Burlington, VT for grain size (sieve) analysis

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Resumen Ejecutivo

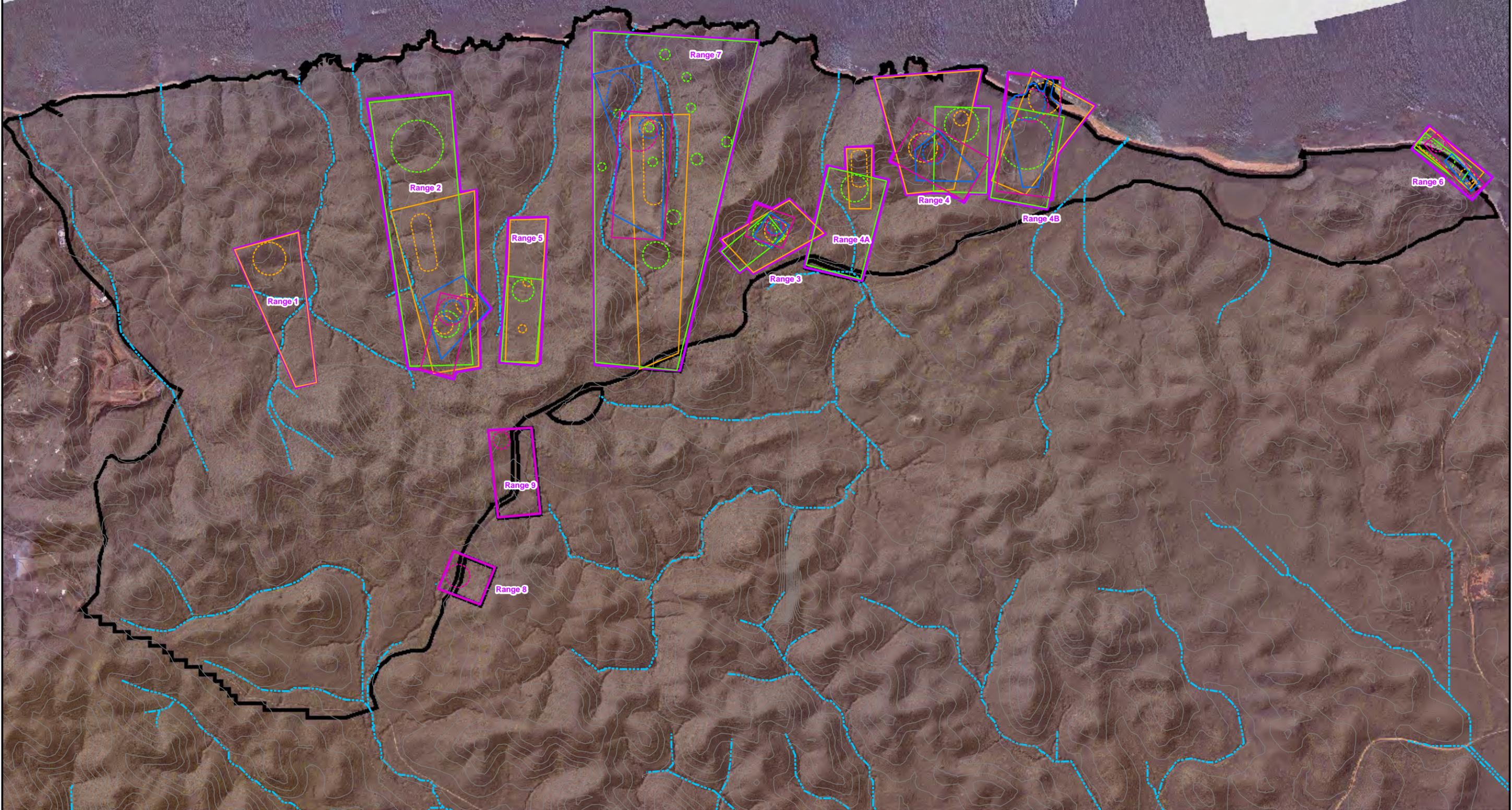
El Plan Maestro Final de Muestreo y Análisis (Master SAP, en inglés), Sitios UXO Terrestres en el Este de Vieques, Antiguo Campo de Adiestramiento Naval de Vieques, Vieques, Puerto Rico (CH2M HILL, 2013a), de aquí en adelante referido como Master SAP, fue preparado para guiar las actividades de la investigación para el remedio (RI, por sus siglas en inglés) en múltiples sitios UXO dentro del antiguo Campo de Adiestramiento Naval de Vieques (VNTR, por sus siglas en inglés) que serán llevadas a cabo a través de múltiples años. Debido a la naturaleza robusta y el largo plazo de las actividades cubiertas por el Master SAP, el mismo intencionalmente no identifica un laboratorio específico, en cambio incluye los protocolos que cualquier laboratorio seleccionado deberá cumplir. Por lo tanto se diseñó para ser usado en conjunto con apéndices específicos para el sitio que provean hojas de trabajo relacionadas con la química específica para los laboratorios y cualquier actualización a las actividades planificadas basada en información recopilada desde que el Master SAP fue emitido.

Este es el Apéndice 3 al Master SAP e incluye una actualización del modelo conceptual del sitio, localizaciones de muestreo adicionales y revisadas, y todas las hojas de trabajo específicas de laboratorio para el análisis de suelo discreto, suelo incremental, aguas superficiales, y muestras de sedimento a ser colectadas en UXO 13. Para todas las otras hojas de trabajo (i.e. los que no cambien o no cambien sustancialmente por la selección de laboratorios específicos), favor referirse al Master SAP (CH2M HILL, 2013a). La **Figura ES-1** muestra la localización de UXO 13 y las características históricas relevantes a la investigación planificada, respectivamente.

El método de muestreo original para UXO 13 fue establecido en el Master SAP (CH2M HILL, 2013), que incluyó las técnicas de colección, análisis y localizaciones de las muestras. Las localizaciones fueron basadas en la información sobre municiones y explosivos de preocupación (MEC, por sus siglas en inglés) que habían sido colectadas hasta octubre de 2012. Sin embargo, desde que se completó ese documento, se recopiló información adicional de la acción de remoción de tiempo no-crítico (NTCRA, por sus siglas en inglés) de MEC que se está llevando a cabo, la cual fue usada para ajustar las localizaciones de muestreo, como fuese apropiado, para asegurar que el objetivo original (muestreo en las áreas más conservadoras) aún se pueda alcanzar. Este enfoque es de acuerdo con el Master SAP. En total, 33 muestras de suelo superficial incremental, 3 muestras discretas del suelo superficial más profundo (alrededor de la franja de la laguna), 60 muestras discretas del subsuelo, 6 de sedimento, y 6 de aguas superficiales serán colectadas de UXO 13. Las localizaciones de muestreo se muestran en la **Figura ES-2**. Las localizaciones de muestreo actualizadas reflejan un esfuerzo colaborativo entre la Marina, agencias reguladoras, y el administrador de los terrenos para seleccionar localizaciones y tipos de muestreo que aseguren que los objetivos del RI se cumplan.

Los siguientes laboratorios fueron seleccionados para llevar a cabo los análisis de las muestras. Las hojas de trabajo específicas a los laboratorios contenidos en este documento demuestran que los laboratorios siguen los protocolos del Master SAP o, según aplique, proveen justificación para desviación.

- APPL, Inc. en Clovis, CA para análisis de explosivos, inorgánicos (metales), compuestos orgánicos semi-volátiles (SVOCs, por sus siglas en inglés), sulfuro ácido volátil/metales extraídos simultáneamente (EVA/SEM, por sus siglas en inglés), y pH
- ALS Environmental en Keslo, WA para análisis del potencial de oxidación-reducción del suelo (ORP, por sus siglas en inglés)
- TestAmerica, Inc. en South Burlington, VT para análisis del tamaño de los granos (cernido)



Historic Range Areas		Historic Impact Area		Topographic Contours (10 Meter)	
	1962		1962		Topographic Contours (10 Meter)
	1967		1967		Stream
	1983		1983		Range
	1994		1994		UXO 13

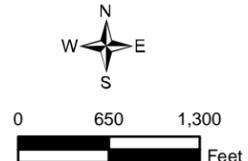
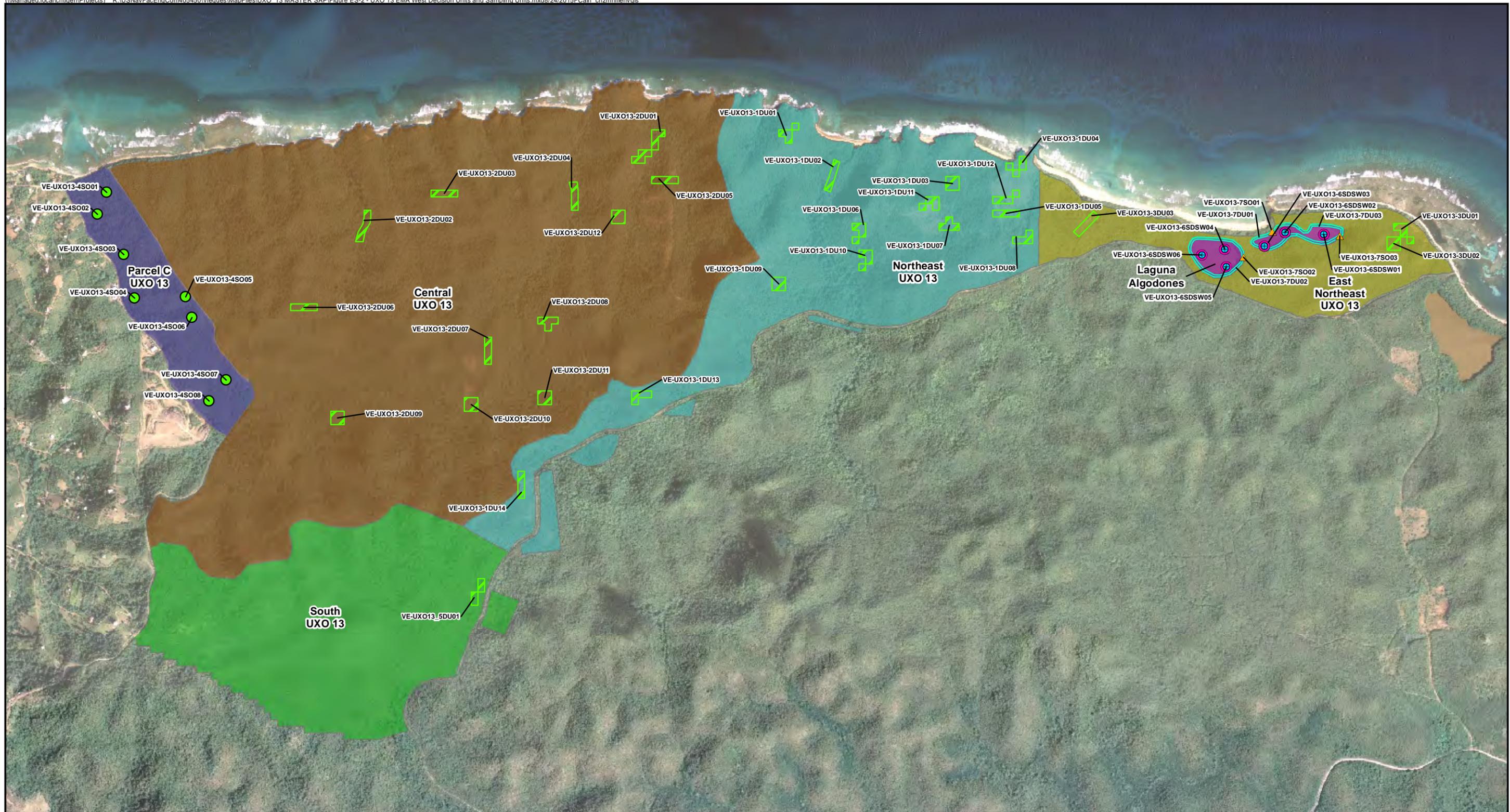


Figure ES-1
UXO 13 Historic Range Features
 UXO 13 Master SAP Addendum
 Former VNTR
 Vieques, Puerto Rico



- | | |
|--------------------------------------|-------------------------|
| ● Surface and Subsurface Soil Sample | Decision Unit |
| ▲ Deep Surface Soil Sample | ■ Central UXO 13 |
| ● Proposed Surface Water Samples | ■ East Northeast UXO 13 |
| ● Proposed Sediment Samples | ■ Laguna Algodones |
| □ Laguna Algodones Fringe | ■ Northeast UXO 13 |
| □ Sample Unit | ■ Parcel C UXO 13 |
| | ■ South UXO 13 |

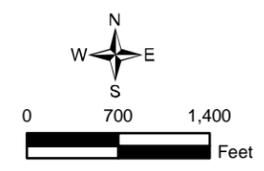


Figure ES-2
UXO 13 EMA West Decision Units and Sampling Units
 UXO 13 Master SAP Addendum
 Former VNTR
 Vieques, Puerto Rico

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- 9 UXO 13 Laguna Algodones Sampling Approach

Acronyms and Abbreviations

ASTM	American Society for Testing and Materials (ASTM)
AVS/SEM	acid volatile sulfide/simultaneously extracted metals
CCV	continue calibration verification
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-term Environmental Action—Navy
CTO	Contract Task Order
DL	detection limit
DMM	discarded military munitions
DoD	Department of Defense
DOI	Department of the Interior
DQI	Data Quality Indicator
EMA	Eastern Maneuver Area
EPA	Environmental Protection Agency
ERA	Ecological Risk Assessment
ERP	Environmental Restoration Program
ESV	ecological screening value
FD	field duplicate
FTL	Field Team Leader
HQ	hazard quotient
ICAL	initial calibration
ICB/CCB	Initial and Continuing Calibration Blank
ICP	Inductive Coupled Plasma Atomic Emission Spectrometry
ICS	interference check solutions
ICV	initial calibration verification
IS	incremental sampling
IS	internal standards
LCS	laboratory control sample
LCL	lower control limit
LD	laboratory duplicate
LDR	linear dynamic range
LIA	Live Impact Area
LOD	limits of detection
LOQ	limits of quantitation
LRB	laboratory reagent blank
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
µmol/g	micromole per gram
MB	method blank
MCT	matrix conductivity threshold
MD	munitions debris
MEC	munitions and explosives of concern
mg/kg	milligrams per kilogram
MPC	measurement performance criteria

MPPEH	material potentially presenting an explosive hazard
MS/MSD	matrix spike/matrix spike duplicate
N/A	not applicable
NAVFAC	Naval Facilities Engineering Command
Navy	Department of the Navy
NOAA	National Oceanic and Atmospheric Administration
NPL	National Priorities List
NTCRA	Non-time Critical Removal Action
ORP	oxidation-reduction potential
OU	Operable Unit
PAH	polycyclic aromatic hydrocarbon
PAL	project action limit
PIL	project indicator limit
PM	Project Manager
POC	Point of Contact
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
QAPP	Quality Assurance Project Plan
QC	quality control
QL	quantitation limit
QSM	Quality Systems Manual
RI	Remedial Investigation
RPD	relative percent difference
RRD	range related debris
RRT	relative retention times
RSD	Relative Standard Deviation
RSL	regional screening level
RT	retention time
SAP	Sampling and Analysis Plan
SB	subsurface soil sample
SD	sediment sample
SEM	scanning electron microscope
SI	Site Inspection
SMI	multi-incremental sampling
SMP	Site Management Plan
SOP	standard operating procedure
SS	surface soil sample
SSC	Site Safety Coordinator
SSL	soil screening level
SVOC	semivolatile organic compound
SW	surface water
TBD	to be determined
TOC	total organic carbon
TRV	Toxicity Reference Value

U.S.	United States
UFP	Uniform Federal Policy
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
Addendum 3
Master Sampling and Analysis Plan
UXO 13 Remedial Investigation**

**Atlantic Fleet Weapons Training Area - Vieques
Former Vieques Naval Training Range
Vieques, Puerto Rico
Contract Task Order 0005
October 2015**

Prepared for:

**Department of the Navy
Naval Facilities Engineering Command
Atlantic Division
6506 Hampton Boulevard
Norfolk, VA 23508-1278**

Prepared by:



5700 Cleveland Street, Suite 200
Virginia Beach, VA 23462
Office phone # 757-671-6219

Prepared under:

Navy CLEAN 8012 Program
Contract N62470-11-D-8012
Contract Task Order – 005

QA Review Signature:

G. Brett Doerr

Digitally signed by G. Brett Doerr
DN: cn=G. Brett Doerr, o=CH2M HILL, ou,
email=brett.doerr@ch2m.com, c=US
Date: 2015.10.13 11:20:17 -04'00'

Brett Doerr
Vieques Activity Manager

Other Approval Signatures:

**CLOE.KEVIN.R.12295
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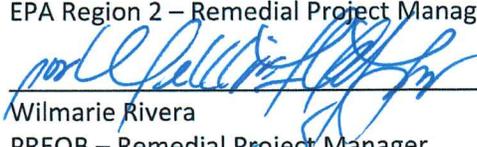
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ou=USN, cn=CLOE.KEVIN.R.1229533947
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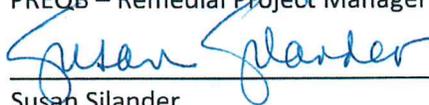
Kevin Cloe
NAVFAC – Remedial Project Manager

JULIO VAZQUEZ

Digitally signed by JULIO VAZQUEZ
DN: c=US, o=U.S. Government, ou=USEPA, ou=Staff,
cn=JULIO VAZQUEZ, dnQualifier=0000013169
Date: 2015.10.13 11:41:21 -04'00'

Julio Vazquez
EPA Region 2 – Remedial Project Manager


Wilmarie Rivera
PREQB – Remedial Project Manager

 10/13/2015
Susan Silander
USFWS – Remedial Project Manager

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SAP Worksheet #2—Sampling and Analysis Plan Identifying Information

Site Name/Number: UXO 13 Atlantic Fleet Weapons Training Area – Vieques, Former Vieques Naval Training Range, Vieques, Puerto Rico

Operable Unit (OU): 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) (Intergovernmental Data Quality Task Force, 2005) and United States (U.S.) Environmental Protection Agency (EPA) Guidance for QAPPs, USEPA QA/G-5, Quality Assurance Management Section (QAMS) (USEPA, 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 HILL, 2013a) to update the conceptual site model for UXO 13 based on data collected during the UXO 13 NTCRA for MEC. It is the third addendum to the Final Master SAP. In addition, this SAP Addendum provides the analytical laboratory worksheets specific to the UXO 13 RI.
4. Dates of scoping sessions:

Scoping Session	Date
Scoping sessions are provided in the Final Master SAP	

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

Title	Date
<i>Master Standard Operating Procedures, Protocols, and Plans, Environmental Restoration Program, Vieques, Puerto Rico</i> (CH2M HILL)	April 2010
<i>Non-Time Critical Removal Action Work Plan, Munitions Response Site UXO 13, Former Vieques Naval Training Range, Vieques, Puerto Rico</i> (CH2M HILL)	February 2012
<i>Master SAP for East Vieques Terrestrial UXO Sites, Former Vieques Naval Training Range, Vieques, Puerto Rico</i> (CH2M HILL)	January 2013

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

6. Organizational partners (stakeholders) and connection with lead organization:
 - **EPA Region 2** – Federal regulatory stakeholder overseeing CERCLA Vieques Environmental Restoration Program (ERP) implemented by lead organization
 - **Puerto Rico Environmental Quality Board (PREQB)** – Commonwealth regulatory stakeholder overseeing 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
 - **United States Fish and Wildlife Service (USFWS)** – Landowner of land transferred from lead organization and on which UXO 15 ERP activities are conducted
 - **National Oceanic and Atmospheric Administration (NOAA)** – Marine habitat stakeholder and technical advisor to EPA
7. Lead organization (see Worksheet #7 from the Master SAP [CH2M HILL, 2013a] for a detailed list of data users):
 - U.S. Department of Navy (Navy)
8. The omitted SAP elements excluded and provide an explanation for their exclusion below:

This addendum includes only those worksheets revised as a result of the RI sampling approach modification and procurement of an analytical laboratory. Worksheets from the Master SAP 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 # 3-10, 13, 14, 21, 22, 27, 29, and 31-37. Please consult the Master SAP for the associated information.

SAP Worksheet #4 — Project Personnel Sign-Off Sheet

Name	Organization/Title/Project Role	Telephone Number (optional)	Signature/ email receipt	SAP Section Reviewed	Date SAP Read
Anita Dodson	CH2M HILL/Navy Program Chemist/ SAP Review	757-671-6218			
John Swenfurth	CH2M HILL/Contractor Project Manager (PM)/Logistics and Administration	813-281-7762			
Bill Hannah	CH2M HILL/Senior Technical Consultant	757-671-6277			
Carl Woods	CH2M HILL/Contractor Health and Safety Lead/Health and Safety Officer	513-889-5771			
Hillary Ott	CH2M HILL/ Project Data Manager/Data Tracking and Management	703-376-5165			
Barrie Selcoe	CH2M HILL/Human Health Risk Assessment Lead	281-721-8527 713-392-8707 (cell)			
John Martin	CH2M HILL/Ecological Risk Assessment Lead	352-384-7122			
Brett Doerr	CH2M HILL/Contractor Activity Manager/CH2M HILL Primary Point of Contact (POC)/Activity Quality Manager/SAP Quality Reviewer	757-671-6219			
Ronny Fields or TBD	CH2M HILL/ Field Team Leader (FTL)	423-310-6556			
Mike Zamboni	CH2M HILL/Project Chemist	709-376-5301			
Cynthia Clark	APPL/Lab Project Manager	559-275-2175			
Howard Holmes	ALS-Kelso/Lab Project Manager	360-577-7222			
Don Dawicki	Test America-Burlington/Lab Project Manager	802-660-1990			
TBD	TBD/Data Validator				
TBD	TBD/Anomaly Avoidance Project Manager				
Bhavana Reddy	CH2M HILL/Database Manager	703-608-1488			
Ronny Fields or TBD	CH2M HILL/Site Safety Coordinator (SSC)/Field Team Member	423-310-6556			

Signed versions of Worksheet #4 will be kept on file at CH2M HILL along with other project documents.

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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 UXO 13 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 HILL, 2010b) 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 the RI is being conducted) Regional Screening Levels (RSLs) (adjusted for a hazard quotient [HQ] of 0.1 for non-carcinogens) provided by EPA.
- Vieques ecological screening values for soil and for marine sediment, which are listed in the Vieques Master Ecological Risk Assessment Protocol (CH2M HILL, 2010c) and associated Master Ecological Risk Assessment Protocol Update 1 (CH2M HILL, 2013b).
- 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 HILL, 2007b).
- Where a specific PAL deviates from the above, it is footnoted in the applicable Worksheet #15 table.
- Results for screening data (i.e., general chemistry parameter pH) collected to support the interpretation of ecological risk results will not be compared to strictly defined PALs, but will be evaluated qualitatively. This parameter is identified in Worksheet #15. There are no project indicator limits (PILs); pH results will be the only screening data generated. AVS/SEM and grain size are also needed for sediment.

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]), 2,4-dinitrotoluene in surface water (RSL), 2,6-dinitrotoluene in surface water (RSL), 1,3-dinitrobenzene (SSL), 2,4,6-trinitrotoluene (SSL), 2,4-dinitrotoluene (SSL), 2,6-dinitrotoluene (SSL), 2-Amino-4,6-dinitrotoluene (SSL), 3-nitrotoluene (SSL), 4-amino-2,6-dinitrotoluene (SSL), 4-nitrotoluene (SSL), RDX (SSL), tetryl (marine sediment ecological screening value [ESV]), nitrobenzene (SSL and marine sediment ESV), nitroglycerin (SSL), PETN (SSL), total and dissolved arsenic in surface water (RSL), total and dissolved chromium in surface water (RSL), total and dissolved hexavalent chromium in surface water (RSL), total and dissolved thallium in surface water (RSL), and hexavalent chromium (SSL).

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

As previously noted, the vast majority of these occurrences are for the SSLs. As noted in various Vieques SAPs and reports, SSLs have been consistently demonstrated on Vieques to be unreliable predictors (i.e., overly conservative) of leaching concerns for groundwater. For example, it has been demonstrated across the former VNTR that explosive constituents are largely absent in groundwater, even in areas with significantly higher densities of munitions (e.g., Live Impact Area [LIA]), providing further evidence that while SSLs can help provide some perspective on leachability of constituents, they should not be considered threshold values upon which to draw conclusions about the utility of data. The remainder of the instances where the DL is higher than the PAL are sporadic and other data collected during the RI will help evaluate any associated uncertainty. For example, there are only two surface water explosives with a DL above the PAL. However, there will be data available for the other explosives in those samples that can be used to help determine if there is an explosives constituent concern in the surface water body. In addition, there are other lines of evidence that can be used, such as whether those constituents are detected in other media (soil, groundwater), to help address any uncertainty associated with non-detect results for those two constituents. With respect to the metals whose surface water PALs are below the DLs, it is important to note that throughout the VNTR where RI surface water sampling has already occurred (many in areas with higher densities of munitions), these metals have been determined to be absent or attributable to background. Based on this information, the occurrence of non-detects for several constituents where the PAL is lower than the DL will not adversely impact the ability to meet the objectives of the RI. Also, in accordance with the provisions of Worksheet #11 of the Master SAP (CH2M HILL, 2013a), if there are instances where the laboratory-specific DL is greater than the screening level, then the resulting uncertainty will be discussed in the data quality evaluation.

- 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 HILL, 2010d]).

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, surface water, and sediment samples will be submitted to an offsite laboratory for analysis (APPL, Inc., of Clovis, CA; ALS-Kelso of Kelso, WA; Test America – Burlington of South Burlington, VT).
- Chemicals of interest consist of explosives constituents, SVOCs/polycyclic aromatic hydrocarbons (PAHs), and metals, as shown in Worksheet #15.
- Worksheets #15 and #18 define the matrices, analytical groups, and, where applicable, specific target analytes for UXO 13.

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 site conditions and potential risks at UXO 13. Laboratory methods will meet CERCLA, EPA Region 2, and Navy guidance and the data will be validated by a third-party validator using EPA Region 2 standard operating procedures (SOPs), national functional guidance, methodology, and laboratory SOPs as described in Worksheet #36.

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

- 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.

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 UXO 13. Worksheet #15 contains the particular analytes, PALs, and quantitation limits (QLs). Worksheet #17 provides the rationale for the particular sampling at each area.

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

- Samples will be collected during one field mobilization planned to occur in September 2015.
- Data will be collected and generated in accordance with the procedures outlined in the UFP-SAP. Specifically, see the SOPs in Appendix D of the Master SAP (CH2M HILL, 2013a) for more details.

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

- CH2M HILL field staff will collect the samples.
- Laboratory analysis will be performed by APPL, Inc., of Clovis, CA with ORP and grain size analysis being performed by ALS-Kelso of Kelso, WA, and Test America – Burlington of South Burlington, VT, respectively.
- The data will be evaluated and documented in an 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 decision analysis process 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 safety risk 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 UXO 13, the nature and extent of MEC at UXO 13 has been sufficiently characterized to make decisions regarding the final MEC-related remedy for the site. Therefore, the first PQO has been addressed and, in keeping with the decision analysis process shown in **Figure 1**, the process may proceed to the subsequent steps for the munitions constituents at the site. The six-step decision analysis and associated PQOs are described in detail in the Master SAP.

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SAP Worksheet #12—Measurement Performance Criteria Table for Field QC Samples

As requested by EPA Region 2 for another site in Puerto Rico, all field QC sample information is provided within Worksheet #28 and Worksheet #12 is not applicable.

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

Matrix: SB, SS, SMI

Analytical Group: SVOC

Analyte	CAS # ¹	Full Scan or SIM	RSLs Residential Soil Adjusted ² (µg/kg)	RSLs Industrial Soil Adjusted ³ (µg/kg)	SSLs ² (µg/kg)	Marine Sediment ESVs ² (µg/kg)	Ecological Soil ESVs ² (µg/kg)	Project QL Goal ³ (µg/kg)	Laboratory Limits ⁵ (µg/kg)			LCS and MS/MSD Recovery Limits and RPD ⁴ (%)		
									LOQ	LOD	DL	LCL	UCL	RPD
2-Chloronaphthalene	91-58-7	Full Scan	630,000	9,300,000	3,800	NC	NC	1,900	330	167	52.4	41	114	20
2-Methylnaphthalene	91-57-6	SIM	23,000	300,000	190	70	NC	35	5	1.67	0.94	39	114	
Acenaphthene	83-32-9	SIM	350,000	4,500,000	5,500	16	NC	8	5	1.67	0.97	44	111	
Acenaphthylene	208-96-8	SIM	350,000	4,500,000	5,500	44	NC	22	5	1.67	0.89	39	116	
Anthracene	120-12-7	SIM	1,700,000	23,000,000	58,000	85.3	NC	42.65	5	1.67	0.83	50	114	
Benzo(a)anthracene	56-55-3	SIM	150	2,900	12	261	NC	6	5	1.67	0.91	54	122	
Benzo(a)pyrene	50-32-8	SIM	15	290	240	430	NC	7.5	5	1.67	0.93	50	125	
Benzo(b)fluoranthene	205-99-2	SIM	150	2,900	41	1,800	NC	20.5	5	1.67	1.11	53	128	
Benzo(g,h,i)perylene	191-24-2	SIM	NC	1,700,000,000	NC	670	NC	335	5	1.67	1.34	49	127	
Benzo(k)fluoranthene	207-08-9	SIM	1,500	29,000	400	1,800	NC	200	5	1.67	1.04	56	123	
Chrysene	218-01-9	SIM	15,000	290,000	1,200	384	NC	192	5	1.67	0.85	57	118	
Dibenz(a,h)anthracene	53-70-3	SIM	15	290	13	63.4	NC	6.5	5	1.67	0.92	50	129	
Fluoranthene	206-44-0	SIM	230,000	3,000,000	89,000	600	NC	300	5	1.67	1.2	55	119	
Fluorene	86-73-7	SIM	230,000	3,000,000	5,400	19	NC	9.5	5	1.67	1	47	114	
Indeno(1,2,3-cd)pyrene	193-39-5	SIM	150	2,900	240	600	NC	75	5	1.67	0.9	49	130	
Naphthalene	91-20-3	SIM	3,800	17,000	0.54	160	NC	0.27	5	1.67	0.89	38	111	
Phenanthrene	85-01-8	SIM	NC	17,000,000,000	NC	240	NC	120	5	1.67	1.1	49	113	
Pyrene	129-00-0	SIM	170,000	2,300,000	13,000	665	NC	332.5	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 2014. SSLs are Risk-Based when an MCL-based value does not exist and are current as of May 2014. The Ecological Soil ESVs screening level for Total HMW PAHs is 1,100 µg/kg and the screening level for Total LMW PAHs is 29,000 µg/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. For fractions which have been dried prior to analysis, results are reported on an as-received basis (for the dried fraction).

NC indicates that there is no criterion for an analyte.

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

Matrix: SW

Analytical Group: EXPLO

Analyte ¹	CAS #	RSLs Tap Water Adjusted ² (µg/L)	Marine Surface Water ESVs ² (µg/L)	PRWQ Class SB & SC (marine for SW) ² (µg/L)	MCLs ² (µg/L)	Project QL Goal ³ (µg/L)	Laboratory Limits ⁴ (µg/L)			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	59	15	NC	NC	7.5	0.5	0.3	0.13	73	125	20
1,3-Dinitrobenzene (1,3-DNB)	99-65-0	0.2	180	NC	NC	0.1	0.5	0.3	0.131	78	120	
2,4,6-Trinitrotoluene (2,4,6-TNT)	118-96-7	0.98	100	NC	NC	0.49	0.5	0.3	0.133	71	123	
2,4-Dinitrotoluene (2,4-DNT)	121-14-2	0.11	480	34	NC	0.055	0.5	0.3	0.125	78	120	
2,6-Dinitrotoluene (2,6-DNT)	606-20-2	0.11	1,000	NC	NC	0.055	0.5	0.3	0.125	77	127	
2-Amino-4,6-dinitrotoluene (2-Am-DNT)	35572-78-2	3.9	NC	NC	NC	1.95	0.5	0.3	0.125	79	120	
2-Nitrotoluene (2-NT)	88-72-2	0.31	NC	NC	NC	0.155	0.5	0.3	0.126	70	127	
3-Nitrotoluene (3-NT)	99-08-1	0.17	NC	NC	NC	0.085	0.5	0.3	0.133	73	125	
4-Amino-2,6-dinitrotoluene (4-Am-DNT)	19406-51-0	3.9	NC	NC	NC	1.95	0.5	0.3	0.1	76	125	
4-Nitrotoluene (4-NT)	99-99-0	4.2	NC	NC	NC	2.1	0.5	0.3	0.133	71	127	
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	0.7	5,000	NC	NC	0.35	0.5	0.3	0.123	68	130	
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	479-45-8	3.9	8	NC	NC	1.95	0.5	0.3	0.133	64	128	
Nitrobenzene (NB)	98-95-3	0.14	66.8	690	NC	0.07	0.5	0.3	0.126	65	134	
Nitroglycerin (NG)	55-63-0	0.2	NC	NC	NC	0.1	0.5	0.3	0.13	74	127	
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	100	NC	NC	NC	50	0.5	0.3	0.115	65	135	
Pentaerythritol tetranitrate (PETN)	78-11-5	3.9	NC	NC	NC	1.95	2.5	1.5	0.607	73	127	
Perchlorate	14797-73-0	1.4	NC	NC	NC	0.7	0.6	0.4	0.2	84	119	15
Picric Acid	88-89-1	NC	9,200	NC	NC	4600	0.2	0.12	0.06	30	130	30

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 2014.

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. NC indicates that there is no criterion for an analyte.

The ammonium picrate concentration will be calculated by taking the reported picric acid result and converting it to ammonium picrate using the following equation:

$$[\text{ammonium picrate (ug/kg)}] = [\text{picric acid (ug/kg)}] * (246.13/229.10).$$

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

Matrix: SB, SS, SD, SMI

Analytical Group: EXPLO

Analyte ¹	CAS #	RSLs Residential Soil Adjusted ³ (µg/kg)	RSLs Industrial Soil Adjusted ³ (µg/kg)	SSLs ² (µg/kg)	Marine Sediment ESVs ² (µg/kg)	Ecologic al Soil ESVs ² (µg/kg)	Project QL Goal ³ (µg/kg)	Laboratory Limits ⁵ (µg/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	7,000	NC	1,050	500	200	79	80	116	20	
1,3-Dinitrobenzene (1,3-DNB)	99-65-0	620	8,200	2	NC	NC	1	450	200	63	73	119		
2,4,6-Trinitrotoluene (2,4,6-TNT)	118-96-7	3,600	52,000	15	20,000	10,000	7.5	500	200	83	71	120		
2,4-Dinitrotoluene (2,4-DNT)	121-14-2	1,700	7,400	0.32	NC	11,000	0.16	500	200	83	75	121		
2,6-Dinitrotoluene (2,6-DNT)	606-20-2	360	1,500	0.07	549	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	NC	80,000	15	500	200	75	71	123		
2-Nitrotoluene (2-NT)	88-72-2	3,200	15,000	NC	NC	NC	1,600	500	200	66	70	124		
3-Nitrotoluene (3-NT)	99-08-1	620	8,200	1.6	NC	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	NC	15	500	200	75	64	127		
4-Nitrotoluene (4-NT)	99-99-0	25,000	140,000	4	NC	NC	2	500	200	80	71	124		
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	6,000	28,000	0.27	891,000	10,000	0.135	500	200	80	67	129		
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	479-45-8	12,000	160,000	370	72	10,000	36	500	200	91	68	135		
Nitrobenzene (NB)	98-95-3	5,100	22,000	0.092	21	2,260	0.046	500	200	75	67	129		
Nitroglycerin (NG)	55-63-0	620	8,200	0.85	NC	NC	0.425	500	200	85	73	124		
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	380,000	5,700,000	1,300	115,000	10,000	650	500	200	80	74	124		
Pentaerythritol tetranitrate (PETN)	78-11-5	12,000	160,000	28	NC	NC	14	2500	1000	579	72	128		
Perchlorate	14797-73-0	5,500	82,000	NC	NC	1,000	500	6	4	2	84	121		15
Picric Acid	88-89-1	NC	NC	NC	53,400	53,400	26,700	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 2014. SSLs are Risk-Based when an MCL-based value does not exist and are current as of May 2014.

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. For fractions which have been dried prior to analysis, results are reported on an as-received basis (for the dried fraction)

NC indicates that there is no criterion for an analyte.

The ammonium picrate concentration will be calculated by taking the reported picric acid result and converting it to ammonium picrate using the following equation: [ammonium picrate (ug/kg)] = [picric acid (ug/kg)] * (246.13/229.10).

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

Matrix: SW

Analytical Group: METAL

Analyte	CAS #	Method	RSLs Tap Water Adjusted ¹ (µg/L)	Marine Surface Water ESVs ¹ (µg/L)	PRWQ Class SB & SC (marine for SW) ¹ (µg/L)	MCLs1 (µg/L)	Project QL Goal ² (µg/L)	Laboratory Limits ³ (µg/L)			LCS and MS/MSD Recovery Limits and RPD ³ (%)		
								LOQ	LOD	DL	LCL	UCL	RPD
Aluminum	7429-90-5	6010C	2,000	NC	NC	NC	1,000	300	80	27.4	86	115	20
Antimony	7440-36-0	6020A	0.78	500	640	6	0.39	6	0.5	0.35	85	117	
Arsenic	7440-38-2	6020A	0.052	36	36	10	0.026	5	1	0.31	84	116	
Barium	7440-39-3	6010C	380	200	NC	2,000	100	10	4	0.75	88	113	
Beryllium	7440-41-7	6020A	2.5	100	NC	4	1.25	1	0.2	0.08	83	121	
Cadmium	7440-43-9	6020A	0.92	8.85	8.85	5	0.46	1	0.1	0.1	87	115	
Calcium	7440-70-2	6010C	NC	NC	NC	NC	75	1,000	75	27.5	87	113	
Chromium	7440-47-3	6020A	0.035	NC	50.35	100	0.0175	10	1.5	0.45	85	116	
Chromium (hexavalent)	18540-29-9	7199	0.035	50.4	50.35	NC	0.0175	0.5	0.2	0.09	90	110	
Cobalt	7440-48-4	6020A	0.6	NC	NC	NC	0.3	1	0.4	0.13	86	115	
Copper	7440-50-8	6020A	80	3.73	3.73	1,300	1.865	2	1.5	0.55	85	118	
Iron	7439-89-6	6020A	1,400	50	NC	NC	25	40	30	13.6	87	118	
Lead	7439-92-1	6020A	15	8.52	8.52	15	4.26	3	0.4	0.19	88	115	
Magnesium	7439-95-4	6010C	NC	NC	NC	NC	30	500	30	12.9	85	113	
Manganese	7439-96-5	6020A	43	100	NC	NC	21.5	3.5	0.8	0.3	87	115	
Nickel	7440-02-0	6020A	39	8.28	8.28	NC	4.14	3	0.8	0.3	85	117	
Potassium	7440-09-7	6010C	NC	NC	NC	NC	500	3,000	500	220	86	114	
Selenium	7782-49-2	6020A	10	71.1	71.14	50	5	5	2	0.5	80	120	
Silver	7440-22-4	6020A	9.4	2.24	2.24	NC	1.12	5	0.1	0.03	85	116	
Sodium	7440-23-5	6010C	NC	NC	NC	NC	500	5,000	500	111.1	87	115	
Thallium	7440-28-0	6020A	0.02	21.3	0.47	2	0.01	1	0.2	0.1	82	116	
Vanadium	7440-62-2	6020A	8.6	50	NC	NC	4.3	6	1	0.45	86	115	
Zinc	7440-66-6	6020A	600	85.6	85.62	NC	42.8	20	15	12.7	83	119	

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 2014.

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

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.

NC indicates that there is no criterion for an analyte.

SAP Worksheet #15-5—Reference Limits and Evaluation Table

Matrix: SB, SS, SD, SMI

Analytical Group: METAL

Analyte	CAS #	Method	RSLs Residential Soil Adjusted ¹ (mg/kg)	RSLs Industrial Soil Adjusted ³ (ug/kg)	SSLs ¹ (mg/kg)	Marine Sediment ESVs ² (ug/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	18,000	NC	3,850	50	4	1.98	74	119	20
Antimony	7440-36-0	6020A	3.1	47	0.27	2	0.27	0.135	0.2	0.2	0.1	72	124	
Arsenic	7440-38-2	6020A	0.67	3	0.29	8.2	18	0.145	0.5	0.3	0.08	82	118	
Barium	7440-39-3	6010C	1,500	22,000	82	48	330	24	2	0.4	0.07	83	113	
Beryllium	7440-41-7	6010C	16	230	3	NC	21	1.6	0.5	0.2	0.04	83	113	
Cadmium	7440-43-9	6020A	7	98	0.38	1.2	0.36	0.18	0.1	0.08	0.03	84	116	
Calcium	7440-70-2	6010C	NC	NC	NC	NC	NC	20	100	20	12	81	116	
Chromium	7440-47-3	6020A	0.3	6.3	100,000	81	26	0.15	0.5	0.2	0.07	83	119	
Chromium (hexavalent)	18540-29-9	7199	0.3	6.3	0.00067	NC	NC	0.000335	0.6	0.4	0.3	80	120	
Cobalt	7440-48-4	6020A	2.3	35	0.27	10	13	0.135	0.1	0.08	0.02	84	115	
Copper	7440-50-8	6010C	310	4,700	46	34	28	14	5	0.4	0.21	81	117	
Iron	7439-89-6	6010C	5,500	82,000	350	220,000	NC	175	80	4	3.5	81	118	
Lead	7439-92-1	6010C	400	800	14	46.7	11	5.5	0.9	0.8	0.25	81	112	
Magnesium	7439-95-4	6010C	NC	NC	NC	NC	NC	4	30	4	3.5	78	115	
Manganese	7439-96-5	6010C	180	2,600	28	260	220	14	4.5	0.4	0.13	84	114	
Nickel	7440-02-0	6010C	150	2,200	26	20.9	38	10.45	4	0.4	0.11	83	113	
Potassium	7440-09-7	6010C	NC	NC	NC	NC	NC	50	300	50	40	81	116	
Selenium	7782-49-2	6020A	39	580	0.26	1	0.52	0.13	0.5	0.1	0.1	80	119	
Silver	7440-22-4	6020A	39	580	0.8	1	4.2	0.4	0.1	0.05	0.02	83	118	
Sodium	7440-23-5	6010C	NC	NC	NC	NC	NC	50	500	50	45	83	118	
Thallium	7440-28-0	6020A	0.078	1.2	0.14	NC	1	0.039	0.1	0.05	0.02	83	118	
Vanadium	7440-62-2	6010C	39	580	86	57	7.8	3.9	2	0.4	0.1	82	114	
Zinc	7440-66-6	6010C	2,300	35,000	370	150	46	23	8	4	1.15	82	113	

Worksheet #15-5 - Reference Limits and Evaluation Table (continued)

Matrix: SB, SS, SD, SMI

Analytical Group: METAL

Analyte	CAS #	Method	RSLs Residential Soil Adjusted ¹ (mg/kg)	RSLs Industrial Soil Adjusted ³ (ug/kg)	SSLs ¹ (mg/kg)	Marine Sediment ESVs ² (ug/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

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 2014. SSLs are Risk-Based when an MCL-based value does not exist and are current as of May 2014.

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. For fractions which have been dried prior to analysis, results are reported on an as-received basis (for the dried fraction).

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.

SAP Worksheet #15-6—Reference Limits and Evaluation Table

Matrix: SW

Analytical Group: DISSOLVED METAL

Analyte	CAS #	Method	RSLs Tap Water Adjusted ¹ (µg/L)	Marine Surface Water ESVs ¹ (µg/L)	PRWQ Class SB & SC (marine for SW) ¹ (µg/L)	MCLs ¹ (µg/L)	Project QL Goal ² (µg/L)	Laboratory Limits ³ (µg/L)			LCS and MS/MSD Recovery Limits and RPD ³ (%)		
								LOQ	LOD	DL	LCL	UCL	RPD
Aluminum	7429-90-5	6010C	2,000	NC	NC	NC	1,000	300	80	27.4	86	115	20
Antimony	7440-36-0	6020A	0.78	500	640	6	0.39	6	0.5	0.35	85	117	
Arsenic	7440-38-2	6020A	0.052	36	36	10	0.026	5	1	0.31	84	116	
Barium	7440-39-3	6010C	380	200	NC	2,000	100	10	4	0.75	88	113	
Beryllium	7440-41-7	6020A	2.5	100	NC	4	1.25	1	0.2	0.08	83	121	
Cadmium	7440-43-9	6020A	0.92	8.8	8.85	5	0.46	1	0.1	0.1	87	115	
Calcium	7440-70-2	6010C	NC	NC	NC	NC	75	1,000	75	27.5	87	113	
Chromium	7440-47-3	6020A	0.035	NC	50.35	100	0.0175	10	1.5	0.45	85	116	
Chromium (hexavalent)	18540-29-9	7199	0.035	50	50.35	NC	0.0175	0.5	0.2	0.09	90	110	
Cobalt	7440-48-4	6020A	0.6	NC	NC	NC	0.3	1	0.4	0.13	86	115	
Copper	7440-50-8	6020A	80	3.1	3.73	1,300	1.55	2	1.5	0.55	85	118	
Iron	7439-89-6	6020A	1,400	50	NC	NC	25	40	30	13.6	87	118	
Lead	7439-92-1	6020A	15	8.1	8.52	15	4.05	3	0.4	0.19	88	115	
Magnesium	7439-95-4	6010C	NC	NC	NC	NC	30	500	30	12.9	85	113	
Manganese	7439-96-5	6020A	43	100	NC	NC	21.5	3.5	0.8	0.3	87	115	
Nickel	7440-02-0	6020A	39	8.2	8.28	NC	4.1	3	0.8	0.3	85	117	
Potassium	7440-09-7	6010C	NC	NC	NC	NC	500	3,000	500	220	86	114	
Selenium	7782-49-2	6020A	10	71	71.14	50	5	5	2	0.5	80	120	
Silver	7440-22-4	6020A	9.4	2.24	2.24	NC	1.12	5	0.1	0.03	85	116	
Sodium	7440-23-5	6010C	NC	NC	NC	NC	500	5,000	500	111.1	87	115	
Thallium	7440-28-0	6020A	0.02	21.3	0.47	2	0.01	1	0.2	0.1	82	116	
Vanadium	7440-62-2	6020A	8.6	50	NC	NC	4.3	6	1	0.45	86	115	
Zinc	7440-66-6	6020A	600	81	85.62	NC	40.5	20	15	12.7	83	119	

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 2014.

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

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.

NC indicates that there is no criterion for an analyte.

SAP Worksheet #15-7—Reference Limits and Evaluation Table

Matrix: SB, SS, SD, SMI

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 #15-8—Reference Limits and Evaluation Table

Matrix: SD

Analytical Group: GRAINSIZE

Analyte ¹	CAS # ²	Project Indicator Limit ³ (% Passing or %)
GS03 Sieve 3" (75 mm)	SIEVE75.0	N/A
GS05 Sieve 2" (50 mm)	SIEVE50.0	N/A
GS06 Sieve 1.5" (37.5 mm)	SIEVE37.5	N/A
GS07 Sieve 1" (25.0 mm)	SIEVE25.0	N/A
GS08 Sieve 0.75" (19.0 mm)	SIEVE19.0	N/A
GS10 Sieve 0.375" (9.5 mm)	SIEVE9.5	N/A
Sieve No. 004 (4.75 mm)	SIEVE4.75	N/A
Sieve No. 010 (2.00 mm)	SIEVE2.0	N/A
Sieve No. 020 (850 um)	SIEVE850	N/A
Sieve No. 040 (425 um)	SIEVE425	N/A
Sieve No. 060 (250 um)	SIEVE250	N/A
Sieve No. 140 (106 um)	SIEVE106	N/A
Sieve No. 200 (75um)	SIEVE75	N/A
Gravel (%)	GRAVEL	N/A
Sand (%)	14808-60-7	N/A
Coarse Sand (%)	COARSESAND	N/A
Medium Sand (%)	MEDIUMSAND	N/A
Fine Sand (%)	FINESAND	N/A
Fines (%)	FINES	N/A

Notes:

¹ A similar sieve set is OK.

² Some CAS numbers are contractor-specific.

³ There are no project indicator limits for GRAINSIZE data.

SAP Worksheet #15-9—Reference Limits and Evaluation Table

Matrix: SD

Analytical Group: AVS/SEM

Analyte	CAS # ¹	Project Indicator Limit ² (umol/g)	Project QL Goal ² (umol/g)	Laboratory Limits (umol/g)			LCS and MS/MSD Recovery Limits and RPD ⁵ (%)		
				LOQ	LOD	DL	LCL	UCL	RPD
Acid Volatile Sulfide	ACIDS02	NA	NA	0.016	0.006	0.004	80	120	30
Cadmium	7440-43-9	NA	NA	0.00018	0.00009	0.00007	80	120	
Copper	7440-50-8	NA	NA	0.0013	0.0008	0.0005			
Lead	7439-92-1	NA	NA	0.0010	0.0007	0.0005			
Mercury	7439-97-6	NA	NA	0.00004	0.00002	0.000008			
Nickel	7440-02-0	NA	NA	0.0014	0.0004	0.0003			
Silver	7440-22-4	NA	NA	0.0015	0.0005	0.0003			
Zinc	7440-66-6	NA	NA	0.0031	0.0005	0.0003			

Notes:

¹ Some CAS numbers are contractor-specific.

² There are no project indicator limits for AVS/SEM data.

SAP Worksheet #16—Project Schedule / Timeline

The official schedule for this investigation is included in the Site Management Plan (SMP) schedule that is updated on a periodic basis.

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SAP Worksheet #17—Sampling and Design and Rationale

Sampling Approach

The sampling approach for UXO 13 was established in the Master SAP (CH2M HILL, 2013a), which included the sample collection techniques, analyses, and locations. The locations were based on the MEC information that had been collected through October 2012. However, since that document was finalized, additional information has been gathered from the site and used to adjust the sample locations, as appropriate, in order to ensure the original objective (sampling in the most conservative areas) will still be met. This approach is in accordance with the Master SAP.

Several types of sampling may occur in each sampling unit including multi-incremental sampling, discrete subsurface soil sampling, discrete deeper subsurface soil sampling, surface water sampling and sediment sampling, and the nature of these samples are defined by the Vieques sampling protocol. Additionally, the initial sampling design was developed several years ago and detailed in the Master SAP and that the following text represents a fine-tuning of the approach. It is important to note that munitions removal activities are still ongoing at UXO 13 as part of the NTCRA for Surface MEC (CH2M HILL, 2012). Approximately 350 acres of the planned 620 acres for this NTCRA have been addressed to-date (**Figure 2**); however, the areas already cleared by the NTCRA represent areas with the highest potential for MEC at the site. Total munitions recovered at UXO 13 through September 2014 include:

- Unexploded ordnance (UXO) - 100
- Material potentially presenting an explosive hazard (MPPEH) – 511
- Discarded military munitions (DMM) – 34
- Munitions debris (MD) – 34,217
- Range related debris (RRD) - 52,271

If information gathered during future munitions-related activities necessitates a modification to the UXO 13 soil characterization approach contained herein, the modification will be presented in an addendum to this SAP provided for regulatory review prior to collecting the samples. However, if the additional information suggests the decision units selected for sampling herein are still the most conservatively representative of all UXO 13 areas, characterization will proceed as described in this SAP.

Soil

For the initial sites investigated, two subsurface soil samples will be collected within each sampling unit. In accordance with concurrence reached by the ERP Technical Subcommittee, as documented in Worksheet #17 of the Master SAP (CH2M HILL, 2013a), two subsurface soil samples are initially proposed within each sampling unit, and as the data collected from the sites are evaluated on a continuing basis, the number of subsurface soil samples within each sampling unit will be adjusted, as warranted, with consensus from the ERP Technical Subcommittee. There are several sampling units that are located within ephemeral streams at the site. Due to the nature of these streams (they are dry except during and immediately following precipitation events), the samples collected from these locations will be soil samples, not sediment samples. As the data collected from the sites are evaluated on a continuing basis, the number of subsurface soil samples within each sampling unit will be adjusted, as warranted, with consensus from the ERP Technical Subcommittee. Two subsurface soil samples within each sampling unit are noted below but may be modified at a later date.

Table 1 summarizes the MEC and munitions scrap items historically found and removed within each of the sampling units and provides the rationale for each sampling unit. In total, 33 incremental surface soil samples (one from each sampling unit), three discrete deeper surface soil samples, and 60 discrete subsurface soil samples will be collected (**Figure 3**). Each sampling unit is one acre in size. Incremental surface soil samples from the sampling units will be collected from the 0 to 2.5 inch depth and composited as a multi-incremental sample.

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

The number of sampling units per decision unit is as follows:

- Northeast UXO 13 - 14 sampling units (0 to 2.5 inches) and 28 discrete subsurface soil samples biased toward the location of former gun positions, and within firing points and former target areas in multiple ranges (Range 3, 4, 4A, 4B, 7, and 9) (**Figure 4**). The layout of sampling units in Range 4 (1DU07), Range 4A (1DU06 and 1DU10), and Range 4B (1DU04, 1DU05, and 1DU08) were slightly adjusted due to the quantity and type of MEC and MD identified during the NTCRA. In addition, two sampling units were added at Range 4 (1DU11) and Range 4B (1DU12) to include areas where a higher quantity of MEC and MD were identified during the NTCRA.
- Central UXO 13 - 12 sampling units (0 to 2.5 inches) and 24 discrete subsurface soil samples biased toward the location of former gun positions, within firing points and former target areas in multiple ranges (Range 1, 2, 5, and 7), diversity and quantity of MEC and munitions scrap, and transport pathways (ephemeral streams) (**Figure 5**). The location of sample unit 2DU03 is at the confluence of two drainages/streams that collect runoff from the nearby ranges. The current location is best suited to identify potential contamination from the nearby areas, as well as from a significant portion of the decision unit. The layout of sampling units in Range 2 (2DU07) and Range 7 (2DU05) were slightly adjusted due to the results of the NTCRA in order to incorporate areas where elevated numbers of MEC and MD were identified. In addition, one sampling unit was added in a former impact area in western Range 7 (2DU12) to include an area where relatively high number of MEC and MD were identified during the NTCRA.
- East Northeast UXO 13 – 3 sampling units (0 to 2.5 inches) and six discrete subsurface soil samples biased toward former range impact areas, quantity of MEC and munitions scrap (limited quantity identified), and transport pathways (ephemeral stream that originated in UXO 12 and runs through former gun positions) (**Figure 6**). The layout of the sampling unit in Range 6 (3DU01) was slightly adjusted due to the results of the NTCRA in order to incorporate areas where elevated numbers of MEC and MD were identified. In addition, one sampling unit was added to the west of Range 6 (3DU02) to include an area where relatively high number of MEC and MD were identified during the NTCRA. Sampling unit 3DU03 is located within a streambed. The streambed has not been characterized yet and a summary of the depositional areas and locations where there are more fines than coarse materials is not available. However, like all proposed sampling locations, this sampling unit is subject to change based on observations made in the field, with objective to collect samples in the most conservative areas. When the UXO 13 RI is conducted, the stream will be walked and observations such as those described in the comment will be made. If warranted, the sampling unit location will be adjusted in accordance with the stated objective. If adjustments are made, they will be described, along with the rationale, in the UXO 13 RI Report.
- South UXO 13 - 1 sampling unit (0 to 2.5 inches) and two discrete subsurface soil samples biased toward the location of a former gun position (**Figure 7**). No additional MEC data has been collected from this area since the Final Master SAP was finalized; therefore, the layout of the sampling unit has not been adjusted.
- Parcel C UXO 13 – Samples within this decision unit are dependent on the findings of additional MEC characterization. Eight discrete surface soil (0 to 1 foot) and eight discrete subsurface soil (depth interval is in accordance with Vieques protocols) will be collected randomly within the transects as part of the munitions investigation. However, if munitions items are identified, a sample location will be moved to where the item was identified. If more than eight munitions items are identified, a SAP Addendum will be prepared for this decision unit following the findings of the MEC characterization (**Figure 8**). The sample locations are “placeholders” (defaults). Actual locations will be selected in the field based on observations and may be adjusted to ensure they are collected in the most conservative areas. If they are adjusted based on field observations, they will be described, along with the rationale, in the UXO 13 RI Report. The sample locations have not changed from those presented in the Final Master SAP.

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

- Laguna Algodones Fringe – three sampling units (0 to 2.5 inches) and three discrete deeper surface soil samples (2.5 to 24 inches) at the two lagoons (Laguna Algodones) (Figure 9). Since no munitions were identified within the lagoon fringe, the discrete sample will be biased toward the highest land crab burrow density. This is in accordance with the approach described in the Worksheet #17 of the Master SAP that establishes: “One subsurface soil sample will still be collected if a subsurface munitions item is not identified” (CH2M HILL, 2013a). Each subsurface soil sample from each incremental sampling unit will be collected in areas with the highest potential for a subsurface release (i.e., adjacent to or beneath MEC) if deemed safe. If MEC is not identified within the sampling unit, the sample will be collected in areas with elevated MD densities. Two subsurface soil samples are initially proposed within each sampling unit, and as the data collected from the sites are evaluated on a continuing basis, the number of subsurface soil samples within each sampling unit will be adjusted, as warranted, with consensus from the ERP Technical Subcommittee.

Each soil sample will be analyzed for explosives, inorganic constituents, pH, and total organic carbon (TOC):

- Explosives and inorganics are the potential contaminants released at this site from past munitions-related activities.
- pH and TOC data help interpret the potential contaminant data.

Since there is the potential for PAHs within Range 4A from flame throwing activities, sampling units 1DU6 and 1DU10 will include PAHs for analysis.

With respect to nature and extent evaluation, the surface soil data will be compared to the adjusted RSLs, ecological screening value, and East Vieques background concentrations. Potential risks to human health will be evaluated using the surface soil samples site-wide, and at the lagoon fringe using both the surface and deeper surface soil samples. The incremental and discrete soil samples will be merged and evaluated together for land crabs only. See Worksheet #17c of the Master SAP for details about merging sampling intervals. All other ecological receptors will be evaluated using incremental soil samples.

As described in the Master SAP, sample locations are biased toward areas where the highest number of MEC and MD were recovered during the NTCRA as well as locations that are known former firing/target areas or locations where runoff from the decision units could collect; these locations represent worst-case conditions with regards to potential MC contamination and have the highest potential to identify if a release has occurred at the site as a result of munitions-related activities. In accordance with the Master SAP, sample/sampling unit locations are adjusted and/or added if information collected subsequent to the Final Master SAP alters the conceptual understanding of the site such that these adjustments/additions are warranted to ensure the RI objectives defined in the Master SAP are met.

Surface Water and Sediment

Sediment and surface water samples were located for broad spatial distribution, while ensuring areas with the highest frequencies of MEC identified were included. The number of samples per lagoon is as follows:

- Laguna Algodones – three sediment samples (0 to 6 inches) and three surface water samples (at mid-depth) will be collected from each of the two lagoons; six sediment and six surface water samples in total (**Figure 9**).

Each surface water and sediment samples will be analyzed for explosives and inorganic constituents. Sediment samples will also be analyzed for pH, TOC, ORP, AVS/SEM, and grain size. The data will be compared to the adjusted RSLs, ecological screening value, and the data collected from the UXO 13 lagoons will be compared to data from other non-tidal lagoons across the VNTR (such as the one at UXO 1 that was found not to be impacted by inorganics contamination) as part of the overall evaluation of inorganics detected and whether the concentrations may be attributable to background. Potential risks to human health and ecological receptors will be evaluated using the surface water and sediment samples.

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

Groundwater

The monitoring well installation and subsequent groundwater sampling at UXO 13, as well as the rest of the former VNTR, for the RI has already occurred. The details of the groundwater sampling are included in the Master SAP and the Master SAP Addendum 1 Laboratory Specific Worksheets for Regional Monitoring Well Soil and Groundwater Sampling (CH2M HILL, 2013a) and the results of the groundwater sampling are provided in the RI Status Report.

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
Decision Unit 1 - Northeast UXO 13					
SMI Samples					
VE-UXO13-1DU01 / VE-UXO13-1SMI01-MMY	SMI	0 - 2.5 inches	EXPLO, METAL, WCHEM (pH, TOC, and ORP)	3 (Triplicate)	See Worksheet #21 of the Final Master SAP
VE-UXO13-1DU01 / VE-UXO13-1SMI01T-MMY				1	
VE-UXO13-1DU01 / VE-UXO13-1SMI01TT-MMY				1	
VE-UXO13-1DU02 / VE-UXO13-1SMI02-MMY				1	
VE-UXO13-1DU03 / VE-UXO13-1SMI03-MMY				1	
VE-UXO13-1DU04 / VE-UXO13-1SMI04-MMY			EXPLO, METAL, SVOC (PAHs), WCHEM (pH, TOC, and ORP)	3 (MS/MSD)	
VE-UXO13-1DU05 / VE-UXO13-1SMI05-MMY				1	
VE-UXO13-1DU06 / VE-UXO13-1SMI06-MMY				1	
VE-UXO13-1DU06 / VE-UXO13-1SMI06-MMY-MS			EXPLO, METAL, WCHEM (pH, TOC, and ORP)	1	
VE-UXO13-1DU06 / VE-UXO13-1SMI06-MMY-SD				1	
VE-UXO13-1DU07 / VE-UXO13-1SMI07-MMY			EXPLO, METAL, SVOC (PAHs), WCHEM (pH, TOC, and ORP)	3 (Triplicate)	
VE-UXO13-1DU08 / VE-UXO13-1SMI08-MMY				1	
VE-UXO13-1DU09 / VE-UXO13-1SMI09-MMY				1	
VE-UXO13-1DU10 / VE-UXO13-1SMI10-MMY			EXPLO, METAL, WCHEM (pH, TOC, and ORP)	3 (Triplicate)	
VE-UXO13-1DU10 / VE-UXO13-1SMI10T-MMY	1				
VE-UXO13-1DU10 / VE-UXO13-1SMI10TT-MMY	1				
VE-UXO13-1DU11 / VE-UXO13-1SMI11-MMY	1				
VE-UXO13-1DU12 / VE-UXO13-1SMI12-MMY	EXPLO, METAL, WCHEM (pH, TOC, and ORP)	1			
VE-UXO13-1DU13 / VE-UXO13-1SMI13-MMY		1			
VE-UXO13-1DU14 / VE-UXO13-1SMI14-MMY		1			

SAP 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
Discrete Subsurface Soil Samples					
VE-UXO13-1SO01A / VE-UXO13-1SB01A-TDBD	SB	(in accordance with modified Vieques Protocols)	EXPLO, METAL, WCHEM (pH, TOC, and ORP)	2 (FD)	See Worksheet #21 of the Final Master SAP
VE-UXO13-1SO01A / VE-UXO13-1SB01AP-TDBD				1	
VE-UXO13-1SO01B / VE-UXO13-1SB01B-TDBD				1	
VE-UXO13-1SO02A / VE-UXO13-1SB02A-TDBD				1	
VE-UXO13-1SO02B / VE-UXO13-1SB02B-TDBD				1	
VE-UXO13-1SO03A / VE-UXO13-1SB03A-TDBD				1	
VE-UXO13-1SO03B / VE-UXO13-1SB03B-TDBD				1	
VE-UXO13-1SO04A / VE-UXO13-1SB04A-TDBD				1	
VE-UXO13-1SO04B / VE-UXO13-1SB04B-TDBD				1	
VE-UXO13-1SO05A / VE-UXO13-1SB05A-TDBD				1	
VE-UXO13-1SO05B / VE-UXO13-1SB05B-TDBD				2 (FD)	
VE-UXO13-1SO05B / VE-UXO13-1SB05B-TDBD					
VE-UXO13-1SO06A / VE-UXO13-1SB06A-TDBD			3 (MS/MSD)		
VE-UXO13-1SO06A / VE-UXO13-1SB06A-TDBD-MS				1	
VE-UXO13-1SO06A / VE-UXO13-1SB06A-TDBD-SD				1	
VE-UXO13-1SO06B / VE-UXO13-1SB06B-TDBD			1		
VE-UXO13-1SO07A / VE-UXO13-1SB07A-TDBD			1		
VE-UXO13-1SO07B / VE-UXO13-1SB07B-TDBD			1		
VE-UXO13-1SO08A / VE-UXO13-1SB08A-TDBD			EXPLO, METAL, WCHEM (pH, TOC, and ORP)		
VE-UXO13-1SO08B / VE-UXO13-1SB08B-TDBD				1	
VE-UXO13-1SO09A / VE-UXO13-1SB09A-TDBD				1	
VE-UXO13-1SO09B / VE-UXO13-1SB09B-TDBD			1		
VE-UXO13-1SO10A / VE-UXO13-1SB10A-TDBD			2 (FD)		
VE-UXO13-1SO10A / VE-UXO13-1SB10AP-TDBD				1	
VE-UXO13-1SO10B / VE-UXO13-1SB10B-TDBD				1	
VE-UXO13-1SO11A / VE-UXO13-1SB11A-TDBD			1		
VE-UXO13-1SO11B / VE-UXO13-1SB11B-TDBD			1		
VE-UXO13-1SO12A / VE-UXO13-1SB12A-TDBD			1		
VE-UXO13-1SO12B / VE-UXO13-1SB12B-TDBD			3 (MS/MSD)		
VE-UXO13-1SO12B / VE-UXO13-1SB12B-TDBD-MS					
VE-UXO13-1SO12B / VE-UXO13-1SB12B-TDBD-SD					
VE-UXO13-1SO13A / VE-UXO13-1SB13A-TDBD			1		

SAP 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				
VE-UXO13-1SO13B / VE-UXO13-1SB13B-TDBD				1					
VE-UXO13-1SO14A / VE-UXO13-1SB14A-TDBD				1					
VE-UXO13-1SO14B / VE-UXO13-1SB14B-TDBD				1					
Decision Unit 2 - Central UXO 13									
SMI Samples									
VE-UXO13-2DU01 / VE-UXO13-2SMI01-MMY VE-UXO13-2DU01 / VE-UXO13-2SMI01-MMY-MS VE-UXO13-2DU01 / VE-UXO13-2SMI01-MMY-SD	SMI	0 - 2.5 inches	EXPLO, METAL, WCHEM (pH, TOC, and ORP)	3 (MS/MSD)	See Worksheet #21 of the Final Master SAP				
VE-UXO13-2DU02 / VE-UXO13-2SMI02-MMY				1					
VE-UXO13-2DU03 / VE-UXO13-2SMI03-MMY				1					
VE-UXO13-2DU04 / VE-UXO13-2SMI04-MMY				1					
VE-UXO13-2DU05 / VE-UXO13-2SMI05-MMY				1					
VE-UXO13-2DU06 / VE-UXO13-2SMI06-MMY				1					
VE-UXO13-2DU07 / VE-UXO13-2SMI07-MMY				1					
VE-UXO13-2DU08 / VE-UXO13-2SMI08-MMY VE-UXO13-2DU08 / VE-UXO13-2SMI08T-MMY VE-UXO13-2DU08 / VE-UXO13-2SMI08TT-MMY				3 (TriPLICATE)					
VE-UXO13-2DU09 / VE-UXO13-2SMI09-MMY				1					
VE-UXO13-2DU10 / VE-UXO13-2SMI10-MMY				1					
VE-UXO13-2DU11 / VE-UXO13-2SMI11-MMY				1					
VE-UXO13-2DU12 / VE-UXO13-2SMI12-MMY				1					
Discrete Subsurface Soil Samples									
VE-UXO13-2SO01A / VE-UXO13-2SB0A1-TDBD				SB		(in accordance with modified Vieques Protocols)	EXPLO, METAL, WCHEM (pH, TOC, and ORP)	1	See Worksheet #21 of the Final Master SAP
VE-UXO13-2SO01B / VE-UXO13-2SB01B-TDBD	1								
VE-UXO13-2SO02A / VE-UXO13-2SB02A-TDBD VE-UXO13-2SO02A / VE-UXO13-2SB02AP-TDBD	2 (FD)								
VE-UXO13-2SO02B / VE-UXO13-2SB02B-TDBD	1								
VE-UXO13-2SO03A / VE-UXO13-2SB03A-TDBD	1								
VE-UXO13-2SO03B / VE-UXO13-2SB03B-TDBD	1								
VE-UXO13-2SO04A / VE-UXO13-2SB04A-TDBD	1								
VE-UXO13-2SO04B / VE-UXO13-2SB04B-TDBD	1								

SAP 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				
VE-UXO13-2SO05A / VE-UXO13-2SB05A-TDBD	SB	(in accordance with modified Vieques Protocols)	EXPLO, METAL, WCHEM (pH, TOC, and ORP)	1					
VE-UXO13-2SO05B / VE-UXO13-2SB05B-TDBD				1					
VE-UXO13-2SO06A / VE-UXO13-2SB06A-TDBD VE-UXO13-2SO06A / VE-UXO13-2SB06A-TDBD-MS VE-UXO13-2SO06A / VE-UXO13-2SB06A-TDBD-SD				3 (MS/MSD)					
VE-UXO13-2SO06B / VE-UXO13-2SB06B-TDBD				1					
VE-UXO13-2SO07A / VE-UXO13-2SB07A-TDBD				1					
VE-UXO13-2SO07B / VE-UXO13-2SB07B-TDBD				1					
VE-UXO13-2SO08A / VE-UXO13-2SB08A-TDBD				1					
VE-UXO13-2SO08B / VE-UXO13-2SB08B-TDBD				1					
VE-UXO13-2SO09A / VE-UXO13-2SB09A-TDBD				1					
VE-UXO13-2SO09B / VE-UXO13-2SB09B-TDBD VE-UXO13-2SO09B / VE-UXO13-2SB09BP-TDBD				2 (FD)					
VE-UXO13-2SO10A / VE-UXO13-2SB10A-TDBD				1					
VE-UXO13-2SO10B / VE-UXO13-2SB10B-TDBD				1					
VE-UXO13-2SO11A / VE-UXO13-2SB11A-TDBD				1					
VE-UXO13-2SO11B / VE-UXO13-2SB11B-TDBD				1					
VE-UXO13-2SO12A / VE-UXO13-2SB12A-TDBD				1					
VE-UXO13-2SO12B / VE-UXO13-2SB12B-TDBD				1					
Decision Unit 3 - East Northeast UXO 13									
SMI Samples									
VE-UXO13-3DU01 / VE-UXO13-3SMI01-MMY	SMI	0 - 2.5 inches	EXPLO, METAL, WCHEM (pH, TOC, and ORP)	1	See Worksheet #21 of the Final Master SAP				
VE-UXO13-3DU02 / VE-UXO13-3SMI02-MMY				1					
VE-UXO13-3DU03 / VE-UXO13-3SMI03-MMY				1					
Discrete Subsurface Soil Samples									
VE-UXO13-3SO01A / VE-UXO13-3SB01A-TDBD	SB	(in accordance with modified Vieques Protocols)	EXPLO, METAL, WCHEM (pH, TOC, and ORP)	1	See Worksheet #21 of the Final Master SAP				
VE-UXO13-3SO01B / VE-UXO13-3SB01B-TDBD				1					
VE-UXO13-3SO02A / VE-UXO13-3SB02A-TDBD				1					
VE-UXO13-3SO02B / VE-UXO13-3SB02B-TDBD				1					
VE-UXO13-3SO03A / VE-UXO13-3SB03A-TDBD				1					
VE-UXO13-3SO03B / VE-UXO13-3SB03B-TDBD				1					

SAP 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		
Decision Unit 4 - Parcel C UXO 13							
Discrete Surface Soil & Subsurface Soil Samples							
VE-UXO13-4SO01 / VE-UXO13-4SS01-0001 VE-UXO13-4SO01 / VE-UXO13-4SB01-TDBD	SS SB	0 - 12 inches TBD	EXPLO, METAL, WCHEM (pH, TOC, and ORP)	SS: 1 SB: 1	See Worksheet #21 of the Final Master SAP		
VE-UXO13-4SO02 / VE-UXO13-4SS02-0001 VE-UXO13-4SO02 / VE-UXO13-4SB02-TDBD	SS SB	0 - 12 inches TBD		SS: 1 SB: 1			
VE-UXO13-4SO03 / VE-UXO13-4SS03-0001 VE-UXO13-4SO03 / VE-UXO13-4SB03-TDBD	SS SB	0 - 12 inches TBD		SS: 1 SB: 1			
VE-UXO13-4SO04 / VE-UXO13-4SS04-0001 VE-UXO13-4SO04 / VE-UXO13-4SB04-TDBD	SS SB	0 - 12 inches TBD		SS: 1 SB: 1			
VE-UXO13-4SO05 / VE-UXO13-4SS05-0001 VE-UXO13-4SO05 / VE-UXO13-4SS05P-0001 VE-UXO13-4SO05 / VE-UXO13-4SB05-TDBD VE-UXO13-4SO05 / VE-UXO13-4SB05P-TDBD	SS SB	0 - 12 inches TBD		SS: 2 (FD) SB: 2 (FD)			
VE-UXO13-4SO06 / VE-UXO13-4SS06-0001 VE-UXO13-4SO06 / VE-UXO13-4SB06-TDBD	SS SB	0 - 12 inches TBD		SS: 1 SB: 1			
VE-UXO13-4SO07 / VE-UXO13-4SS07-0001 VE-UXO13-4SO07 / VE-UXO13-4SB07-TDBD	SS SB	0 - 12 inches TBD		SS: 1 SB: 1			
VE-UXO13-4SO08 / VE-UXO13-4SS08-0001 VE-UXO13-4SO08 / VE-UXO13-4SS08-0001-MS VE-UXO13-4SO08 / VE-UXO13-4SS08-0001-SD VE-UXO13-4SO08 / VE-UXO13-4SB08-TDBD VE-UXO13-4SO08 / VE-UXO13-4SB08-TDBD-MS VE-UXO13-4SO08 / VE-UXO13-4SB08-TDBD-SD	SS SB	0 - 12 inches TBD		SS: 3 (MS/MSD) SB: 3 (MS/MSD)			
Decision Unit 5 - South							
SMI Samples							
VE-UXO13-5DU01 / VE-UXO13-5SMI01-MMY VE-UXO13-5DU01 / VE-UXO13-5SMI01T-MMY VE-UXO13-5DU01 / VE-UXO13-5SMI01TT-MMY	SMI	0 - 2.5 inches	EXPLO, METAL, WCHEM (pH, TOC, and ORP)	3 (Triplicate)	See Worksheet #21 of the Final Master SAP		

SAP 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				
Discrete Subsurface Soil Samples									
VE-UXO13-5SO01A / VE-UXO13-5SB01A-TDBD	SB	(in accordance with modified Vieques Protocols)	EXPLO, METAL, WCHEM (pH, TOC, and ORP)	1	See Worksheet #21 of the Final Master SAP				
VE-UXO13-5SO01B / VE-UXO13-5SB01B-TDBD				2 (FD)					
VE-UXO13-5SO01B / VE-UXO13-5SB01BP-TDBD									
Decision Unit 6 - Laguna Algodones									
Sediment & Surface Water Samples									
VE-UXO13-6SDSW01 / VE-UXO13-6SD01-MMY VE-UXO13-6SDSW01 / VE-UXO13-6SD01P-MMY VE-UXO13-6SDSW01 / VE-UXO13-6SW01-MMY VE-UXO13-6SDSW01 / VE-UXO13-6SW01P-MMY	SD/SW	SW: Mid-Depth SD: 0 - 6 inches	SW: EXPLO, METAL, FMETAL SD: EXPLO, METAL, GRAINSIZE, WCHEM (pH, TOC, and ORP), AVS/SEM	SD: 2 (FD) SW: 2 (FD)	See Worksheet #21 of the Final Master SAP				
VE-UXO13-6SDSW02 / VE-UXO13-6SD02-MMY VE-UXO13-6SDSW02 / VE-UXO13-6SD02-MMY-MS VE-UXO13-6SDSW02 / VE-UXO13-6SD02-MMY-SD VE-UXO13-6SDSW02 / VE-UXO13-6SW02-MMY VE-UXO13-6SDSW02 / VE-UXO13-6SW02-MMY-MS VE-UXO13-6SDSW02 / VE-UXO13-6SW02-MMY-SD				SD: 3 (MS/MSD) SW: 3 (MS/MSD)					
VE-UXO13-6SDSW03 / VE-UXO13-6SD03-MMY VE-UXO13-6SDSW03 / VE-UXO13-6SW03-MMY				SD: 1 SW: 1					
VE-UXO13-6SDSW04 / VE-UXO13-6SD04-MMY VE-UXO13-6SDSW04 / VE-UXO13-6SW04-MMY				SD: 1 SW: 1					
VE-UXO13-6SDSW05 / VE-UXO13-6SD05-MMY VE-UXO13-6SDSW05 / VE-UXO13-6SW05-MMY				SD: 1 SW: 1					
VE-UXO13-6SDSW06 / VE-UXO13-6SD06-MMY VE-UXO13-6SDSW06 / VE-UXO13-6SW06-MMY				SD: 1 SW: 1					
Decision Unit 7 - Laguna Algodones Fringe									
SMI Samples									
VE-UXO13-7DU01 / VE-UXO13-7SMI01-MMY				SMI		0-2.5 inches	EXPLO, METAL, WCHEM (pH, TOC, and ORP)	1	See Worksheet #21 of the Final Master SAP
VE-UXO13-7DU02 / VE-UXO13-7SMI02-MMY	1								
VE-UXO13-7DU03 / VE-UXO13-7SMI03-MMY	1								

SAP 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
Deep Surface Soil Samples					
VE-UXO13-7SO01 / VE-UXO13-7SS01-0002	SS	2.5-24 inches	EXPLO, METAL, WCHEM (pH, TOC, and ORP)	1	See Worksheet #21 of the Final Master SAP
VE-UXO13-7SO02 / VE-UXO13-7SS02-0002				2 (FD)	
VE-UXO13-7SO02 / VE-UXO13-7SS02P-0002					
VE-UXO13-7SO03 / VE-UXO13-7SS03-0002				1	

Notes:

Two subsurface soil samples are planned within each sampling unit for the initial sites; as data collected from these sites are evaluated on a continuing basis, the number of subsurface soil samples will be adjusted, as warranted, with consensus from the ERP Technical Subcommittee.

¹ MMY = Two digit month and year of sampling date.

TDBD = Top depth, bottom depth in feet (i.e. 0-6" is 000H)

² Field QC samples will not be analyzed for WCHEM.

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SAP Worksheet #19—Field Sampling Requirements Table

Matrix	Analytical Group ^{1,2}	Analytical and Preparation Method / SOP Reference	Containers ²	Sample Volume ³	Preservation Requirements	Maximum Holding Time	
SMI	SVOC	SW-846 3550C, SW-846 8270D, SW-846 8270D_SIM/ SON009, ANA8270, ANA8270SIM	1 Gallon bag (s)	30 g	≤ 6°C but not frozen	14 days / 40 days	
	EXPLO	SW-846 8330B / HPL8330, MSE018MIS		10 g			
		SW8330B, SW-846 8321A / MSE018, HPL8321		10 g			
		SW-846 6850 / HPL6850		10 g ⁵	Headspace in jar; ≤ 6°C but not frozen	28 days	
	METAL	SW-846 3050B, 6010C, 6020A / PREMETSIS, PRE3050B, ANA6010, ANA6020		1 Gallon bag (s)	1 g	≤ 6°C but not frozen	180 days
		SW-846 3060A, SW-846 7199/ ANA3060A, ANA218.6-7199			2.5 g		30 days / 7 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	10 g	30 days				
SB, SS, SD	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		10 g ⁵	Headspace in jar; ≤ 6°C but not frozen	28 days	
		SW-846 6850 / HPL6850					

SAP Worksheet #19—Field Sampling Requirements Table (continued)

Matrix	Analytical Group ^{1,2}	Analytical and Preparation Method / SOP Reference	Containers ²	Sample Volume ³	Preservation Requirements	Maximum Holding Time
SB, SS, SD	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		30 days / 7 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	
SD	GRAINSIZE	ASTM D422 / BR-GT-006	16 oz glass jar	500 g	N/A	N/A
	AVS/SEM	EPA 821_R-91-100 / GEN-AVS, MET-7470A, MET-ICP	1 x 8 oz glass jar with Teflon lined screw cap (zero head space above sediment)	Fill jar completely	≤ 6°C but not frozen	14 days / 7 days for AVS, 108 for metals, 28 days for Mercury
SW	EXPLO	SW-846 3535A, 8330B / MWE3535, HPL8330	2 x 1 L amber glass	1000 mL ⁴	≤ 6°C but not frozen	7 days / 40 days
		SW-846 3535A, 8321 / MWE3535, HPL8321				
	EXPLO	SW-846 6850 / HPL6850	1 x 125 mL PE bottle	10 mL	Field-filter with 0.2um PTFE membrane filter; headspace in jar; ≤ 6°C but not frozen	28 days
	METAL	SW-846 301A, 6010C, 6020A / PRE3010A, ANA6010, ANA6020	1 x 500 mL PE bottle	100 mL	HNO ₃ to pH < 2; ≤ 6°C but not frozen	180 days

SAP Worksheet #19—Field Sampling Requirements Table (continued)

Matrix	Analytical Group ^{1,2}	Analytical and Preparation Method / SOP Reference	Containers ²	Sample Volume ³	Preservation Requirements	Maximum Holding Time
SW	METAL	SW-846 7199 / ANA218.6-7199	1 x 125 mL PE bottle	25 mL	≤ 6°C but not frozen	24 hours. Samples may be preserved in the field with ammonium hydroxide-ammonium sulfate buffer solution (pH = 9-9.5) to extend holding time to 28 days.
	FMETAL	Additional containers collected after field filtering; otherwise identical to SW METAL, above.				

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 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 Triplicates	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
Decision Unit 1 - Northeast UXO 13 (14 SMI, 28 SB Samples) Decision Unit 2 - Central UXO 13 (12 SMI, 24 SB Samples) Decision Unit 3 - East Northeast UXO13 (3 SMI, 6 SB Samples) Decision Unit 4 - Parcel C UXO 13 (8 SS, 8 SB Samples)				Decision Unit 5 - South (1 SMI, 2 SB Samples) Decision Unit 6 - Laguna Algodones (6 SW, 6 SD Samples) Decision Unit 7 - Laguna Algodones Fringe (3 SMI, 3 SS Samples)				
SMI	SVOC (PAHs)	2	1	--	1	--	1	6
	EXPLO	33	4	--	2	--	4	45
	METAL	33	4	--	2	--	4	45
	WCHEM (pH)	33	4	--	2	--	4	45
	WCHEM (TOC)	33	4	--	2	--	4	45
	WCHEM (ORP)	33	4	--	2	--	4	45
SB	SVOC (PAHs)	4	--	1	1	--	1	10
	EXPLO	68	--	7	4	--	8	91
	METAL	68	--	7	4	--	8	91
	WCHEM (pH)	68	--	7	4	--	8	91
	WCHEM (TOC)	68	--	7	4	--	8	91
	WCHEM (ORP)	68	--	7	4	--	8	91
SS	EXPLO	11	--	2	1	--	2	17
	METAL	11	--	2	1	--	2	17
	WCHEM (pH)	11	--	2	1	--	2	17
	WCHEM (TOC)	11	--	2	1	--	2	17
	WCHEM (ORP)	11	--	2	1	--	2	17
SW	EXPLO	6	--	1	1	--	1	10
	METAL	6	--	1	1	--	1	10
	WCHEM (pH)	6	--	1	1	--	1	10
	WCHEM (TOC)	6	--	1	1	--	1	10
	WCHEM (ORP)	6	--	1	1	--	1	10
SD	EXPLO	6	--	1	1	--	1	10
	METAL	6	--	1	1	--	1	10
	WCHEM (pH)	6	--	1	1	--	1	10
	WCHEM (TOC)	6	--	1	1	--	1	10
	WCHEM (ORP)	6	--	1	1	--	1	10

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.

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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)
MSE018IS	Mechanical Shaker Extraction for Solid Explosive Samples using Incremental sampling (IS) techniques EPA METHOD 8330B; 06/2014; Rev. 3		Definitive	SMI / EXPLO	N/A (extraction)	APPL	None	N
MWE3535	Solid phase extraction for aqueous explosive samples EPA method 3535A, Rev. 2, 01/2014		Definitive	SW / EXPLO	N/A (extraction)	APPL	None	N
PRE3010A	Acid Digestion of Aqueous Samples for Extracts for Total and Dissolved Metals for Analysis by ICP Spectroscopy or ICP Mass Spectroscopy by EPA Method 3010A; 10/2013; Rev. 0		Definitive	SW / METAL, FMETAL	N/A (digestion)	APPL	None	N
PREMETALSIS	Incremental Sampling (IS) techniques for Digestion of Soil Samples; 06/2014; Rev. 2		Definitive	SMI / METAL	N/A (digestion)	APPL	None	N
ANA6010	Inductively Coupled Plasma Atomic Emission Spectroscopy by EPA Method 6010; 03/2014; Rev. 7		Definitive	SS/SB/SD/SMI/SW / METAL	ICP-AES	APPL	None	N
ANA6020	Inductively Coupled Plasma-Mass Spectrometry by EPA Method 6020; 10/2013; Rev. 3		Definitive	SS/SB/SD/SMI/SW / METAL	ICP-MS	APPL	None	N
ANA218.6-7199	Hexavalent Chromium Analysis EPA Method 7199/218.6; 06/2014; Rev. 5		Definitive	SS/SB/SD/SMI/SW / METAL	IC	APPL	None	N
ANA8270SIM	PAH by SIM by EPA Method 8270; 03/2014; Rev. 1		Definitive	SS/SB/SMI / SVOC	GC-MS	APPL	None	N
ANA8270	Semivolatile Organic Compounds by EPA Method 8270; 03/2014; Rev. 3		Definitive	SS/SB/SMI / SVOC	GC-MS	APPL	None	N
ANAWALKLEY	Total Organic Carbon (TOC) in Soil (Walkley-Black, Modified); 06/2014; Rev. 1		Screening	SB/SS/SD/SMI / WCHEM	N/A (titration)	APPL	None	N
HPL6850	Analysis of Perchlorate in Environmental Samples by EPA 6850; 01/2014; Rev. 2		Definitive	SS/SB/SD/SMI/SW / EXPLO	HPLC	APPL	None	Y ³
HPL8321	Method 8321 LC-Mass Spectrometer Analysis of Carbamate / Urea and Nitroaromatic / Nitrosamine Compounds; 01/2014; Rev. 1		Definitive	SS/SB/SD/SMI/SW / EXPLO (Picric Acid only)	HPLC	APPL	None	N
HPL8330	Explosive Compounds: Diode Array Detector by High Pressure Liquid Chromatography; 06/2014; Rev. 3		Definitive	SS/SB/SD/SMI/SW / EXPLO	HPLC	APPL	None	N
PRE3050B	Acid Digestion of Sediments, Sludges, and Soils by EPA Method 3050B; 05/2014; Rev. 3		Definitive	SS/SB/SD/SMI / METAL	N/A (digestion)	APPL	None	Y ⁴
SON009	8270, BNA, SIM, and PAH Sonication Extraction of Soil, Sludge and Solids (EPA Method 3550C); 11/2013; Rev. 9		Definitive	SS/SB/SMI / SVOC	N/A (extraction)	APPL	None	N
ANA3060A	Alkaline Digestion for Hexavalent Chromium (Method 3060A); 06/2014; Rev. 1		Definitive	SS/SB/SD/SMI / METAL (Hexavalent Chromium only)	N/A (digestion)	APPL	None	N
ANA9045D	pH in Soil and Waste (EPA SW846 Method 9045C&D); 06/2014; Rev. 2		Screening	SB/SS/SD/SMI / 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/SD/SMI / WCHEM	ORP Probe	ALS - Kelso	None	N
SHR001	Receiving Samples; 06/03/2014; Rev. 0		N/A (Receiving)	SB/SS/SD/SMI/SW / SVOC, EXPLO, METAL, FMETAL, WCHEM, GRAINSIZE, AVS/SEM	N/A (Receiving)	APPL	None	N
SHR003	Subcontracting Samples to Other Laboratories; 06/24/2014; Rev. 15		N/A (Receiving)	SB/SS/SD/SMI/SW / SVOC, EXPLO, METAL, FMETAL, WCHEM, GRAINSIZE, AVS/SEM	N/A (Receiving)	APPL	None	N
SHR012	Sample Disposal and Waste Collection, Storage and Disposal; 06/17/2014; Rev. 16		N/A (Disposal)	SB/SS/SD/SMI/SW / SVOC, EXPLO, METAL, FMETAL, WCHEM, GRAINSIZE, AVS/SEM	N/A (Disposal)	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)
MET-ICP	Determination of Metals and Trace elements by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP) by Method 6010C; 12/1/2012, Rev. 24	12/2013	Screening	SD / AVS/SEM	ICP-OES	ALS - Kelso	None	N
MET-7470A	Mercury in Liquid Waste by EPA 7470A, 1/31/2014, Rev. 16		Screening	SD / AVS/SEM	CVAAS	ALS - Kelso	None	N
GEN-AVS	Acid Volatile Sulfide by EPA 821, 4/30/2013, Rev. 7	In review	Screening	SD / AVS/SEM	Spectrophotometer	ALS - Kelso	None	N
SMO-SCOC	Sample Tracking and Internal Chain-of-Custody; 12/01/12; Rev. 13		N/A (Receiving)	SB/SS/SMI/SD / WCHEM, AVS/SEM	N/A (Receiving)	ALS - Kelso	None	N
SMO-DISP	Sample Disposal; 6/01/14; Rev. 11		N/A (Disposal)	SB/SS/SMI/SD / WCHEM, AVS/SEM	N/A (Disposal)	ALS - Kelso	None	N
SMO-GEN	Sample Receiving; 7/31/13; Rev. 30		N/A (Receiving)	SB/SS/SMI/SD / WCHEM, AVS/SEM	N/A (Receiving)	ALS - Kelso	None	N
MSE018	EPA Method 8330 Mechanical Orbital Shaker Extraction for Solid Explosive Samples; 01/2014; Rev. 0		Definitive	SB/SS/SD / EXPLO	N/A (extraction)	APPL	None	N
BR-GT-006	Particle Size Analysis (ASTM D 2217 and D422-63); 02/20/2014; Rev. 7		Screening	SD / GRAINSIZE	Hydrometer	Test America - Burlington	None	N
BR-EH-001	Tracking and Collection of Hazardous Waste; 05/13/2014; Rev. 16		N/A (Disposal)	SD / GRAINSIZE	N/A (Disposal)	Test America - Burlington	None	N
BR-SM-001	Sample Management; 02/19/2014; Rev. 12.1		N/A (Receiving)	SD / GRAINSIZE	N/A (Receiving)	Test America - Burlington	None	N
BR-SM-003	Sample Storage & Temperature Monitoring of Refrigerated and Frozen Storage Units; 01/31/2014; Rev. 6		N/A (Receiving)	SD / GRAINSIZE	N/A (Receiving)	Test America - Burlington	None	N

Notes:

1. This worksheet was prepared in August 2014. 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 Appendix A:
APPL's DoD ELAP accreditation through PJLA is granted through November 27, 2015.
ALS-Kelso's DoD ELAP accreditation through PJLA is granted through March 13, 2016.
Test America-Burlington's DoD ELAP accreditation through L-A-B is granted through February 25, 2017.
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.

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 \leq 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 \leq 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.		
	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 $\pm 20\%$ 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 $\pm 20\%$ of true value. All reported analytes and surrogates within $\pm 50\%$ 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.		
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 $\leq 15\%$; 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 $\pm 20\%$ 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 $\pm 20\%$ 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.		

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)	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 $\leq 20\%$; 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 $\pm 15\%$ of true value.	Correct problem, rerun ICV. If that fails, repeat ICAL.		
	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 $\pm 15\%$ 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.		
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 $\leq 15\%$; Option 2: linear least squares regression for each analyte: $r^2 \geq 0.995$.	Correct problem, then repeat ICAL.		
	ICV	Once after each ICAL.	Perchlorate concentration must be within $\pm 15\%$ of its 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 Perchlorate)	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 $\pm 15\%$ 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.	Analyst	HPL6850
	Laboratory Reagent Blank (LRB)	Prior to calibration and at the end of the analytical sequence.	No perchlorate detected $> \frac{1}{2}$ LOQ.	Reanalyze reagent blank (until no carryover is observed) and all samples processed since the contaminated blank.		
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 $\pm 10\%$ 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 $\pm 10\%$ 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 $\pm 10\%$ 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 $\pm 20\%$ 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.	<u>ICS-A</u> : Absolute value of concentration for all non- spiked project analytes $< LOD$ (unless they are a verified trace impurity from one of the spiked analytes); <u>ICS-AB</u> : Within $\pm 20\%$ 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.		

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)	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 $\pm 10\%$ 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.		
	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 $\pm 10\%$ 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 $\pm 10\%$ 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 $\pm 20\%$ 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.	<u>ICS-A</u> : Absolute value of concentration for all non- spiked project analytes $< LOD$ (unless they are a verified trace impurity from one of the spiked analytes); <u>ICS-AB</u> : Within $\pm 20\%$ 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 $\pm 10\%$ 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 $\pm 10\%$ 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-prepare 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.		
ICP-AES(SEM Metals)	ICAL	Each analytical sequence - High Standard and a Blank	ICV Standard, MRL Standard, & Calibration Blank to meet criteria	Recalibrate	Lab Section Supervisor	MET-ICP
	ICV	Once after each ICAL, prior to beginning a sample run	Analytes must agree within 10% of the expected value	Correct problem and verify second source standard. Rerun ICV. If that fails, correct problem and repeat ICAL.		
	CCV	Every 10 samples and at the end of the analytical sequence	Analytes must agree within 10% of the expected value	Correct problem, rerun CCV. If that fails, then repeat ICAL. Reanalyze all samples since the last acceptable CCV.		
	High-level check standard	Daily	Analytes must agree within 10% of the expected value	Correct problem, reanalyze		
	MRL standard	Beginning and end of daily run	70-130%	Correct problem, reanalyze		
	Calibration Blank	Before beginning a sample run, after every 10 samples, and at the end of the analysis sequence.	No analytes detected > LOQ	Correct problem. Re-prepare and reanalyze calibration blank. All samples following the last acceptable calibration blank must be reanalyzed except samples <LOQ.		
	Interference check solutions (ICS)	At beginning and end of the daily sequence	ICS-A: Absolute value of concentration for all non-spiked analytes < LOQ (<2XLOQ for elements with LOQ<10mg/L) ICS-AB: Within 20% of true value	Terminate analysis; locate and correct problem; reanalyze ICS, reanalyze affected samples.		
CVAA (SEM Mercury)	ICAL	Each analytical sequence (5 standards)	Correlation coefficient of calibration curve ≥0.995	Correct problem, repeat ICAL	Lab Section Supervisor	MET-7470A
	ICV	Once after each ICAL, prior to beginning a sample run	Analytes must agree within 10% of the expected value	Correct problem and verify second source standard. Rerun ICV. If that fails, correct problem and repeat ICAL.		
	CCV	Every 10 samples and at the end of the analytical sequence	Analyte must agree within 20% of the expected value	Correct problem, rerun CCV. If that fails, then repeat ICAL. Reanalyze all samples since the last acceptable CCV.		
	Calibration Blank	Before beginning a sample run, after every 10 samples, and at the end of the analysis sequence.	No analytes detected > LOQ	Correct problem. Re-prepare and reanalyze calibration blank. All samples following the last acceptable calibration blank must be reanalyzed.		
Spectrophotometer (AVS)	ICAL	As needed	The correlation coefficient must be ≥ 0.995	Correct problem then repeat ICAL	Lab Section Supervisor	GEN-AVS
	ICV	After each initial calibration	± 10% of the expected value	Correct problem and rerun ICV. If that fails, correct problem and repeat ICAL.		
	CCV	Before beginning a sample run, after every 10 samples, and at the end of the analysis sequence.	± 10% of the expected value	Correct problem, rerun CCV. If that fails, then repeat ICAL. Reanalyze all samples since the last acceptable CCV.		

Notes:

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

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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		
	tune MS		Manufacturer comes on-site to re-tune annually.	Annual	Calibrations meet method acceptance criteria.	A service call should be placed with the manufacturer		
HPLC	Change guard cartridge, inlet filter and Ftpf frit.	Perchlorate	Review pressure profile.	As needed based on pressure profile	Part was replaced	Replace them and check often	Analyst / Supervisor	HPL6850
	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		N/A	Daily	minimum noise in the base line	Prepare fresh mobile phase solution		

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
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.		
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
ICP-AES (SEM Metals)	Clean plasma torch; clean filters; clean spray and nebulizer chambers; replace pump tubing	SEM Metals	Torch, filters, nebulizer chamber, pump, pump tubing	Perform as needed.	must meet initial and/or continuing calibration criteria	Repeat maintenance activity or remove from service.	Analyst / Supervisor	MET-200.7/6010B
CVAA (SEM Mercury)	Clean or replace dehydrator tubing and sample mixing coil tubing; replace sample probe; replace pump tubing; clean optical cell.	SEM Mercury	Tubing, sample probe, optical cell	Perform as needed.		Repeat maintenance activity or remove from service.	Analyst / Supervisor	MET-7470A/245.1
Spectrophotometer (AVS)	Inspect lamp alignment. Adjust zero. Replace lamp as needed.	AVS	Check wavelengths against NIST traceable standards	Every 6 months	Within 3% of certified transmittance density values or 2nm for holmium oxide	Repeat maintenance activity or remove from service.	Analyst / Supervisor	GEN-AVS

SAP Worksheet #26—Sample Handling System

(UFP-QAPP Manual Appendix A)

<p>SAMPLE COLLECTION, PACKAGING, AND SHIPMENT</p> <p>Sample Collection (Personnel/Organization): Field Team Leader (Ronny Fields or TBD)/CH2M HILL</p> <p>Sample Packaging (Personnel/Organization): Sample Processor or Field Team Member (TBD)/CH2M HILL</p> <p>Coordination of Shipment (Personnel/Organization): Sample Processor or Field Team Member (TBD)/CH2M HILL</p> <p>Type of Shipment/Carrier: Overnight/FedEx</p>
<p>SAMPLE RECEIPT AND ANALYSIS</p> <p>Sample Receipt (Personnel/Organization): Sample Receipt Personnel/APPL. Sample Receipt Personnel/ALS-Kelso. Sample Receipt Personnel/Test America-Burlington. Note that all samples will be shipped to APPL who will forward ORP and AVS/SEM fractions to ALS and Grainsize fraction to Test America-Burlington.</p> <p>Sample Custody and Storage (Personnel/Organization): Sample Receipt Personnel/APPL. Sample Receipt Personnel/ALS-Kelso. Sample Receipt Personnel/Test America-Burlington</p> <p>Sample Preparation (Personnel/Organization): Digestion Personnel/APPL. Extraction Personnel/ALS-Kelso. Extraction Personnel/Test America-Burlington.</p> <p>Sample Determinative Analysis (Personnel/Organization): Analyst/APPL. Analyst/ALS-Kelso. Analyst/Test America-Burlington.</p>
<p>SAMPLE ARCHIVING</p> <p>Field Sample Storage (No. of days from sample collection): 90</p> <p>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.</p> <p>Biological Sample Storage (No. of days from sample collection): 90 days</p>
<p>SAMPLE DISPOSAL</p> <p>Personnel/Organization: Environmental Health and Safety Officer/APPL. Environmental Health and Safety Officer/ALS-Kelso. Environmental Health and Safety Officer/Test America-Burlington.</p> <p>Number of Days from Analysis: Samples may be disposed of 90 days after report mail date.</p>

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SAP Worksheet #28-0—Laboratory QC Samples Table

Matrix: SMI

Analytical Group: SVOC, EXPLO, METAL, WCHEM

Analytical Method/SOP Reference: SW-846 8330B (preparation) / MSE018IS, PREMETALSIS

Deviations from Final Master SAP:

1. Ground LCS (or CRM) frequency will be 'one per site' rather than 'one per preparatory batch.' Because the standard material is unreasonably expensive, many projects waive the requirement for this QC sample. However, this project will simply use a reduced frequency in order to avoid being excessive.
2. A gloved hand is not used to break up pieces of soil during the soil sieving procedure. Instead, a mortar and pestle is used (if necessary) prior to the #10 sieve.
3. WCHEM (pH, TOC, and ORP) do not require grinding. However, they will be hand-ground along with the Picric Acid, METAL and SVOA fraction.

Clarifications to Final Master SAP:

1. SVOAs and Picric Acid are hand-ground due to the heat generated during the grinding process. This is done simultaneously with the METALS (and WCHEM) fraction.

Laboratory Preparation of a Multi-Incremental Sample:

1. The sample material is dried.
2. The sample material is #10 sieved. If necessary, a mortar and pestle is used to break up soil clumps.
3. Calculate how much soil does not require mechanical grinding (depending on the requested analyses other than 8330B EXPLO and Perchlorate):
 - a. 10g for 6010/6020 metals.
 - b. 2.5g for HexCr.
 - c. 30g for SVOCs.
 - d. 5g for TOC
 - e. 50g for pH
 - f. 10g for ORP
 - g. 10g for Picric Acid.
 - h. Multiply by 2 (remove twice that needed for analytical preparation) for potential re-extraction/reanalysis.
4. Subsample (30 or more increments) that soil, per #3 above, which does not require mechanical grinding.
5. The remainder of the soil is mechanically ground with the puck mill grinder.
 - a. Selected option: one 90s cycle (per MSE018MIS).
 - b. Not selected: Five 60s cycles separated by two minute cool-down periods (because samples are not expected to contain NC-based residues).
6. Subsample (30 or more increments) the soil which has been mechanically-ground via puck mill as described in 8330B
 - a. 10g for Explosives
 - b. 10g for Perchlorate
7. Hand-grind (using equipment suitable for metals) the soil from #4, above.
8. Subsample (30 or more increments) from the soil which has been hand-ground.

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SAP Worksheet #28-1—Laboratory QC Samples Table

Matrix: SB, SS, SMI

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, reprep 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 reprep 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 reprep 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	
Field QA/QC Samples						
Field Duplicate (for SB, SS, SD)	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
Field Triplicate (for SMI only)	One per 10 normal field samples per matrix	% Relative Standard Deviation (RSD) < 30% (advisory only)	None.	N/A	Precision	

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

Matrix: SB, SS, SMI

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
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.

SAP Worksheet #28-2—Laboratory QC Samples Table

Matrix: SB, SS, SMI, SD

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
Soil grinding blank	Prior to grinding samples; after every 10 samples; and at the end of the batch	A grinding blank using clean solid matrix (such as Ottawa sand) must be prepared (e.g., ground and subsampled) and analyzed in the same manner as a field sample. No reported analytes must be detected > 1/2 LOQ.	Blank results must be reported and the affected samples must be flagged accordingly if blank criteria are not met. If any individual grinding blank is found to exceed the acceptance criteria, apply B-flag to the samples following that blank. Grinding blanks may be composited for analysis. At least one grinding blank per batch must be analyzed.		Contamination	
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, reprep 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)	One per preparatory batch. Incremental samples: The LCS is prepared from a ground clean sand matrix that has been spiked post-grind.	See Worksheet #15	Correct problem. If required, reprep 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	
Surrogate Spike	All field and QC samples.	1,2-Dinitrobenzene: 78-119%	Correct problem, then reprep 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 #28-2—Laboratory QC Samples Table (continued)

Matrix: SB, SS, SMI, SD

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
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 from both columns. Apply J-flag if RPD >40%. Discuss in the case narrative.		Accuracy, Precision	
Field QA/QC Samples						
Field Duplicate (for SB, SS, SD)	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	
Field Triplicate (for SMI only)	One per 10 normal field samples per matrix	% Relative Standard Deviation (RSD) < 30% (advisory only)	None.	N/A	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, SMI, SD

Analytical Group: EXPLO

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.	<p>Correct problem. If required, reprep 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.</p> <p>Results may not be reported without a valid method blank. Flagging is only appropriate in cases where the samples cannot be reanalyzed.</p>	Analyst / Supervisor	Contamination	Same as Method/SOP QC Acceptance Limits
Laboratory Control Sample (LCS)	One per preparatory batch.	See Worksheet #15	<p>Correct problem, then reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available.</p> <p>Results may not be reported without a valid method blank. Flagging is only appropriate in cases where the samples cannot be reanalyzed.</p>		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 reprep 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 for second column are the same as for initial or primary column analysis. Results between primary and secondary column RPD ≤ 40%.	Apply J-flag if RPD > 40%. Discuss in the case narrative.		Accuracy, Precision	
Field QA/QC Samples						
Field Duplicate (for SB, SS, SD)	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 #28-3—Laboratory QC Samples Table (continued)

Matrix: SB, SS, SMI, SD

Analytical Group: EXPLO

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 Triplicate (for SMI only)	One per 10 normal field samples per matrix	% Relative Standard Deviation (RSD) < 30% (advisory only)	None.	N/A	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, SMI, SD

Analytical Group: EXPLO

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. Reprep 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. Reprep 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, SMI, SD

Analytical Group: EXPLO

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
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 $\pm 20\%$ 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.		Accuracy, Bias	
Isotope Ratio $^{35}\text{Cl}/^{37}\text{Cl}$	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, SD)	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	
Field Triplicate (for SMI only)	One per 10 normal field samples per matrix	% Relative Standard Deviation (RSD) < 30% (advisory only)	None.	N/A	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	$\leq 6^\circ\text{C}$ 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, SMI, SD

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, reprep 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 reprep 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. 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. 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, SD)	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	
Field Triplicate (for SMI only)	One per 10 normal field samples per matrix	% Relative Standard Deviation (RSD) < 30% (advisory only)	None.	N/A	Precision	

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

Matrix: SB, SS, SMI, SD

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
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 #28-6—Laboratory QC Samples Table

Matrix: SB, SS, SMI, SD

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, reprep 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, SD)	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, SMI, SD

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 Triplicate (for SMI only)	One per 10 normal field samples per matrix	% Relative Standard Deviation (RSD) < 30% (advisory only)	None.	N/A	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 #28-7—Laboratory QC Samples Table

Matrix: SB, SS, SMI, SD

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 reprep 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	Contamination	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 reprep 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.		Accuracy	
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.		Accuracy	
Matrix Spike Duplicate (MSD) or Matrix Duplicate	One per preparatory batch	See Worksheet #15			Accuracy, Precision	
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 rehomogenize, redigest, and reanalyze samples. If that fails, evaluate against LCS results.		Accuracy, Precision	
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 rehomogenize, redigest, and reanalyze samples.		Accuracy, Precision	
Field QA/QC Samples						
Field Duplicate (for SB, SS, SD)	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	
Field Triplicate (for SMI only)	One per 10 normal field samples per matrix	% Relative Standard Deviation (RSD) < 30% (advisory only)	None.	N/A	Precision	

SAP Worksheet #28-7—Laboratory QC Samples Table (continued)

Matrix: SB, SS, SMI, SD

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
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, SMI, SD

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, SMI, SD

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 \geq 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, reanalyze 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	\leq 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, SMI, SD

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 #28-11—Laboratory QC Samples Table

Matrix: SD

Analytical Group: GRAINSIZE

Analytical Method/SOP Reference: ASTM D422 / BR-GT-006

QC Sample	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
QA/QC Samples are not required for GRAINSIZE analysis.						

SAP Worksheet #28-12—Laboratory QC Samples Table

Matrix: SD

Analytical Group: AVS/SEM

Analytical Method/SOP Reference: EPA 821_R-91-100 / GEN-AVS, MET-7470A, MET-ICP

QC Sample	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per batch or 5%, whichever is greater. This blank carries through AVS extraction and SEM digestion and analysis.	Target analytes must be ≤ LOQ	Correct the problem; if required, reprep and reanalyze the method blank and all samples processed with the contaminated blank	Analyst/ Supervisor	Contamination/ Bias	Same as Method/SOP QC Acceptance Limits.
Digestion Blank	One is performed for each batch of 20 samples. This blank does not undergo AVS extraction. It only undergoes SEM digestion and analysis.	Target analytes must be ≤ LOQ	Correct the problem; if required, reprep and reanalyze the method blank and all samples processed with the contaminated blank		Contamination/ Bias	
LCS	One per batch or 5%, whichever is greater. The LCS is spiked after AVS extraction and before SEM digestion.	Refer to Worksheet #15.	Re-prepare and analyze all associated samples.		Accuracy/Bias	
Laboratory Replicate (for AVS extraction)	One per batch or 5%, whichever is greater.	RPD ≤30%	Note outlier in case narrative		Precision	
Serial Dilution	One is performed for each preparation batch with sample concentration(s) > 50x LOQ	The five-fold dilution result must agree within ± 10% of the original sample result.	Qualify the results.		Precision / Accuracy	
Post Digestion Spike	One is performed when serial dilution fails or analyte concentration(s) in all samples < 50x LOD.	The result must agree within ± 25% of expected result.	Run all associate sample in the preparatory batch by method of standard additions or qualify results.		Precision / Accuracy	
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 #28-13—Laboratory QC Samples Table

Matrix: SW

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						
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.	<p>Correct problem. If required, reprep 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.</p> <p>Results may not be reported without a valid method blank. Flagging is only appropriate in cases where the samples cannot be reanalyzed.</p>	Analyst / Supervisor	Contamination	Same as Method/SOP QC Acceptance Limits
Laboratory Control Sample (LCS)	One per preparatory batch.	See Worksheet #15	<p>Correct problem. If required, reprep and reanalyze the LCS and all samples in the associated preparatory batch for the failed analytes, if sufficient sample material is available.</p> <p>Results may not be reported without a valid LCS. Flagging is only appropriate in cases where the samples cannot be reanalyzed.</p>		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 qualifier if acceptance criteria are not met and explain in the case narrative.		Accuracy, Precision	
Surrogate Spike	All field and QC samples.	1,2-Dinitrobenzene: 83-119%	Correct problem, then reprep 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 from both columns. Apply J-flag if RPD >40%. Discuss in the case narrative.		Accuracy, Precision	
Field QA/QC Samples						
Field Duplicate	One per 10 normal field samples per matrix	% Relative Percent Difference (RPD) < 20%	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

SAP Worksheet #28-13—Laboratory QC Samples Table (continued)

Matrix: SW
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
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	Same as Method/SOP QC Acceptance Limits
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 #28-14—Laboratory QC Samples Table

Matrix: SW

Analytical Group: EXPLO

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.	<p>Correct problem. If required, reprep 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.</p> <p>Results may not be reported without a valid method blank. Flagging is only appropriate in cases where the samples cannot be reanalyzed.</p>	Analyst / Supervisor	Contamination	Same as Method/SOP QC Acceptance Limits
Laboratory Control Sample (LCS)	One per preparatory batch.	See Worksheet #15	<p>Correct problem, then reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available.</p> <p>Results may not be reported without a valid method blank. Flagging is only appropriate in cases where the samples cannot be reanalyzed.</p>		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 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	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 qualifier if acceptance criteria are not met and explain in the case narrative.		Accuracy, Precision	
Surrogate Spike	All field and QC samples.	1,2-Dinitrobenzene: 50-150%	Correct problem, then reprep 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 for second column are the same as for initial or primary column analysis. Results between primary and secondary column RPD ≤ 40%.	Apply J-flag if RPD > 40%. Discuss in the case narrative.		Accuracy, Precision	

SAP Worksheet #28-14—Laboratory QC Samples Table (continued)

Matrix: SW
Analytical Group: EXPLO
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	One per 10 normal field samples per matrix	% Relative Percent Difference (RPD) < 20%	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 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 #28-15—Laboratory QC Samples Table

Matrix: SW

Analytical Group: EXPLO

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.	<p>Reanalyze reagent blank (until no carryover is observed) and all samples processed since the contaminated blank.</p> <p>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.</p>	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.	<p>Correct problem. Reprep and reanalyze method blank and all samples processed with the contaminated blank. Flagging is only appropriate in cases where the samples cannot be reanalyzed.</p> <p>Results may not be reported without a valid method blank. Flagging is only appropriate in cases where the samples cannot be reanalyzed.</p>		Contamination	
Laboratory Control Sample (LCS)	One per preparatory batch.	See Worksheet #15	<p>Correct problem. Reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available.</p> <p>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.</p>		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 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	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 qualifier if acceptance criteria are not met and explain in the case narrative.		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 #28-15—Laboratory QC Samples Table (continued)

Matrix: SW
Analytical Group: EXPLO
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
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 $\pm 20\%$ 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.		Accuracy, Bias	
Isotope Ratio $^{35}\text{Cl}/^{37}\text{Cl}$	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	One per 10 normal field samples per matrix	% Relative Percent Difference (RPD) < 20%	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 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	$\leq 6^\circ\text{C}$ 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 #28-16—Laboratory QC Samples Table

Matrix: SW

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, reprep 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 reprep 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 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 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 qualifier if acceptance criteria are not met and explain in the case narrative.		Accuracy, Precision	

SAP Worksheet #28-16—Laboratory QC Samples Table (continued)

Matrix: SW
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						
Field Duplicate	One per 10 normal field samples per matrix	% Relative Percent Difference (RPD) < 20%	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 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 #28-17—Laboratory QC Samples Table

Matrix: SW

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, reprep 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 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 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 qualifier if acceptance criteria are not met and explain in the case narrative.		Accuracy, Precision	

SAP Worksheet #28-17—Laboratory QC Samples Table (continued)

Matrix: SW
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						
Field Duplicate	One per 10 normal field samples per matrix	% Relative Percent Difference (RPD) < 20%	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 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 #28-18—Laboratory QC Samples Table

Matrix: SW

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 reprep 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	Contamination	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 reprep 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.		Accuracy	
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.		Accuracy	
Matrix Spike Duplicate (MSD) or Matrix Duplicate	One per preparatory batch	See Worksheet #15			Accuracy, Precision	
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 rehomogenize, redigest, and reanalyze samples. If that fails, evaluate against LCS results.		Accuracy, Precision	
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 rehomogenize, redigest, and reanalyze samples.		Accuracy, Precision	
Field QA/QC Samples						
Field Duplicate	One per 10 normal field samples per matrix	% Relative Percent Difference (RPD) < 20%	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

SAP Worksheet #28-18—Laboratory QC Samples Table (continued)

Matrix: SW
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
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	Same as Method/SOP QC Acceptance Limits
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.

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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, SD, SMI	SVOC (SS, SB, SMI only)	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			
SD	GRAINSIZE	See Worksheet #18	ASTM D422 / BR-GT-006	Standard 28 Calendar-day TAT	Test America - Burlington 30 Community Dr., Suite 11 South Burlington, VT 05403 802-660-1990 POC: Don Dawicki	TBD
	AVS/SEM		EPA 821_R-91-100 / GEN-AVS, MET-7470A, MET-ICP			
SW	EXPLO	See Worksheet #18	SW-846 8330B / MSE018 , HPL8330	Standard 28 Calendar-day TAT	APPL	TBD
	EXPLO (Picric Acid)		SW-846 8321A / MSE018, HPL8321			
	EXPLO (Perchlorate)		SW-846 6850 / HPL6850			
	METAL, FMETAL		SW-846 6010C, 6020A / PRE3050B, ANA6010, ANA6020			
	METAL, FMETAL (Hexavalent Chromium)		SW-846 7199 / ANA3060A, ANA218.6-7199			

Notes:

¹ All samples will be shipped from the field to APPL. APPL will ship ORP and AVS/SEM fractions to ALS-Kelso and GRAINSIZE fractions to Test America.

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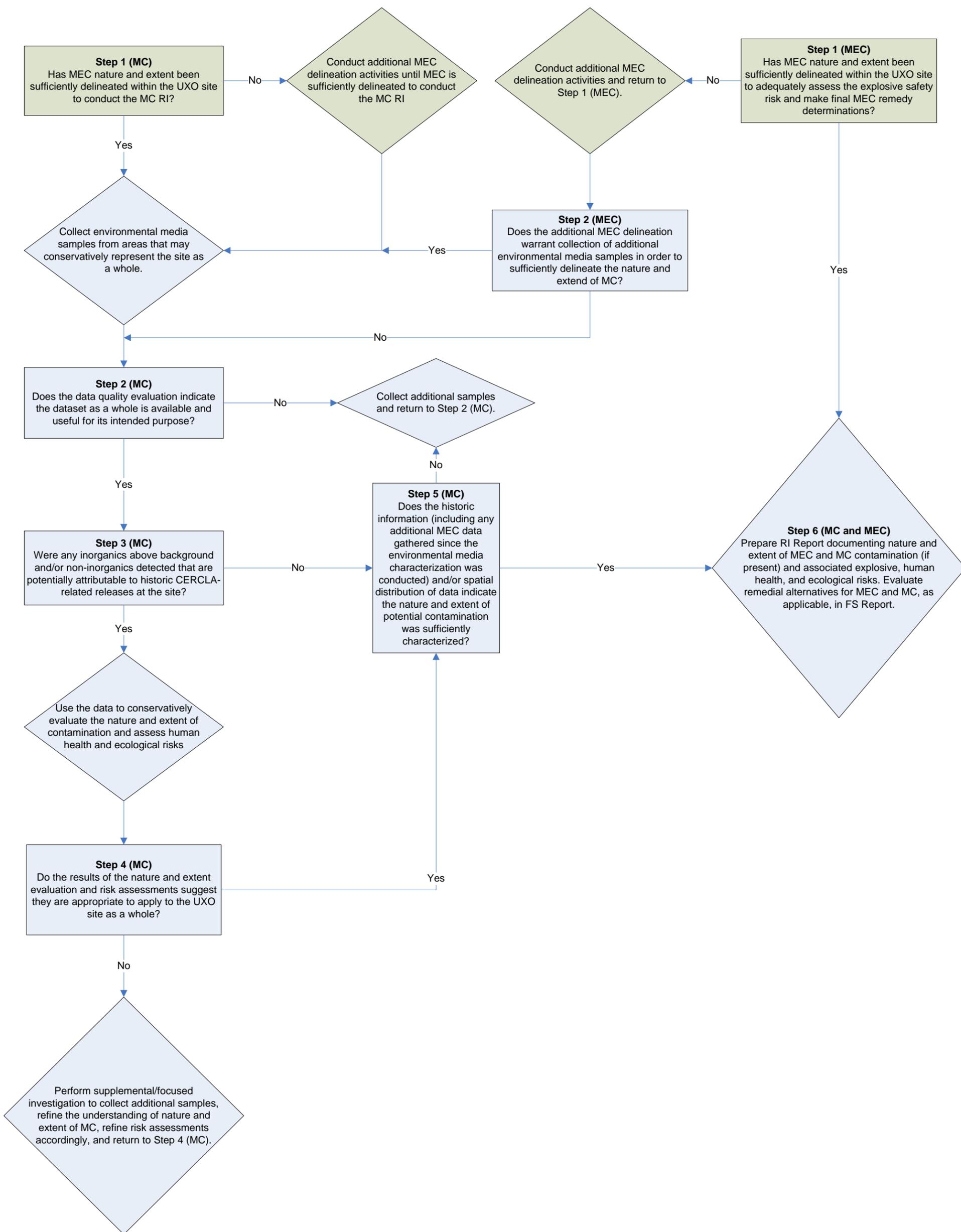
Tables

Table 1

UXO 13 Munitions Items Removed within Sampling Unit and Sample Rationale
 Master Sampling and Analysis Plan - East Vieques Terrestrial UXO Sites
 Vieques, Puerto Rico

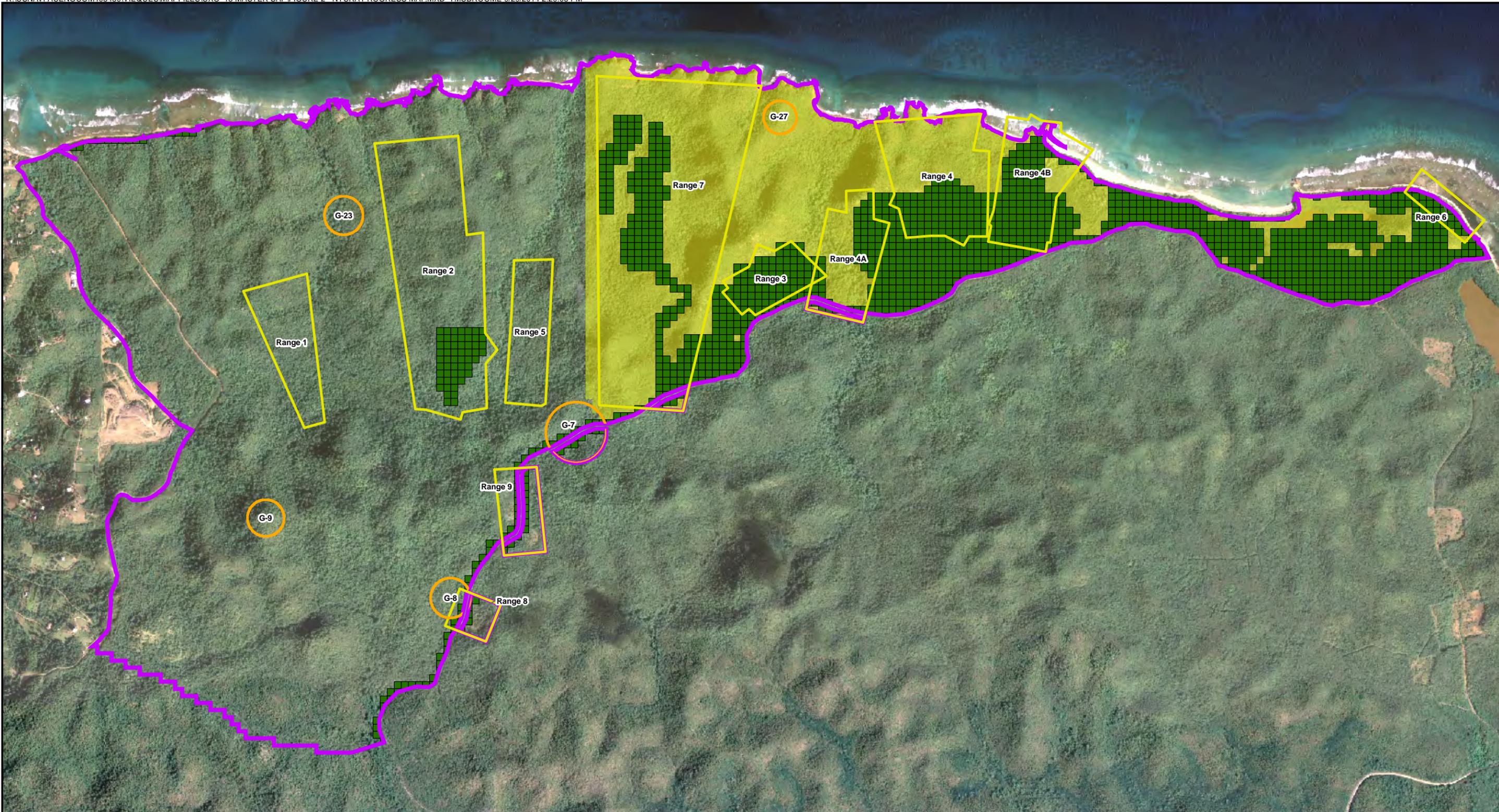
Sample ID	Sampling Unit	Quantity of MEC/MD Removed from Surface								Sample Rationale (in order of importance)
		Bombs	Flares/ Pyrotechnics	Grenades	MEC Components	Projectiles /Mortars	Rockets/Guid ed Missiles	Submunitions	Scrap	
Decision Unit 1 - Northeast UXO 13										
VE-UXO13-1DU01	Northeast 1	0	2	0	0	0	0	0	0	Gun position
VE-UXO13-1DU02	Northeast 2	0	0	0	0	0	0	0	0	Located within ephemeral stream downgradient from Range 4A
VE-UXO13-1DU03	Northeast 3	0	1	0	0	0	0	0	0	Former target area within Range 4
VE-UXO13-1DU04	Northeast 4	0	0	0	20	0	1	0	1,836	Former target area within Range 4B
VE-UXO13-1DU05	Northeast 5	0	0	0	1	0	8	0	3044	Former impact area within Range 4B
VE-UXO13-1DU06	Northeast 6	0	0	26	0	0	0	0	2843	Former target area within Range 4A
VE-UXO13-1DU07	Northeast 7	0	0	0	1	0	0	0	60	PAOC CC within Range 4
VE-UXO13-1DU08	Northeast 8	0	0	0	0	0	0	0	334	Former firing point within Range 4B
VE-UXO13-1DU09	Northeast 9	0	0	1	0	0	0	0	115	Former target area within Range 3
VE-UXO13-1DU10	Northeast 10	0	0	1	0	0	0	0	896	Former target area within Range 4A
VE-UXO13-1DU11	Northeast 11	0	0	13	0	4	0	0	537	Former target area within Range 4
VE-UXO13-1DU12	Northeast 12	0	0	0	0	0	31	0	4240	Former impact area within Range 4B
VE-UXO13-1DU13	Northeast 13	0	0	0	0	0	0	0	0	Former firing point within Range 7
VE-UXO13-1DU14	Northeast 14	0	0	0	0	0	0	0	0	Former target area within Range 9
Decision Unit 2 - Central UXO 13										
VE-UXO13-2DU01	Central 1	0	0	0	0	0	0	0	0	Range 7 and confluence of two ephemeral streams
VE-UXO13-2DU02	Central 2	0	0	0	0	0	0	0	0	Gun positions and transport pathway (ephemeral stream)
VE-UXO13-2DU03	Central 3	0	0	0	0	0	0	0	0	Former target area within Range 2
VE-UXO13-2DU04	Central 4	0	0	0	0	1	0	0	0	Former target area within Range 7 and transport pathway (ephemeral stream)
VE-UXO13-2DU05	Central 5	0	1	0	1	8	0	0	133	Former target area within Range 7
VE-UXO13-2DU06	Central 6	0	0	0	0	0	0	0	0	Former target area within Range 1
VE-UXO13-2DU07	Central 7	0	0	0	0	0	0	0	1086	Former target area within Range 2
VE-UXO13-2DU08	Central 8	0	0	0	0	0	0	0	0	Former target area within Range 5
VE-UXO13-2DU09	Central 9	0	0	0	0	0	0	0	0	Firing point within Range 1
VE-UXO13-2DU10	Central 10	0	0	0	0	0	0	0	71	Firing point within Range 2
VE-UXO13-2DU11	Central 11	0	0	0	0	0	0	0	0	Firing point within Range 5
VE-UXO13-2DU12	Central 12					5			325	Former target area within Range 7
Decision Unit 3 - East Northeast UXO13										
VE-UXO13-3DU01	East Northeast 1	0	0	0	2	1	0	0	310	Higher number of MEC and munitions scrap at Range 6
VE-UXO13-3DU02	East Northeast 2	0	0	0	4	1	0	0	769	Higher number of MEC and munitions scrap adjacent to Range 6
VE-UXO13-3DU03	East Northeast 3	0	0	0	0	0	0	0	0	Transport pathways (ephemeral stream)
Decision Unit 5 - South UXO 13										
VE-UXO13-5DU01	South 1	0	0	0	0	0	0	0	1	Gun position and within Range 8
Decision Unit 6 - Laguna Algodones - quantity of items are from entire lagoon										
VE-UXO13-6SDSW01	Laguna Algodones	0	0	0	1	0	0	0	40	Sediment and surface water samples were located for broad spatial distribution
VE-UXO13-6SDSW02										
VE-UXO13-6SDSW03										
VE-UXO13-6SDSW04										
VE-UXO13-6SDSW05										
VE-UXO13-6SDSW06										
Decision Unit 7 - Laguna Algodones Fringe										
VE-UXO13-7DU01	Laguna Algodones Fringe 1	0	0	0	0	0	0	0	0	One acre sampling unit within ~3 acre lagoon fringe (includes both lagoons)
VE-UXO13-7DU02	Laguna Algodones Fringe 2	0	0	0	0	0	0	0	0	One acre sampling unit within ~3 acre lagoon fringe (includes both lagoons)
VE-UXO13-7DU03	Laguna Algodones Fringe 3	0	0	0	0	0	0	0	0	One acre sampling unit within ~3 acre lagoon fringe (includes both lagoons)

Figures



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

FIGURE 1
MEC and MC Remedial Investigation Decision Process
UXO 13 Master SAP Addendum
Former Vieques Naval Training Range



-  Gun Positions
-  Range
-  UXO 13 Boundary
-  NTCRA Completed
-  Planned NTCRA Area

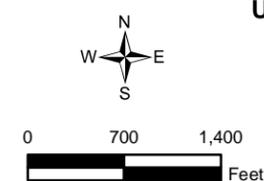
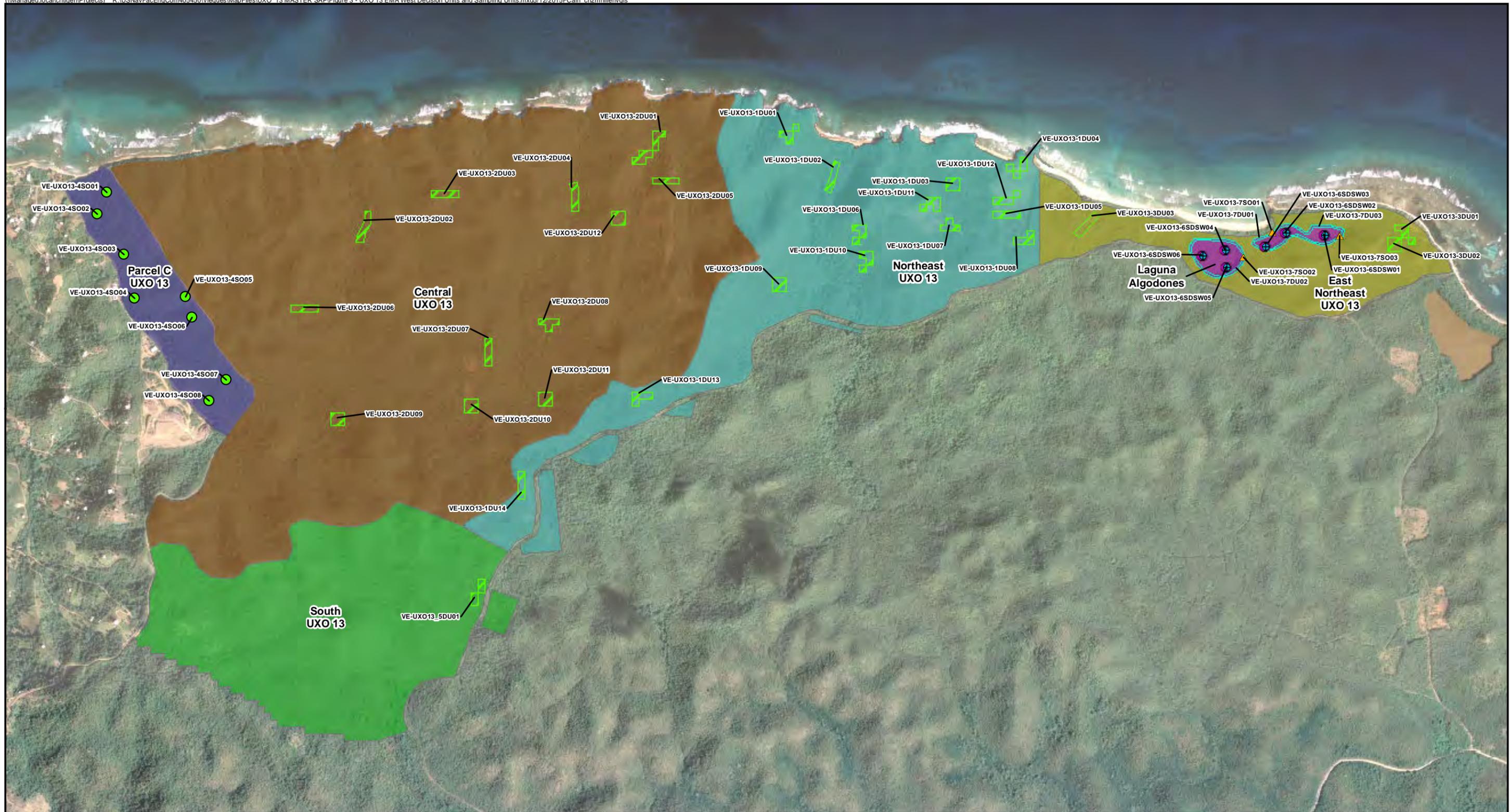


Figure 2
UXO 13 NTCRA Progress Map (through September 2014)
UXO 13 Master SAP Addendum
Former VNTR
Vieques, Puerto Rico



- | | |
|--------------------------------------|-------------------------|
| ● Surface and Subsurface Soil Sample | Decision Unit |
| ▲ Deep Surface Soil Sample | ■ Central UXO 13 |
| ● Proposed Surface Water Samples | ■ East Northeast UXO 13 |
| ● Proposed Sediment Samples | ■ Laguna Algodones |
| □ Laguna Algodones Fringe | ■ Northeast UXO 13 |
| □ Sample Unit | ■ Parcel C UXO 13 |
| | ■ South UXO 13 |

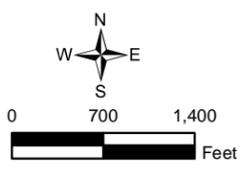
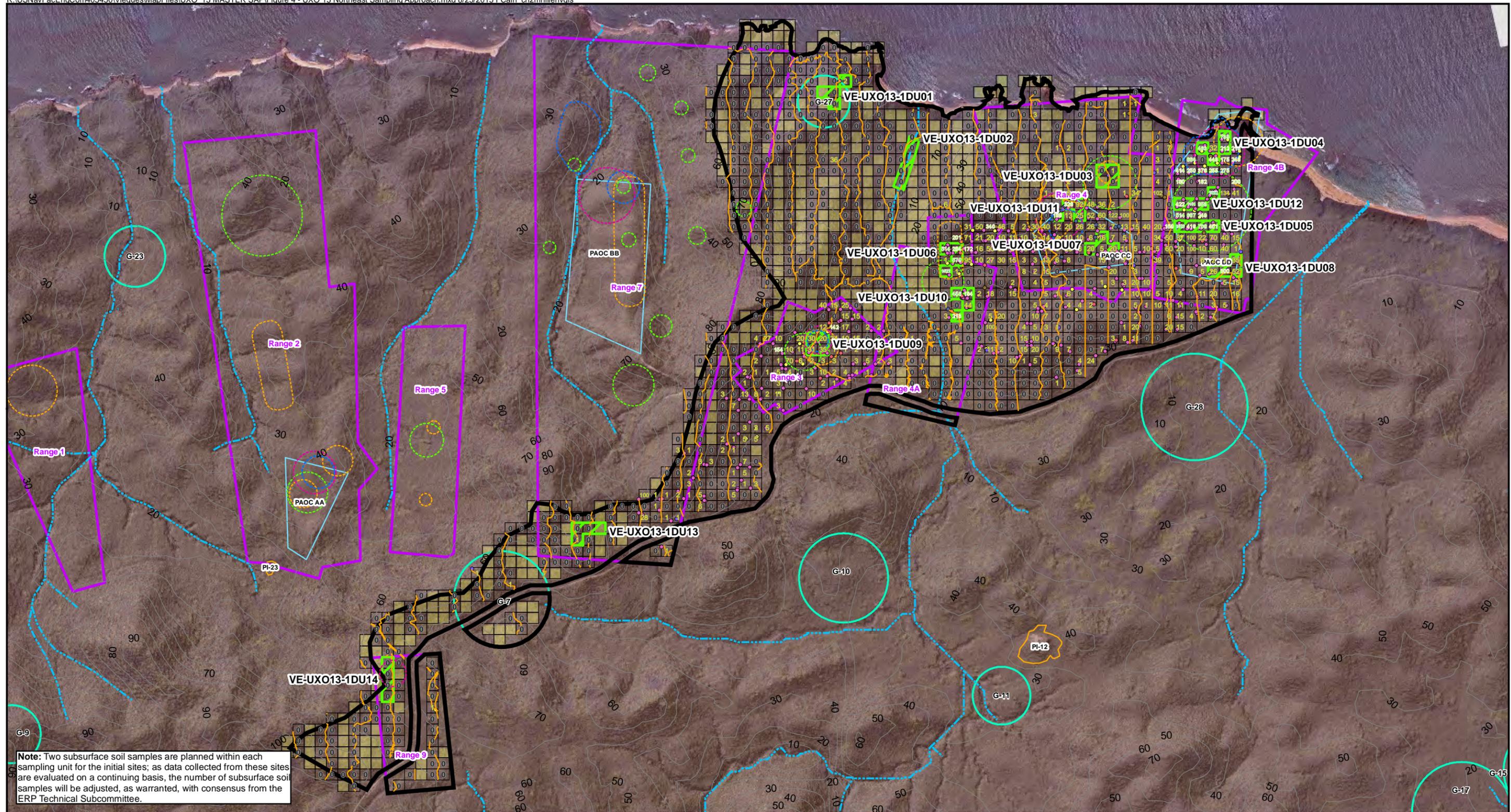


Figure 3
UXO 13 EMA West Decision Units and Sampling Units
 UXO 13 Master SAP Addendum
 Former VNTR
 Vieques, Puerto Rico



Note: Two subsurface soil samples are planned within each sampling unit for the initial sites; as data collected from these sites are evaluated on a continuing basis, the number of subsurface soil samples will be adjusted, as warranted, with consensus from the ERP Technical Subcommittee.

- Sample Unit
- Decision Unit
- Flares-Pyrotechnics
- Grenades
- MEC Component
- Projectiles / Mortars
- Rockets / Guided Missiles
- Scrap (Munitions Debris)
- Transect -3 Foot Width was Investigated
- Topographic Contours (10 Meter)
- Stream
- Gun Positions
- Range
- Photo Identified Area
- Preliminary Area of Concern
- Grid (30 Meter)
- Yellow shading indicates no MEC investigation has been conducted to date

- Range Impact Areas**
- 1962
 - 1967
 - 1983
 - 1994

Density of MEC and Munitions Scrap by 30 Meter Grid (Jenks Method Classification)

1 - 139
140 - 455
456 - 929
930 - 1579
1580 - 2360
2361 - 3463
3464 - 4920
4921 - 6808
6809 - 10113
10114 - 16918

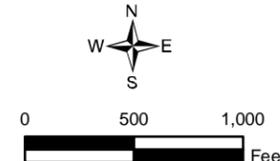
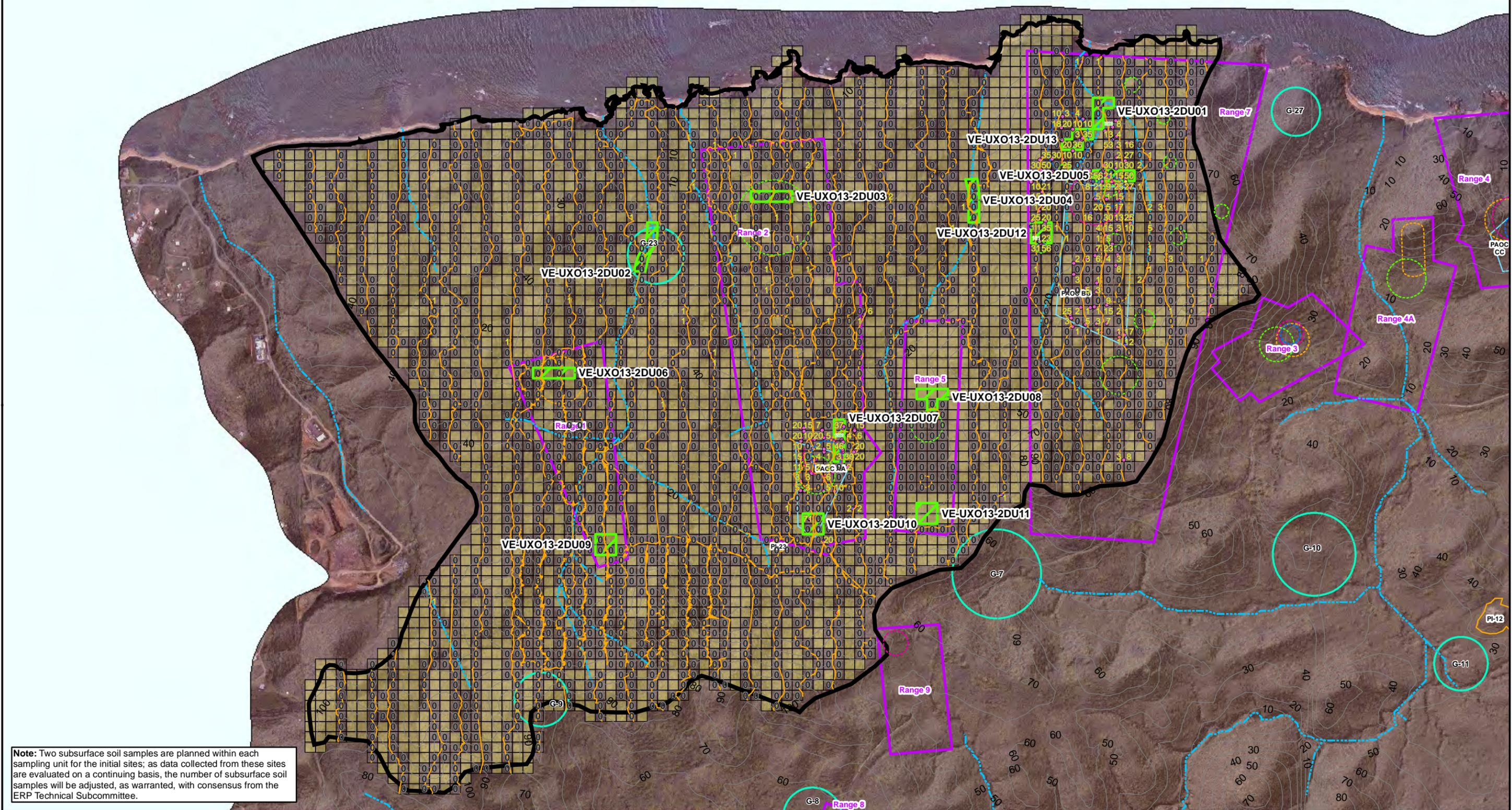


Figure 4
UXO 13 Northeast Sampling Approach
 UXO 13 Master SAP Addendum
 Former VNTR
 Vieques, Puerto Rico



Note: Two subsurface soil samples are planned within each sampling unit for the initial sites; as data collected from these sites are evaluated on a continuing basis, the number of subsurface soil samples will be adjusted, as warranted, with consensus from the ERP Technical Subcommittee.

- | | | |
|--|--|--|
| <ul style="list-style-type: none"> ■ Sample Unit Decision Unit ● Flares-Pyrotechnics ● Grenades ● MEC Component ● Projectiles / Mortars ● Rockets / Guided Missiles ● Scrap (Munitions Debris) | <ul style="list-style-type: none"> — Transect -3 Foot Width was Investigated — Topographic Contours (10 Meter) — Stream □ Gun Positions Range Photo Identified Area Preliminary Area of Concern Grid (30 Meter) Yellow shading indicates no MEC investigation has been conducted to date | <p>Range Impact Areas</p> <ul style="list-style-type: none"> 1962 1967 1983 1994 |
|--|--|--|

Density of MEC and Munitions Scrap by 30 Meter Grid (Jenks Method Classification)

1 - 130
140 - 455
456 - 929
930 - 1579
1580 - 2360
2361 - 3463
3464 - 4920
4921 - 6808
6809 - 10113
10114 - 16918

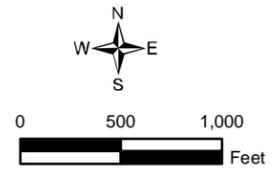


Figure 5
UXO 13 Central Sampling Approach
 UXO 13 Master SAP Addendum
 Former VNTR
 Vieques, Puerto Rico



Density of Surface MEC and Munitions Scrap by 30 Meter Grid (Jenks Method Classification)

0
1 - 139
140 - 455
456 - 929
930 - 1579
1580 - 2360
2361 - 3463
3464 - 4920
4921 - 6808
6809 - 10113
10114 - 16918

Orange outline indicates where total subsurface findings are used for color coding

Subsurface Anomalies/Findings by Grids

0
1 - 139
140 - 455
456 - 929
930 - 1579
1580 - 2360
2361 - 3460
3461 - 4920
4921 - 6808
6809 - 10113
10114 - 16918

Orange outline indicates where total subsurface findings are used for color coding

Sample Unit
 Decision Unit
 Flares-Pyrotechnics
 Grenades
 MEC Component
 Projectiles / Mortars
 Rockets / Guided Missiles
 Scrap (Munitions Debris)
 Transect -3 Foot Width was Investigated

Topographic Contours (10 Meter)
 Stream
 Gun Positions
 Range
 Grid (30 Meter)
 Tan shading indicates no MEC investigation has been conducted to date
 Lagoon

Range Impact Areas

1962
1967
1983
1994

Note: Two subsurface soil samples are planned within each sampling unit for the initial sites; as data collected from these sites are evaluated on a continuing basis, the number of subsurface soil samples will be adjusted, as warranted, with consensus from the ERP Technical Subcommittee.

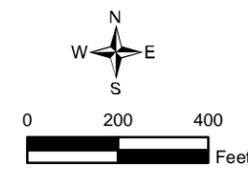
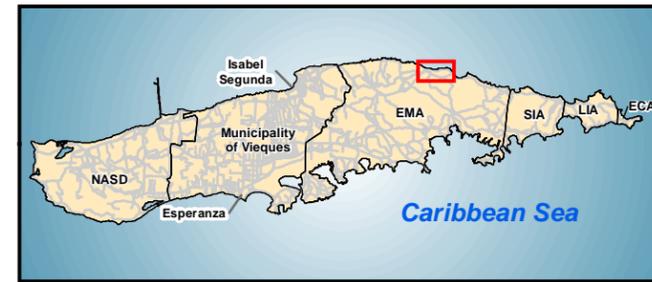
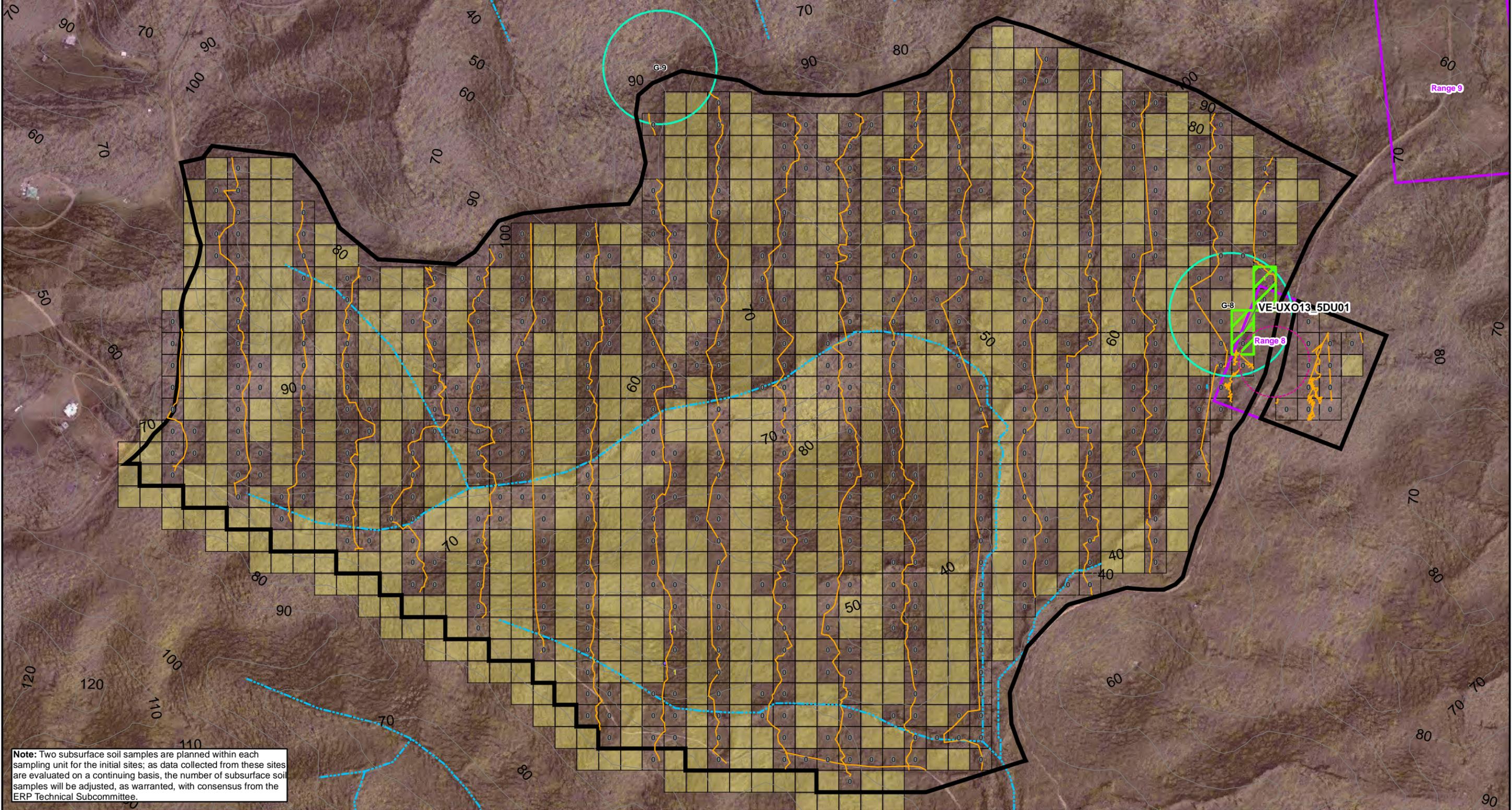


Figure 6
 UXO 13 East Northeast Sampling Approach
 UXO 13 Master SAP Addendum
 Former VNTR
 Vieques, Puerto Rico



Note: Two subsurface soil samples are planned within each sampling unit for the initial sites; as data collected from these sites are evaluated on a continuing basis, the number of subsurface soil samples will be adjusted, as warranted, with consensus from the ERP Technical Subcommittee.

- Sample Unit
- Decision Unit
- Flares-Pyrotechnics
- Transect -3 Foot Width was Investigated
- Topographic Contours (10 Meter)
- - - Stream
- Gun Positions
- Range
- Grid (30 Meter)
- Yellow shading indicates no MEC investigation has been conducted to date
- Range Impact Areas**
- 1994

Density of MEC and Munitions Scrap by 30 Meter Grid (Jenks Method Classification)

1-139
140 - 455
456 - 929
930 - 1579
1580 - 2360
2361 - 3463
3464 - 4920
4921 - 6808
6809 - 10113
10114 - 16918

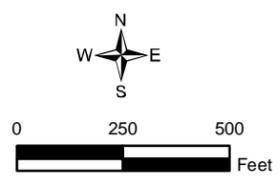
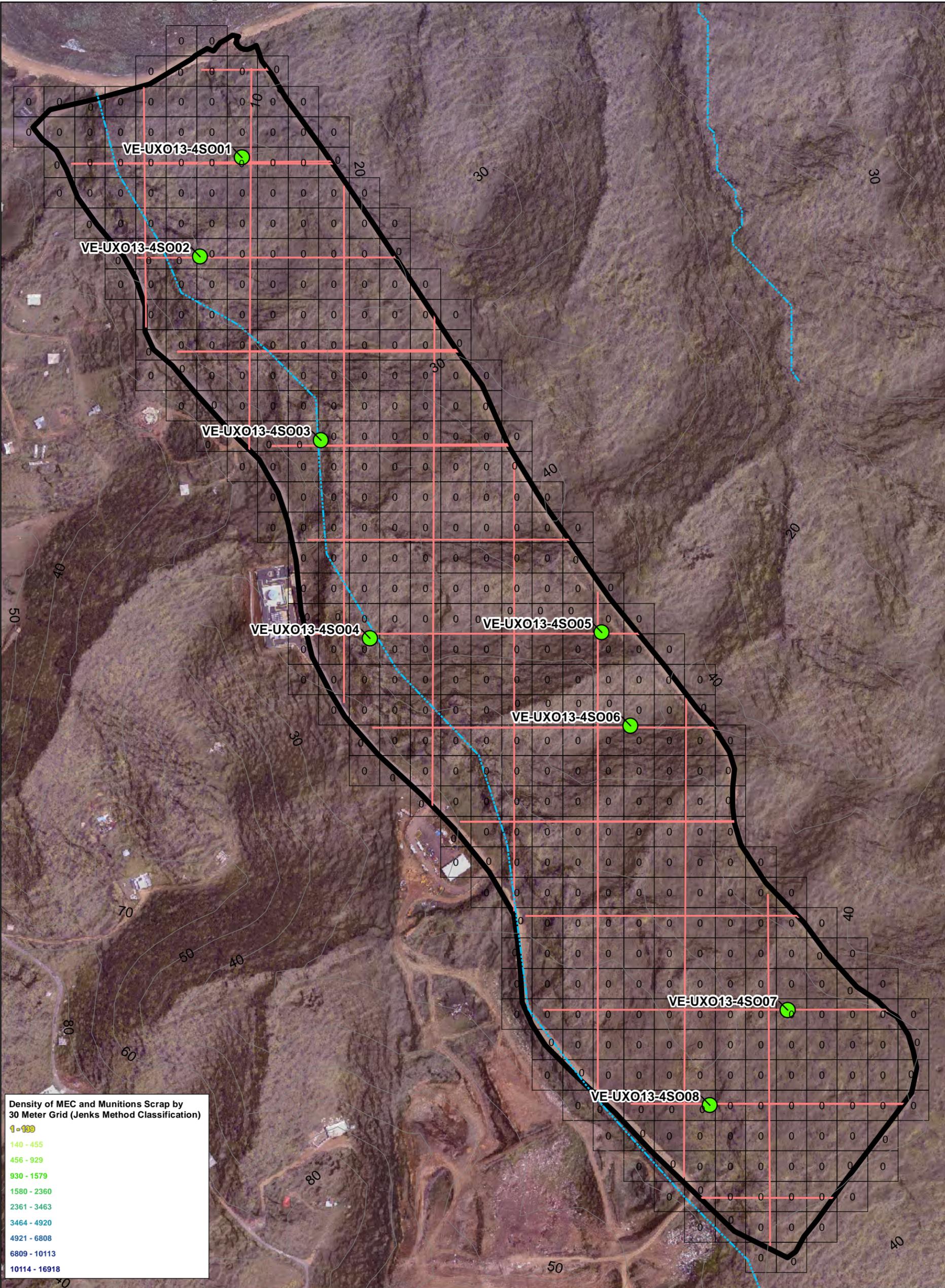


Figure 7
UXO 13 South Sampling Approach
 UXO 13 Master SAP Addendum
 Former VNTR
 Vieques, Puerto Rico



- Surface and Subsurface Soil Sample
- Topographic Contours (10 Meter)
- Stream
- Proposed Transects
- Grid (30 Meter)
- Decision Unit - Parcel C (No MEC Investigation)

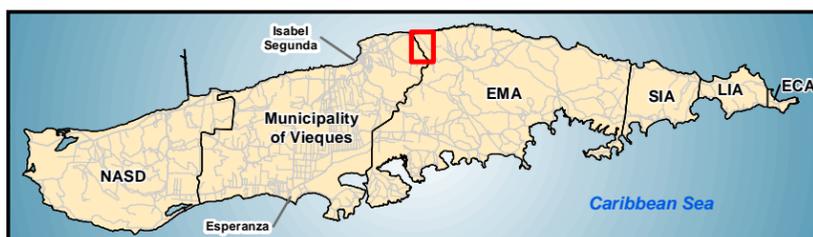
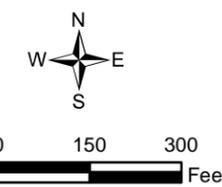
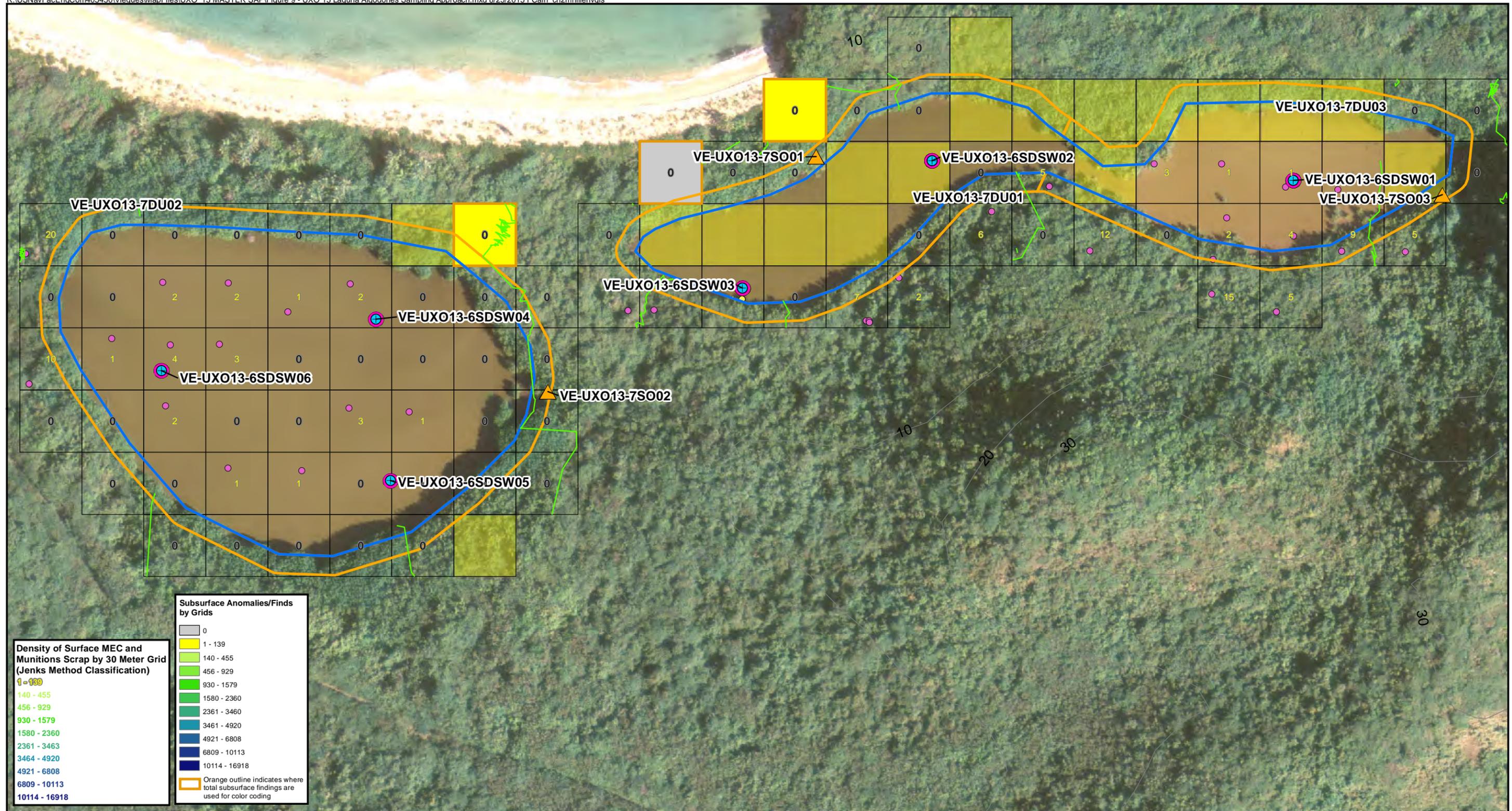


Figure 8
UXO 13 Parcel C Sampling Approach
 UXO 13 Master SAP Addendum
 Former VNTR
 Vieques, Puerto Rico





- Proposed Surface Water Samples
- Proposed Sediment Samples
- Deep Surface Soil Sample
- Lagoon
- Lagoon Fringe
- Scrap (Munitions Debris)
- MEC Component
- Transect -3 Foot Width was Investigated
- Topographic Contours (10 Meter)
- Grid (30 Meter)
- Yellow shading indicates no MEC investigation has been conducted to date

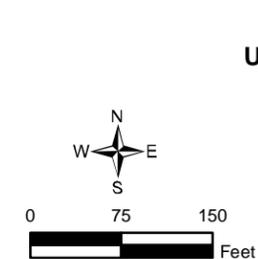


Figure 9
UXO 13 Laguna Algodones Sampling Approach
 UXO 13 Master SAP Addendum
 Former VNTR
 Vieques, Puerto Rico

Attachment A
DoD ELAP Letters



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 4.2 10/26/2010 and is accredited in 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:

Tracy Szerszen
President/Operations Manager

Initial Accreditation Date:

July 19, 2011

Issue Date:

March 13, 2014

Expiration Date:

March 13, 2016

Accreditation No.:

65188

Certificate No.:

L14-51

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.pjllabs.com



Certificate of Accreditation: Supplement
ISO/IEC 17025:2005 and DoD-ELAP

ALS Environmental-Kelso

1317 South 13th Avenue, Kelso, WA 98626
Lee Wolf 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 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 (EDB)
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
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)



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Matrix	Standard / Method	Technology	Analyte
Aqueous	EPA 9040C	pH Meter	pH
Aqueous	EPA 9060A	TOC Meter	Total Organic Carbons (TOC)
Aqueous	SM 2130B	Nephelometer	Turbidity
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	SM2320B	Titrimetry	Total Alkalinity (as CaCO ₃)
Aqueous	SM2510B	Conductivity Meter	Specific Conductance
Aqueous	SM2540B	Balance	Solids, Total
Aqueous	SM2540C	Balance	Solids, Total Dissolved
Aqueous	SM2540D	Balance	Solids, Total Suspended
Aqueous	SM4500CN E	Colorimetry	Total Cyanide
Aqueous	SM4500CN-G	Colorimetry	Cyanide, Amenable
Aqueous	SM4500NH3 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	Perfluor-n butanoic acid (PFBA)
Aqueous	SOP-LCP-PFC	HPLC/MS/MS	Perfluor-n octanesulfonate (PFOS)
Aqueous	SOP-LCP-PFC	HPLC/MS/MS	Perfluor-n octanoic acid (PFOA)
Aqueous/Drinking Water	EPA 200.9	GFAA	Antimony
Aqueous/Drinking Water	EPA 200.9	GFAA	Selenium
Aqueous/Drinking Water	EPA 200.9	GFAA	Thallium
Aqueous/Drinking Water	EPA 200.9	GFAA	Arsenic
Aqueous/Drinking Water	EPA 200.9	GFAA	Lead
Aqueous/Solid	ASTM D 1426-93B	ISE	Nitrogen, Total Kjeldahl (TKN)
Aqueous/Solid	EPA 1630	CVAFS	Methyl Mercury
Aqueous/Solid	EPA 1020A	Closed Cup Flashpoint	Ignitability
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



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Matrix	Standard / Method	Technology	Analyte
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
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



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Matrix	Standard / Method	Technology	Analyte
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 7010	GFAA	Antimony
Aqueous/Solid	EPA 7010	GFAA	Arsenic
Aqueous/Solid	EPA 7010	GFAA	Chromium, total
Aqueous/Solid	EPA 7010	GFAA	Lead
Aqueous/Solid	EPA 7010	GFAA	Selenium
Aqueous/Solid	EPA 7010	GFAA	Thallium
Aqueous/Solid	EPA 7742	AA, Borohydride Reduction; GFAA	Selenium
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 8021B	GC-FID	Benzene
Aqueous/Solid	EPA 8021B	GC-FID	Ethyl Benzene
Aqueous/Solid	EPA 8021B	GC-FID	Toluene
Aqueous/Solid	EPA 8021B	GC-FID	Xylene, total
Aqueous/Solid	EPA 8081A, B	GC-ECD	Aldrin
Aqueous/Solid	EPA 8081A, B	GC-ECD	Alpha-BHC



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

Matrix	Standard / Method	Technology	Analyte
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
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 8082, A	GC-ECD	2,2,3,3,4,4,5,5,6-Nonachlorobiphenyl (PCB 206)
Aqueous/Solid	EPA 8082, A	GC-ECD	2,2,3,3,4,4,5,6-Octachlorobiphenyl (PCB 195)
Aqueous/Solid	EPA 8082, A	GC-ECD	2,2,3,3,4,4,5-Heptachlorobiphenyl (PCB 170)
Aqueous/Solid	EPA 8082, A	GC-ECD	2,2,3,3,4,4-Hexachlorobiphenyl (PCB 128)



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1317 South 13th Avenue, Kelso, WA 98626
Lee Wolf Phone: 360-577-7222

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

Matrix	Standard / Method	Technology	Analyte
Aqueous/Solid	EPA 8082, A	GC-ECD	2,2,3,4,4,5,5-Heptachlorobiphenyl (PCB180)
Aqueous/Solid	EPA 8082, A	GC-ECD	2,2,3,4,4,5,6-Heptachlorobiphenyl (PCB 183)
Aqueous/Solid	EPA 8082, A	GC-ECD	2,2,3,4,4,5-Hexachlorobiphenyl (PCB 138)
Aqueous/Solid	EPA 8082, A	GC-ECD	2,2,3,4,4,6,6-Heptachlorobiphenyl (PCB 184)
Aqueous/Solid	EPA 8082, A	GC-ECD	2,2,3,4,5,5,6-Heptachlorobiphenyl (PCB 187)
Aqueous/Solid	EPA 8082, A	GC-ECD	2,2,3,4,5-Pentachlorobiphenyl (PCB87)
Aqueous/Solid	EPA 8082, A	GC-ECD	2,2,3,4,5-Pentachlorobiphenyl (PCB90)
Aqueous/Solid	EPA 8082, A	GC-ECD	2,2,3,5-Tetrachlorobiphenyl (PCB44)
Aqueous/Solid	EPA 8082, A	GC-ECD	2,2,4,4,5,5-Hexachlorobiphenyl (PCB153)
Aqueous/Solid	EPA 8082, A	GC-ECD	2,2,4,5,5-Pentachlorobiphenyl (PCB 101)
Aqueous/Solid	EPA 8082, A	GC-ECD	2,2,5,5-Tetrachlorobiphenyl (PCB 53)
Aqueous/Solid	EPA 8082, A	GC-ECD	2,2,5-Trichlorobiphenyl (PCB18)
Aqueous/Solid	EPA 8082, A	GC-ECD	2,3,3,4,4,5,5-Heptachlorobiphenyl (PCB 189)
Aqueous/Solid	EPA 8082, A	GC-ECD	2,3,3,4,4,5-Hexachlorobiphenyl (PCB 156)
Aqueous/Solid	EPA 8082, A	GC-ECD	2,3,3,4,4,5-Hexachlorobiphenyl (PCB 157)
Aqueous/Solid	EPA 8082, A	GC-ECD	2,3,3,4,4,6-Hexachlorobiphenyl (PCB 158)
Aqueous/Solid	EPA 8082, A	GC-ECD	2,3,3,4,4-Pentachlorobiphenyl (PCB 105)
Aqueous/Solid	EPA 8082, A	GC-ECD	2,3,4,4,5,5 Hexachlorobiphenyl (PCB 167)
Aqueous/Solid	EPA 8082, A	GC-ECD	2,3,4,4,5,6-Hexachlorobiphenyl (PCB 168)
Aqueous/Solid	EPA 8082, A	GC-ECD	2,3,4,4,5-Pentachlorobiphenyl (PCB 114)
Aqueous/Solid	EPA 8082, A	GC-ECD	2,3,4,4,5-Pentachlorobiphenyl (PCB 118)
Aqueous/Solid	EPA 8082, A	GC-ECD	2,3,4,4,5-Pentachlorobiphenyl (PCB 123)
Aqueous/Solid	EPA 8082, A	GC-ECD	2,3,4,4-Tetrachlorobiphenyl (PCB60)
Aqueous/Solid	EPA 8082, A	GC-ECD	2,3,4,4-Tetrachlorobiphenyl (PCB66)
Aqueous/Solid	EPA 8082, A	GC-ECD	2,4,4-Trichlorobiphenyl (PCB 28)
Aqueous/Solid	EPA 8082, A	GC-ECD	2,4-Dichlorobiphenyl (PCB8)
Aqueous/Solid	EPA 8082, A	GC-ECD	3,3,4,4,5,5-Hexachlorobiphenyl (PCB 169)
Aqueous/Solid	EPA 8082, A	GC-ECD	3,3,4,4,5-Pentachlorobiphenyl (PCB 126)
Aqueous/Solid	EPA 8082, A	GC-ECD	3,3,4,4-Tetrachlorobiphenyl (PCB 77)
Aqueous/Solid	EPA 8082, A	GC-ECD	3,4,4,5-Tetrachlorobiphenyl (PCB 81)
Aqueous/Solid	EPA 8082, A	GC-ECD	Aroclor 1016
Aqueous/Solid	EPA 8082, A	GC-ECD	Aroclor 1221
Aqueous/Solid	EPA 8082, A	GC-ECD	Aroclor 1232



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

Matrix	Standard / Method	Technology	Analyte
Aqueous/Solid	EPA 8082, A	GC-ECD	Aroclor 1242
Aqueous/Solid	EPA 8082, A	GC-ECD	Aroclor 1248
Aqueous/Solid	EPA 8082, A	GC-ECD	Aroclor 1254
Aqueous/Solid	EPA 8082, A	GC-ECD	Aroclor 1260
Aqueous/Solid	EPA 8082, A	GC-ECD	Aroclor 1262
Aqueous/Solid	EPA 8082, A	GC-ECD	Aroclor 1268
Aqueous/Solid	EPA 8082, A	GC-ECD	Decachlorobiphenyl (PC B209)
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-phenylpropane
Aqueous/Solid	EPA 8260B, C	GC-MS	Benzene
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	Freon 11
Aqueous/Solid	EPA 8260B, C	GC-MS	Freon 113
Aqueous/Solid	EPA 8260B, C	GC-MS	MTBE
Aqueous/Solid	EPA 8260B, C	GC-MS	TAME
Aqueous/Solid	EPA 8260B, C	GC-MS	tert-Butyl alcohol
Aqueous/Solid	EPA 8260B, C	GC-MS	Toluene
Aqueous/Solid	EPA 8260B, C	GC-MS	Xylene, total
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



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Matrix	Standard / Method	Technology	Analyte
Aqueous/Solid	EPA 8260B, C	GC-MS	1,1-Dichloroethane
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 8260B, C	GC-MS	1,2-Dibromoethane (EDB)
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	2,2-Dichloropropane
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



Certificate of Accreditation: Supplement

ISO/IEC 17025:2005 and DoD-ELAP

ALS Environmental-Kelso

1317 South 13th Avenue, Kelso, WA 98626
Lee Wolf 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	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	Ethylbenzene
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-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	Xylenes, total



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

Matrix	Standard / Method	Technology	Analyte
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
Aqueous/Solid	EPA 8270C, D	GC-MS	2,6-Dichlorophenol
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	Azinphos-methyl (Guthion)



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ALS Environmental-Kelso

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Lee Wolf 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	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	Chlorpyrifos
Aqueous/Solid	EPA 8270C, D	GC-MS	Chrysene
Aqueous/Solid	EPA 8270C, D	GC-MS	Demeton O & S
Aqueous/Solid	EPA 8270C, D	GC-MS	Diazinon
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	Dichlorvos
Aqueous/Solid	EPA 8270C, D	GC-MS	Diethyl phthalate
Aqueous/Solid	EPA 8270C, D	GC-MS	dimethoate
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	Disulfoton
Aqueous/Solid	EPA 8270C, D	GC-MS	Ethoprop
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



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

Matrix	Standard / Method	Technology	Analyte
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-Nitrosodiethylamine
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	o-Toluidine
Aqueous/Solid	EPA 8270C, D	GC-MS	Parathion, ethyl
Aqueous/Solid	EPA 8270C, D	GC-MS	Parathion, methyl
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	Phorate
Aqueous/Solid	EPA 8270C, D	GC-MS	Pyrene
Aqueous/Solid	EPA 8270C, D	GC-MS	Pyridine
Aqueous/Solid	EPA 8270C, D	GC-MS	Ronnel
Aqueous/Solid	EPA 8270C, D	GC-MS	Stirophos
Aqueous/Solid	EPA 8270C, D	GC-MS	Sulfotepp
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 8270SIM	GC-MS	2-Methylnaphthalene
Aqueous/Solid	EPA 8270SIM	GC-MS	Acenaphthene
Aqueous/Solid	EPA 8270SIM	GC-MS	Acenaphthylene
Aqueous/Solid	EPA 8270SIM	GC-MS	Anthracene
Aqueous/Solid	EPA 8270SIM	GC-MS	Benzo(a)anthracene
Aqueous/Solid	EPA 8270SIM	GC-MS	Benzo(a)pyrene
Aqueous/Solid	EPA 8270SIM	GC-MS	Benzo(b)fluoranthene
Aqueous/Solid	EPA 8270SIM	GC-MS	Benzo(g,h,i)perylene
Aqueous/Solid	EPA 8270SIM	GC-MS	Benzo(k)fluoranthene



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

Matrix	Standard / Method	Technology	Analyte
Aqueous/Solid	EPA 8270SIM	GC-MS	Chrysene
Aqueous/Solid	EPA 8270SIM	GC-MS	Dibenzo(a,h)anthracene
Aqueous/Solid	EPA 8270SIM	GC-MS	Fluoranthene
Aqueous/Solid	EPA 8270SIM	GC-MS	Fluorene
Aqueous/Solid	EPA 8270SIM	GC-MS	Indeno(1,2,3, cd)pyrene
Aqueous/Solid	EPA 8270SIM	GC-MS	Naphthalene
Aqueous/Solid	EPA 8270SIM	GC-MS	p-Dioxane
Aqueous/Solid	EPA 8270SIM	GC-MS	Phenanthrene
Aqueous/Solid	EPA 8270SIM	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
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



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Matrix	Standard / Method	Technology	Analyte
Aqueous/Solid	EPA 9056A	IC	Sulfate
Aqueous/Solid	EPA 9065	Spectrophotometer	Total Phenolics
Aqueous/Solid	LCP-NITG	HPLC/UV	Nitroguanidine
Aqueous/Solid	SM4500 NH3 G	Colorimetry	Ammonia
Aqueous/Solid	SOC-OTTO	GC-ECD	Otto Fuel
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
Aqueous/Solid	SOC-Butyl	GC-FPD	Tri-n-butyltin
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
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
Drinking Water	EPA 524.2	GC-MS	1,1-Dichloroethene



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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-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)



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

Matrix	Standard / Method	Technology	Analyte
Drinking Water	EPA 524.2	GC-MS	Ethylbenzene
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	ASTMD4129-92M, Lloyd Kahn	TOC Meter	Total Organic Carbons (TOC)
Solid	EPA 160.3M	Gravimetry	Solids, Total
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



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ISO/IEC 17025:2005 and DoD-ELAP

ALS Environmental-Kelso
 1317 South 13th Avenue, Kelso, WA 98626
 Lee Wolf 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	4-Amino-2,6-dinitrotoluene
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

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
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
Aqueous/Solids	ASTM D3590-89	Digestion	TKN
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
Solids	EPA 9013	Midi-Distillation	Cyanides



PERRY JOHNSON LABORATORY ACCREDITATION, INC.

Certificate of Accreditation

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

APPL, Inc.

908 N. Temperance Avenue, Clovis, CA 93611

(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 4.2 10/26/2010 and is accredited in 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:

Tracy Szerszen
President/Operations Manager

Initial Accreditation Date:

May 13, 2013

Issue Date:

November 28, 2013

Expiration Date:

November 27, 2015

Accreditation No.:

74807

Certificate No.:

L13-238

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.pjilabs.com



Certificate of Accreditation: Supplement

ISO/IEC 17025:2005 and DoD-ELAP

APPL, Inc.

908 N. Temperance Avenue, Clovis, CA 93611
Diane Anderson Phone: 559-275-2175

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

Matrix	Standard/Method	Technology	Analyte
Aqueous	EPA 218.6	Ion Chromatography (IC)	Chromium VI
Aqueous	EPA 245.1	AAS	Mercury
Aqueous	EPA 7470A	AAS	Mercury
Aqueous	EPA 8011	GC/ECD	1,2,3-Trichloropropane
Aqueous	EPA 8011	GC/ECD	1,2-Dibromo-3-chloropropane (DBCP)
Aqueous	EPA 8011	GC/ECD	1,2-Dibromomethane (EDB, Ethylene dibromide)
Aqueous	EPA 9060A	Nondispersive Infrared Detector (NDIR)	Dissolved Organic Carbon
Aqueous	EPA 9060A	Nondispersive Infrared Detector (NDIR)	Total Organic Carbon
Aqueous	RSK-175	GC/FIC	Ethane
Aqueous	RSK-175	GC/FIC	Ethene
Aqueous	RSK-175	GC/FIC	Methane
Aqueous	SM 2320B	Titrimetric	Bicarbonate
Aqueous	SM 2320B	Titrimetric	Carbonate
Aqueous	SM 2320B	Titrimetric	Hydroxide
Aqueous	SM 2320B	Titrimetric	Total Alkalinity (CaCO ₃)
Aqueous	SM 2510B	EC Meter	Specific conductance, Conductivity (25C)
Aqueous	SM 2540C	Gravimetric	Total Dissolved Solids (TDS)
Aqueous	SM 2540D	Gravimetric	Non-Filterable Residue (TSS)
Aqueous	SM 4500S2F	Titrimetric	Sulfide
Aqueous	SM 5310B	Nondispersive Infrared Detector (NDIR)	Dissolved Organic Carbon
Aqueous	SM 5310B	Nondispersive Infrared Detector (NDIR)	Total Organic Carbon
Aqueous	SM 5520B	Gravimetric	Oil & Grease
Aqueous	SM 5520BF	Gravimetric	TRPH (Gravimetric)
Aqueous	SM 5540C	UV/Vis	MBAS
Aqueous	EPA 160.1	Gravimetric	Total Dissolved Solids (TDS)
Aqueous	EPA 1664A	Gravimetric	n-Hexane Extractable Material (O&G)
Aqueous	EPA 1664A	Gravimetric	TPH (SGT-HEM)
Solids	AK103	GC/FID	Residual Range Organics, C25-C36
Solids	EPA 1030	Manual	Ignitability



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

Matrix	Standard/Method	Technology	Analyte
Solids	EPA 7471A/B	AAS	Mercury
Solids	EPA 8015B/C/D	GC/FID	RRO (Residual Range Organics)
Solids	EPA 9045C/D	Ion Selective Electrode	pH/Corrosivity
Solids	WALKLEY-BLACK	Titration	Total Organic Carbon (TOC)
Aqueous/Solids	AK101	GC-FID	Gasoline Range Organics, C6-C10
Aqueous/Solids	AK102	GC-FID	Diesel Range Organics, C10-C25
Aqueous/Solids	EPA 1668A	High Res. GC/MS	2,2',3,4,4',5,5'-Heptachlorobiphenyl (PCB 180)
Aqueous/Solids	EPA 1668A	High Res. GC/MS	2,2',3,4,4',5'-Hexachlorobiphenyl (PCB 138)
Aqueous/Solids	EPA 1668A	High Res. GC/MS	2,2',4,4',5,5'-Hexachlorobiphenyl (PCB 153)
Aqueous/Solids	EPA 1668A	High Res. GC/MS	2,2',4,5,5'-Pentachlorobiphenyl (PCB 101)
Aqueous/Solids	EPA 1668A	High Res. GC/MS	2,2',5,5'-Tetrachlorobiphenyl (PCB 52)
Aqueous/Solids	EPA 1668A	High Res. GC/MS	2,3,3',4,4',5,5'-Heptachlorobiphenyl (PCB 189)
Aqueous/Solids	EPA 1668A	High Res. GC/MS	2,3,3',4,4',5-Hexachlorobiphenyl (PCB 156)
Aqueous/Solids	EPA 1668A	High Res. GC/MS	2,3,3',4,4',5'-Hexachlorobiphenyl (PCB 157)
Aqueous/Solids	EPA 1668A	High Res. GC/MS	2,3,3',4,4'-Pentachlorobiphenyl (PCB 105)
Aqueous/Solids	EPA 1668A	High Res. GC/MS	2,3',4,4',5,5'-Hexachlorobiphenyl (PCB 167)
Aqueous/Solids	EPA 1668A	High Res. GC/MS	2,3,4,4',5-Pentachlorobiphenyl (PCB 114)
Aqueous/Solids	EPA 1668A	High Res. GC/MS	2,3',4,4',5-Pentachlorobiphenyl (PCB 118)
Aqueous/Solids	EPA 1668A	High Res. GC/MS	2,3',4,4',5'-Pentachlorobiphenyl (PCB 123)
Aqueous/Solids	EPA 1668A	High Res. GC/MS	2,4,4'-Trichlorobiphenyl (PCB 28)
Aqueous/Solids	EPA 1668A	High Res. GC/MS	3,3',4,4',5,5'-Hexachlorobiphenyl (PCB 169)
Aqueous/Solids	EPA 1668A	High Res. GC/MS	3,3',4,4',5-Pentachlorobiphenyl (PCB 126)
Aqueous/Solids	EPA 1668A	High Res. GC/MS	3,3',4,4'-Tetrachlorobiphenyl (PCB 77)
Aqueous/Solids	EPA 1668A	High Res. GC/MS	3,4,4',5-Tetrachlorobiphenyl (PCB 81)
Aqueous/Solids	EPA 1668A	High Res. GC/MS	PCB (129)+(138)+(163)



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APPL, Inc.

908 N. Temperance Avenue, Clovis, CA 93611
Diane Anderson Phone: 559-275-2175

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

Matrix	Standard/Method	Technology	Analyte
Aqueous/Solids	EPA 1668A	High Res. GC/MS	PCB (153)+(168)
Aqueous/Solids	EPA 1668A	High Res. GC/MS	PCB (156)+(157)
Aqueous/Solids	EPA 1668A	High Res. GC/MS	PCB (180)+(193)
Aqueous/Solids	EPA 1668A	High Res. GC/MS	PCB (20)+(28)
Aqueous/Solids	EPA 1668A	High Res. GC/MS	PCB (90)+(101)+(113)
Aqueous/Solids	EPA 1668A	High Res. GC/MS	PCBs, total
Aqueous/Solids	EPA 300.0	Ion Chromatography (IC)	Orthophosphate as P
Aqueous/Solids	EPA 300.0	Ion Chromatography (IC)	Bromide
Aqueous/Solids	EPA 300.0	Ion Chromatography (IC)	Chloride
Aqueous/Solids	EPA 300.0	Ion Chromatography (IC)	Fluoride
Aqueous/Solids	EPA 300.0	Ion Chromatography (IC)	Nitrate as N (NO ₃ ⁻ as N)
Aqueous/Solids	EPA 300.0	Ion Chromatography (IC)	Nitrite + Nitrate as N
Aqueous/Solids	EPA 300.0	Ion Chromatography (IC)	Nitrite as N
Aqueous/Solids	EPA 300.0	Ion Chromatography (IC)	Sulfate (SO ₄)
Aqueous/Solids	EPA 350.1	Flow Injection Analysis (FIA)	Ammonia as N
Aqueous/Solids	EPA 351.2	Flow Injection Analysis (FIA)	Total Kheldahl Nitrogen
Aqueous/Solids	EPA 353.2	Flow Injection Analysis (FIA)	Nitrate as N (NO ₃ as N)
Aqueous/Solids	EPA 353.2	Flow Injection Analysis (FIA)	Nitrate + Nitrate as N
Aqueous/Solids	EPA 353.2	Flow Injection Analysis (FIA)	Nitrite as N
Aqueous/Solids	EPA 6010B/C	ICP-OES	Aluminum
Aqueous/Solids	EPA 6010B/C	ICP-OES	Antimony
Aqueous/Solids	EPA 6010B/C	ICP-OES	Antimony
Aqueous/Solids	EPA 6010B/C	ICP-OES	Arsenic
Aqueous/Solids	EPA 6010B/C	ICP-OES	Arsenic
Aqueous/Solids	EPA 6010B/C	ICP-OES	Barium
Aqueous/Solids	EPA 6010B/C	ICP-OES	Beryllium
Aqueous/Solids	EPA 6010B/C	ICP-OES	Boron
Aqueous/Solids	EPA 6010B/C	ICP-OES	Cadmium



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APPL, Inc.

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

Matrix	Standard/Method	Technology	Analyte
Aqueous/Solids	EPA 6010B/C	ICP-OES	Calcium
Aqueous/Solids	EPA 6010B/C	ICP-OES	Chromium
Aqueous/Solids	EPA 6010B/C	ICP-OES	Cobalt
Aqueous/Solids	EPA 6010B/C	ICP-OES	Copper
Aqueous/Solids	EPA 6010B/C	ICP-OES	Iron
Aqueous/Solids	EPA 6010B/C	ICP-OES	Lead
Aqueous/Solids	EPA 6010B/C	ICP-OES	Magnesium
Aqueous/Solids	EPA 6010B/C	ICP-OES	Manganese
Aqueous/Solids	EPA 6010B/C	ICP-OES	Molybdenum
Aqueous/Solids	EPA 6010B/C	ICP-OES	Nickel
Aqueous/Solids	EPA 6010B/C	ICP-OES	Potassium
Aqueous/Solids	EPA 6010B/C	ICP-OES	Selenium
Aqueous/Solids	EPA 6010B/C	ICP-OES	Silver
Aqueous/Solids	EPA 6010B/C	ICP-OES	Sodium
Aqueous/Solids	EPA 6010B/C	ICP-OES	Strontium
Aqueous/Solids	EPA 6010B/C	ICP-OES	Thallium
Aqueous/Solids	EPA 6010B/C	ICP-OES	Tin
Aqueous/Solids	EPA 6010B/C	ICP-OES	Titanium
Aqueous/Solids	EPA 6010B/C	ICP-OES	Total Phosphorus
Aqueous/Solids	EPA 6010B/C	ICP-OES	Vanadium
Aqueous/Solids	EPA 6010B/C	ICP-OES	Zinc
Aqueous/Solids	EPA 6020A	ICP-MS	Aluminum
Aqueous/Solids	EPA 6020A	ICP-MS	Antimony
Aqueous/Solids	EPA 6020A	ICP-MS	Arsenic
Aqueous/Solids	EPA 6020A	ICP-MS	Barium
Aqueous/Solids	EPA 6020A	ICP-MS	Beryllium
Aqueous/Solids	EPA 6020A	ICP-MS	Boron
Aqueous/Solids	EPA 6020A	ICP-MS	Cadmium
Aqueous/Solids	EPA 6020A	ICP-MS	Calcium
Aqueous/Solids	EPA 6020A	ICP-MS	Chromium
Aqueous/Solids	EPA 6020A	ICP-MS	Cobalt
Aqueous/Solids	EPA 6020A	ICP-MS	Copper
Aqueous/Solids	EPA 6020A	ICP-MS	Iron
Aqueous/Solids	EPA 6020A	ICP-MS	Lead
Aqueous/Solids	EPA 6020A	ICP-MS	Magnesium



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

Matrix	Standard/Method	Technology	Analyte
Aqueous/Solids	EPA 6020A	ICP-MS	Manganese
Aqueous/Solids	EPA 6020A	ICP-MS	Molybdenum
Aqueous/Solids	EPA 6020A	ICP-MS	Nickel
Aqueous/Solids	EPA 6020A	ICP-MS	Potassium
Aqueous/Solids	EPA 6020A	ICP-MS	Selenium
Aqueous/Solids	EPA 6020A	ICP-MS	Silver
Aqueous/Solids	EPA 6020A	ICP-MS	Sodium
Aqueous/Solids	EPA 6020A	ICP-MS	Strontium
Aqueous/Solids	EPA 6020A	ICP-MS	Thallium
Aqueous/Solids	EPA 6020A	ICP-MS	Tin
Aqueous/Solids	EPA 6020A	ICP-MS	Titanium
Aqueous/Solids	EPA 6020A	ICP-MS	Vanadium
Aqueous/Solids	EPA 6020A	ICP-MS	Zinc
Aqueous/Solids	EPA 6850	HPLC/Electrospray Ionization/MS	Perchlorate
Aqueous/Solids	EPA 7196A	UV/Vis	Chromium VI
Aqueous/Solids	EPA 7199	Ion Chromatography (IC)	Chromium VI
Aqueous/Solids	EPA 8015B/C/D	GC/FID	Total Purgeable Hydrocarbons
Aqueous/Solids	EPA 8015B/C/D	GC/FID	Diesel Range Organics
Aqueous/Solids	EPA 8015B/C/D	GC/FID	Gasoline Range Organics
Aqueous/Solids	EPA 8081A/B	GC/ECD	4,4'-DDD
Aqueous/Solids	EPA 8081A/B	GC/ECD	4,4'-DDE
Aqueous/Solids	EPA 8081A/B	GC/ECD	4,4'-DDT
Aqueous/Solids	EPA 8081A/B	GC/ECD	4,4'-Methoxychlor
Aqueous/Solids	EPA 8081A/B	GC/ECD	a-BHC
Aqueous/Solids	EPA 8081A/B	GC/ECD	a-Chlordane
Aqueous/Solids	EPA 8081A/B	GC/ECD	Aldrin
Aqueous/Solids	EPA 8081A/B	GC/ECD	b-BHC
Aqueous/Solids	EPA 8081A/B	GC/ECD	Chlordane
Aqueous/Solids	EPA 8081A/B	GC/ECD	d-BHC
Aqueous/Solids	EPA 8081A/B	GC/ECD	Dieldrin
Aqueous/Solids	EPA 8081A/B	GC/ECD	Endosulfan I
Aqueous/Solids	EPA 8081A/B	GC/ECD	Endosulfan II
Aqueous/Solids	EPA 8081A/B	GC/ECD	Endosulfan sulfate
Aqueous/Solids	EPA 8081A/B	GC/ECD	Endrin



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APPL, Inc.

908 N. Temperance Avenue, Clovis, CA 93611
Diane Anderson Phone: 559-275-2175

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

Matrix	Standard/Method	Technology	Analyte
Aqueous/Solids	EPA 8081A/B	GC/ECD	Endrin aldehyde
Aqueous/Solids	EPA 8081A/B	GC/ECD	Endrin ketone
Aqueous/Solids	EPA 8081A/B	GC/ECD	g-BHC (Lindane)
Aqueous/Solids	EPA 8081A/B	GC/ECD	g-Chlordane
Aqueous/Solids	EPA 8081A/B	GC/ECD	Heptachlor
Aqueous/Solids	EPA 8081A/B	GC/ECD	Heptachlor epoxide
Aqueous/Solids	EPA 8081A/B	GC/ECD	Hexachlorobenzene
Aqueous/Solids	EPA 8081A/B	GC/ECD	Methoxychlor
Aqueous/Solids	EPA 8081A/B	GC/ECD	Toxaphene
Aqueous/Solids	EPA 8082A	GC/ECD	2,2',3,4,4',5,5'-Heptachlorobiphenyl (PCB 180)
Aqueous/Solids	EPA 8082A	GC/ECD	2,2',3,4,4',5'-Hexachlorobiphenyl (PCB 138)
Aqueous/Solids	EPA 8082A	GC/ECD	2,2',4,4',5,5'-Hexachlorobiphenyl (PCB 153)
Aqueous/Solids	EPA 8082A	GC/ECD	2,2',4,5,5'-Pentachlorobiphenyl (PCB 101)
Aqueous/Solids	EPA 8082A	GC/ECD	2,2',5,5'-Tetrachlorobiphenyl (PCB 52)
Aqueous/Solids	EPA 8082A	GC/ECD	2,3,3',4,4',5,5'-Heptachlorobiphenyl (PCB 189)
Aqueous/Solids	EPA 8082A	GC/ECD	2,3,3',4,4',5-Hexachlorobiphenyl (PCB 156)
Aqueous/Solids	EPA 8082A	GC/ECD	2,3,3',4,4',5'-Hexachlorobiphenyl (PCB 157)
Aqueous/Solids	EPA 8082A	GC/ECD	2,3,3',4,4'-Pentachlorobiphenyl (PCB 105)
Aqueous/Solids	EPA 8082A	GC/ECD	2,3',4,4',5,5'-Hexachlorobiphenyl (PCB 167)
Aqueous/Solids	EPA 8082A	GC/ECD	2,3,4,4',5-Pentachlorobiphenyl (PCB 114)
Aqueous/Solids	EPA 8082A	GC/ECD	2,3',4,4',5-Pentachlorobiphenyl (PCB 118)
Aqueous/Solids	EPA 8082A	GC/ECD	2,3',4,4',5'-Pentachlorobiphenyl (PCB 123)
Aqueous/Solids	EPA 8082A	GC/ECD	2,4,4'-Trichlorobiphenyl (PCB 28)
Aqueous/Solids	EPA 8082A	GC/ECD	3,3',4,4',5,5'-Hexachlorobiphenyl (PCB 169)
Aqueous/Solids	EPA 8082A	GC/ECD	3,3',4,4',5-Pentachlorobiphenyl (PCB 126)
Aqueous/Solids	EPA 8082A	GC/ECD	3,3',4,4'-Tetrachlorobiphenyl (PCB 77)



Certificate of Accreditation: Supplement

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APPL, Inc.

908 N. Temperance Avenue, Clovis, CA 93611
Diane Anderson Phone: 559-275-2175

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

Matrix	Standard/Method	Technology	Analyte
Aqueous/Solids	EPA 8082A	GC/ECD	3,4,4',5-Tetrachlorobiphenyl (PCB 81)
Aqueous/Solids	EPA 8082A	GC/ECD	Aroclor 1016/1242
Aqueous/Solids	EPA 8082A	GC/ECD	Aroclor-1016 (PCB-1016)
Aqueous/Solids	EPA 8082A	GC/ECD	Aroclor-1221 (PCB-1221)
Aqueous/Solids	EPA 8082A	GC/ECD	Aroclor-1232 (PCB-1232)
Aqueous/Solids	EPA 8082A	GC/ECD	Aroclor-1242 (PCB-1242)
Aqueous/Solids	EPA 8082A	GC/ECD	Aroclor-1248 (PCB-1248)
Aqueous/Solids	EPA 8082A	GC/ECD	Aroclor-1254 (PCB-1254)
Aqueous/Solids	EPA 8082A	GC/ECD	Aroclor-1260 (PCB-1260)
Aqueous/Solids	EPA 8082A	GC/ECD	Aroclor-1262 (PCB-1262)
Aqueous/Solids	EPA 8082A	GC/ECD	Aroclor-1268 (PCB-1268)
Aqueous/Solids	EPA 8082A	GC/ECD	PCB (129)+(138)+(163)
Aqueous/Solids	EPA 8082A	GC/ECD	PCB (153)+(168)
Aqueous/Solids	EPA 8082A	GC/ECD	PCB (156)+(157)
Aqueous/Solids	EPA 8082A	GC/ECD	PCB (180)+(193)
Aqueous/Solids	EPA 8082A	GC/ECD	PCB (20)+(28)
Aqueous/Solids	EPA 8082A	GC/ECD	PCB (90)+(101)+(113)
Aqueous/Solids	EPA 8082A	GC/ECD	PCBs, total
Aqueous/Solids	EPA 8141A/B	GC/ECD	Ametryn
Aqueous/Solids	EPA 8141A/B	GC/ECD	Atraton
Aqueous/Solids	EPA 8141A/B	GC/ECD	Atrazine
Aqueous/Solids	EPA 8141A/B	GC/ECD	Azinphosmethyl
Aqueous/Solids	EPA 8141A/B	GC/ECD	Bolstar
Aqueous/Solids	EPA 8141A/B	GC/ECD	Chlorpyrifos
Aqueous/Solids	EPA 8141A/B	GC/ECD	Coumaphos
Aqueous/Solids	EPA 8141A/B	GC/ECD	Cyanizine
Aqueous/Solids	EPA 8141A/B	GC/ECD	DEF
Aqueous/Solids	EPA 8141A/B	GC/ECD	Demeton, (Mix of Isomers O:S)
Aqueous/Solids	EPA 8141A/B	GC/ECD	Diazinon
Aqueous/Solids	EPA 8141A/B	GC/ECD	Dichlorvos
Aqueous/Solids	EPA 8141A/B	GC/ECD	Dimethoate
Aqueous/Solids	EPA 8141A/B	GC/ECD	Disulfoton
Aqueous/Solids	EPA 8141A/B	GC/ECD	EPN
Aqueous/Solids	EPA 8141A/B	GC/ECD	Ethion
Aqueous/Solids	EPA 8141A/B	GC/ECD	Ethoprop



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APPL, Inc.

908 N. Temperance Avenue, Clovis, CA 93611
Diane Anderson Phone: 559-275-2175

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

Matrix	Standard/Method	Technology	Analyte
Aqueous/Solids	EPA 8141A/B	GC/ECD	Fenchlorphos (Ronnel)
Aqueous/Solids	EPA 8141A/B	GC/ECD	Fensulfothion
Aqueous/Solids	EPA 8141A/B	GC/ECD	Fenthion
Aqueous/Solids	EPA 8141A/B	GC/ECD	Malathion
Aqueous/Solids	EPA 8141A/B	GC/ECD	Merphos
Aqueous/Solids	EPA 8141A/B	GC/ECD	Mevinphos
Aqueous/Solids	EPA 8141A/B	GC/ECD	Naled
Aqueous/Solids	EPA 8141A/B	GC/ECD	Parathion ethyl
Aqueous/Solids	EPA 8141A/B	GC/ECD	Parathion methyl
Aqueous/Solids	EPA 8141A/B	GC/ECD	Phorate
Aqueous/Solids	EPA 8141A/B	GC/ECD	Prometon
Aqueous/Solids	EPA 8141A/B	GC/ECD	Prometryn
Aqueous/Solids	EPA 8141A/B	GC/ECD	Propazine
Aqueous/Solids	EPA 8141A/B	GC/ECD	Prowl
Aqueous/Solids	EPA 8141A/B	GC/ECD	Simazine
Aqueous/Solids	EPA 8141A/B	GC/ECD	Simetryn
Aqueous/Solids	EPA 8141A/B	GC/ECD	Sulfotep
Aqueous/Solids	EPA 8141A/B	GC/ECD	Terbutryn
Aqueous/Solids	EPA 8141A/B	GC/ECD	Terbutylazine
Aqueous/Solids	EPA 8141A/B	GC/ECD	Tetrachlorvinphos (Stirophos)
Aqueous/Solids	EPA 8141A/B	GC/ECD	Tokuthion
Aqueous/Solids	EPA 8141A/B	GC/ECD	Trichlorinate
Aqueous/Solids	EPA 8141A/B	GC/ECD	Trifluralin
Aqueous/Solids	EPA 8151A	GC/ECD	2,4,5-T
Aqueous/Solids	EPA 8151A	GC/ECD	2,4-D (2,4-Dichlorophenoxyacetic acid)
Aqueous/Solids	EPA 8151A	GC/ECD	2,4-DB
Aqueous/Solids	EPA 8151A	GC/ECD	3,5-Dichlorobenzoic acid
Aqueous/Solids	EPA 8151A	GC/ECD	4-Nitrophenol
Aqueous/Solids	EPA 8151A	GC/ECD	Acifluorfen
Aqueous/Solids	EPA 8151A	GC/ECD	Bentazon
Aqueous/Solids	EPA 8151A	GC/ECD	Dacthal
Aqueous/Solids	EPA 8151A	GC/ECD	Dalapon
Aqueous/Solids	EPA 8151A	GC/ECD	Dicamba
Aqueous/Solids	EPA 8151A	GC/ECD	Dichlorprop



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APPL, Inc.

908 N. Temperance Avenue, Clovis, CA 93611
Diane Anderson Phone: 559-275-2175

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

Matrix	Standard/Method	Technology	Analyte
Aqueous/Solids	EPA 8151A	GC/ECD	Dinoseb (2-sec-Butyl-4,6-dinitrophenol)
Aqueous/Solids	EPA 8151A	GC/ECD	Pentachlorophenol
Aqueous/Solids	EPA 8151A	GC/ECD	Picloram
Aqueous/Solids	EPA 8151A	GC/ECD	Silvex (2,4,5-TP)
Aqueous/Solids	EPA 8260B/C	GC/MS	1,1,1,2-Tetrachloroethane
Aqueous/Solids	EPA 8260B/C	GC/MS	1,1,1-Trichloroethane
Aqueous/Solids	EPA 8260B/C	GC/MS	1,1,2,2-Tetrachloroethane
Aqueous/Solids	EPA 8260B/C	GC/MS	1,1,2-Trichloroethane
Aqueous/Solids	EPA 8260B/C	GC/MS	1,1,2-Trichlorotrifluoroethane
Aqueous/Solids	EPA 8260B/C	GC/MS	1,1-Dichloroethane
Aqueous/Solids	EPA 8260B/C	GC/MS	1,1-Dichloroethene
Aqueous/Solids	EPA 8260B/C	GC/MS	1,1-Dichloropropene
Aqueous/Solids	EPA 8260B/C	GC/MS	1,2,3-Trichlorobenzene
Aqueous/Solids	EPA 8260B/C	GC/MS	1,2,3-Trichloropropane
Aqueous/Solids	EPA 8260B/C	GC/MS	1,2,4-Trichlorobenzene
Aqueous/Solids	EPA 8260B/C	GC/MS	1,2,4-Trimethylbenzene
Aqueous/Solids	EPA 8260B/C	GC/MS	1,2-Dibromo-3-chloropropane
Aqueous/Solids	EPA 8260B/C	GC/MS	1,2-Dibromoethane
Aqueous/Solids	EPA 8260B/C	GC/MS	1,2-Dichlorobenzene
Aqueous/Solids	EPA 8260B/C	GC/MS	1,2-Dichloroethane
Aqueous/Solids	EPA 8260B/C	GC/MS	1,2-Dichloropropane
Aqueous/Solids	EPA 8260B/C	GC/MS	1,3,5-Trimethylbenzene
Aqueous/Solids	EPA 8260B/C	GC/MS	1,3-Dichlorobenzene
Aqueous/Solids	EPA 8260B/C	GC/MS	1,3-Dichloropropane
Aqueous/Solids	EPA 8260B/C	GC/MS	1,4-Dichlorobenzene
Aqueous/Solids	EPA 8260B/C	GC/MS	2,2-Dichloropropane
Aqueous/Solids	EPA 8260B/C	GC/MS	2-Butanone (Methyl ethyl ketone)
Aqueous/Solids	EPA 8260B/C	GC/MS	2-Chloroethyl vinyl ether
Aqueous/Solids	EPA 8260B/C	GC/MS	2-Chlorotoluene
Aqueous/Solids	EPA 8260B/C	GC/MS	2-Hexanone
Aqueous/Solids	EPA 8260B/C	GC/MS	4-Chlorotoluene
Aqueous/Solids	EPA 8260B/C	GC/MS	4-methyl-2-pentanone
Aqueous/Solids	EPA 8260B/C	GC/MS	Acetone
Aqueous/Solids	EPA 8260B/C	GC/MS	Acetonitrile
Aqueous/Solids	EPA 8260B/C	GC/MS	Acrolein



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Aqueous/Solids	EPA 8260B/C	GC/MS	Acrylonitrile
Aqueous/Solids	EPA 8260B/C	GC/MS	Benzene
Aqueous/Solids	EPA 8260B/C	GC/MS	Bromobenzene
Aqueous/Solids	EPA 8260B/C	GC/MS	Bromochloromethane
Aqueous/Solids	EPA 8260B/C	GC/MS	Bromodichloromethane
Aqueous/Solids	EPA 8260B/C	GC/MS	Bromoform
Aqueous/Solids	EPA 8260B/C	GC/MS	Bromomethane
Aqueous/Solids	EPA 8260B/C	GC/MS	Carbon disulphide
Aqueous/Solids	EPA 8260B/C	GC/MS	Carbon tetrachloride
Aqueous/Solids	EPA 8260B/C	GC/MS	Chlorobenzene
Aqueous/Solids	EPA 8260B/C	GC/MS	Chloroethane
Aqueous/Solids	EPA 8260B/C	GC/MS	Chloroform
Aqueous/Solids	EPA 8260B/C	GC/MS	Chloromethane
Aqueous/Solids	EPA 8260B/C	GC/MS	cis-1,2-Dichloroethene
Aqueous/Solids	EPA 8260B/C	GC/MS	cis-1,3-Dichloropropene
Aqueous/Solids	EPA 8260B/C	GC/MS	Dibromochloromethane
Aqueous/Solids	EPA 8260B/C	GC/MS	Dibromomethane
Aqueous/Solids	EPA 8260B/C	GC/MS	Dichlorodifluoromethane
Aqueous/Solids	EPA 8260B/C	GC/MS	Ethyl tert-butyl ether (ETBE)
Aqueous/Solids	EPA 8260B/C	GC/MS	Ethylbenzene
Aqueous/Solids	EPA 8260B/C	GC/MS	Hexachlorobutadiene
Aqueous/Solids	EPA 8260B/C	GC/MS	Hexachloroethane
Aqueous/Solids	EPA 8260B/C	GC/MS	Iodomethane
Aqueous/Solids	EPA 8260B/C	GC/MS	Isopropyl ether (DIPE)
Aqueous/Solids	EPA 8260B/C	GC/MS	Isopropylbenzene
Aqueous/Solids	EPA 8260B/C	GC/MS	m+p-Xylene
Aqueous/Solids	EPA 8260B/C	GC/MS	Methyl tert-butyl ether (MTBE)
Aqueous/Solids	EPA 8260B/C	GC/MS	Methylene chloride (Dichloromethane)
Aqueous/Solids	EPA 8260B/C	GC/MS	Naphthalene
Aqueous/Solids	EPA 8260B/C	GC/MS	n-Butyl benzene
Aqueous/Solids	EPA 8260B/C	GC/MS	Nitrobenzene
Aqueous/Solids	EPA 8260B/C	GC/MS	n-Propylbenzene
Aqueous/Solids	EPA 8260B/C	GC/MS	o-Xylene
Aqueous/Solids	EPA 8260B/C	GC/MS	p-isopropyl toluene
Aqueous/Solids	EPA 8260B/C	GC/MS	sec-Butyl benzene



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Matrix	Standard/Method	Technology	Analyte
Aqueous/Solids	EPA 8260B/C	GC/MS	Styrene
Aqueous/Solids	EPA 8260B/C	GC/MS	tert-Amyl methyl ether (TAME)
Aqueous/Solids	EPA 8260B/C	GC/MS	tert-Butyl alcohol (t-Butanol)
Aqueous/Solids	EPA 8260B/C	GC/MS	tert-Butyl benzene
Aqueous/Solids	EPA 8260B/C	GC/MS	tert-Butyl ethyl ether (ETBE)
Aqueous/Solids	EPA 8260B/C	GC/MS	Tetrachloroethene
Aqueous/Solids	EPA 8260B/C	GC/MS	Toluene
Aqueous/Solids	EPA 8260B/C	GC/MS	Total Xylenes
Aqueous/Solids	EPA 8260B/C	GC/MS	trans-1,2-Dichloroethene
Aqueous/Solids	EPA 8260B/C	GC/MS	trans-1,3-Dichloropropene
Aqueous/Solids	EPA 8260B/C	GC/MS	Trichloroethene
Aqueous/Solids	EPA 8260B/C	GC/MS	Trichlorofluoromethane
Aqueous/Solids	EPA 8260B/C	GC/MS	Vinyl Acetate
Aqueous/Solids	EPA 8260B/C	GC/MS	Vinyl chloride
Aqueous/Solids	EPA 8270C/D	GC/MS	1,1-Biphenyl
Aqueous/Solids	EPA 8270C/D	GC/MS	1,2,4,5-Tetrachlorobenzene
Aqueous/Solids	EPA 8270C/D	GC/MS	1,2,4-Trichlorobenzene
Aqueous/Solids	EPA 8270C/D	GC/MS	1,2-Dichlorobenzene
Aqueous/Solids	EPA 8270C/D	GC/MS	1,3-Dichlorobenzene
Aqueous/Solids	EPA 8270C/D	GC/MS	1,4-Dichlorobenzene
Aqueous/Solids	EPA 8270C/D	GC/MS	1,4-Dioxane
Aqueous/Solids	EPA 8270C/D	GC/MS	2,3,4,6-Tetrachlorophenol
Aqueous/Solids	EPA 8270C/D	GC/MS	2,4,5-Trichlorophenol
Aqueous/Solids	EPA 8270C/D	GC/MS	2,4,6-Trichlorophenol
Aqueous/Solids	EPA 8270C/D	GC/MS	2,4-Dichlorophenol
Aqueous/Solids	EPA 8270C/D	GC/MS	2,4-Dimethylphenol
Aqueous/Solids	EPA 8270C/D	GC/MS	2,4-Dinitrophenol
Aqueous/Solids	EPA 8270C/D	GC/MS	2,4-Dinitrotoluene (2,4-DNT)
Aqueous/Solids	EPA 8270C/D	GC/MS	2,6-Dichlorophenol
Aqueous/Solids	EPA 8270C/D	GC/MS	2,6-Dinitrotoluene (2,6-DNT)
Aqueous/Solids	EPA 8270C/D	GC/MS	2-Chloronaphthalene
Aqueous/Solids	EPA 8270C/D	GC/MS	2-Chlorophenol
Aqueous/Solids	EPA 8270C/D	GC/MS	2-Methyl-4,6-Dinitrophenol
Aqueous/Solids	EPA 8270C/D	GC/MS	2-Methylnaphthalene
Aqueous/Solids	EPA 8270C/D	GC/MS	2-Methylphenol (o-Cresol)



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Matrix	Standard/Method	Technology	Analyte
Aqueous/Solids	EPA 8270C/D	GC/MS	2-Nitroaniline
Aqueous/Solids	EPA 8270C/D	GC/MS	2-Nitrophenol
Aqueous/Solids	EPA 8270C/D	GC/MS	3,3'-Dichlorobenzidine
Aqueous/Solids	EPA 8270C/D	GC/MS	3+4-Methylphenol (m+p-Cresol)
Aqueous/Solids	EPA 8270C/D	GC/MS	3-Nitroaniline
Aqueous/Solids	EPA 8270C/D	GC/MS	4-Bromophenyl phenyl ether
Aqueous/Solids	EPA 8270C/D	GC/MS	4-Chloro-3-methylphenol
Aqueous/Solids	EPA 8270C/D	GC/MS	4-Chloroaniline
Aqueous/Solids	EPA 8270C/D	GC/MS	4-Chlorophenyl phenylether
Aqueous/Solids	EPA 8270C/D	GC/MS	4-Methylphenol (p-Cresol)
Aqueous/Solids	EPA 8270C/D	GC/MS	4-Nitroaniline
Aqueous/Solids	EPA 8270C/D	GC/MS	4-Nitrophenol
Aqueous/Solids	EPA 8270C/D	GC/MS	Acenaphthene
Aqueous/Solids	EPA 8270C/D	GC/MS	Acenaphthylene
Aqueous/Solids	EPA 8270C/D	GC/MS	Acetophenone
Aqueous/Solids	EPA 8270C/D	GC/MS	Aniline
Aqueous/Solids	EPA 8270C/D	GC/MS	Anthracene
Aqueous/Solids	EPA 8270C/D	GC/MS	Atrazine
Aqueous/Solids	EPA 8270C/D	GC/MS	Benzaldehyde
Aqueous/Solids	EPA 8270C/D	GC/MS	Benzidine
Aqueous/Solids	EPA 8270C/D	GC/MS	Benzo(a)anthracene
Aqueous/Solids	EPA 8270C/D	GC/MS	Benzo(a)pyrene
Aqueous/Solids	EPA 8270C/D	GC/MS	Benzo(b)fluoranthene
Aqueous/Solids	EPA 8270C/D	GC/MS	Benzo(g,h,i)perylene
Aqueous/Solids	EPA 8270C/D	GC/MS	Benzo(k)fluoranthene
Aqueous/Solids	EPA 8270C/D	GC/MS	Benzoic acid
Aqueous/Solids	EPA 8270C/D	GC/MS	Benzyl alcohol
Aqueous/Solids	EPA 8270C/D	GC/MS	Benzyl butyl phthalate
Aqueous/Solids	EPA 8270C/D	GC/MS	Biphenyl
Aqueous/Solids	EPA 8270C/D	GC/MS	bis(2-Chloroethoxy) methane
Aqueous/Solids	EPA 8270C/D	GC/MS	bis(2-Chloroethyl) ether
Aqueous/Solids	EPA 8270C/D	GC/MS	bis(2-Chloroisopropyl) ether
Aqueous/Solids	EPA 8270C/D	GC/MS	bis(2-Ethylhexyl) phthalate (DEHP)
Aqueous/Solids	EPA 8270C/D	GC/MS	Butyl benzyl phthalate
Aqueous/Solids	EPA 8270C/D	GC/MS	Caprolactam



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APPL, Inc.

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Matrix	Standard/Method	Technology	Analyte
Aqueous/Solids	EPA 8270C/D	GC/MS	Carbazole
Aqueous/Solids	EPA 8270C/D	GC/MS	Chrysene
Aqueous/Solids	EPA 8270C/D	GC/MS	Dibenz(a,h) anthracene
Aqueous/Solids	EPA 8270C/D	GC/MS	Dibenzofuran
Aqueous/Solids	EPA 8270C/D	GC/MS	Diethyl phthalate
Aqueous/Solids	EPA 8270C/D	GC/MS	Dimethyl phthalate
Aqueous/Solids	EPA 8270C/D	GC/MS	Di-n-butyl phthalate
Aqueous/Solids	EPA 8270C/D	GC/MS	Di-n-octyl phthalate
Aqueous/Solids	EPA 8270C/D	GC/MS	Fluoranthene
Aqueous/Solids	EPA 8270C/D	GC/MS	Fluorene
Aqueous/Solids	EPA 8270C/D	GC/MS	Hexachlorobenzene
Aqueous/Solids	EPA 8270C/D	GC/MS	Hexachlorobutadiene
Aqueous/Solids	EPA 8270C/D	GC/MS	Hexachlorocyclopentadiene
Aqueous/Solids	EPA 8270C/D	GC/MS	Hexachloroethane
Aqueous/Solids	EPA 8270C/D	GC/MS	Indeno(1,2,3-cd) pyrene
Aqueous/Solids	EPA 8270C/D	GC/MS	Isophorone
Aqueous/Solids	EPA 8270C/D	GC/MS	Naphthalene
Aqueous/Solids	EPA 8270C/D	GC/MS	Nitrobenzene
Aqueous/Solids	EPA 8270C/D	GC/MS	N-nitrosodimethylamine
Aqueous/Solids	EPA 8270C/D	GC/MS	N-nitrosodi-n-propylamine
Aqueous/Solids	EPA 8270C/D	GC/MS	n-Nitrosodiphenylamine
Aqueous/Solids	EPA 8270C/D	GC/MS	Pentachlorophenol
Aqueous/Solids	EPA 8270C/D	GC/MS	Phenanthrene
Aqueous/Solids	EPA 8270C/D	GC/MS	Phenol
Aqueous/Solids	EPA 8270C/D	GC/MS	Pyrene
Aqueous/Solids	EPA 8270C/D	GC/MS	Pyridine
Aqueous/Solids	EPA 8270C/D SIM	GC/MS	1-Methylnaphthalene
Aqueous/Solids	EPA 8270C/D SIM	GC/MS	2-Methylnaphthalene
Aqueous/Solids	EPA 8270C/D SIM	GC/MS	Acenaphthene
Aqueous/Solids	EPA 8270C/D SIM	GC/MS	Acenaphthylene
Aqueous/Solids	EPA 8270C/D SIM	GC/MS	Anthracene
Aqueous/Solids	EPA 8270C/D SIM	GC/MS	Benzo(a)anthracene
Aqueous/Solids	EPA 8270C/D SIM	GC/MS	Benzo(a)pyrene
Aqueous/Solids	EPA 8270C/D SIM	GC/MS	Benzo(b)fluoranthene
Aqueous/Solids	EPA 8270C/D SIM	GC/MS	Benzo(b+k)fluoranthene



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Matrix	Standard/Method	Technology	Analyte
Aqueous/Solids	EPA 8270C/D SIM	GC/MS	Benzo(e)pyrene
Aqueous/Solids	EPA 8270C/D SIM	GC/MS	Benzo(g,h,i)perylene
Aqueous/Solids	EPA 8270C/D SIM	GC/MS	Benzo(k)fluoranthene
Aqueous/Solids	EPA 8270C/D SIM	GC/MS	Chrysene
Aqueous/Solids	EPA 8270C/D SIM	GC/MS	Dibenzo(a,h)anthracene
Aqueous/Solids	EPA 8270C/D SIM	GC/MS	Fluoranthene
Aqueous/Solids	EPA 8270C/D SIM	GC/MS	Fluorene
Aqueous/Solids	EPA 8270C/D SIM	GC/MS	Indeno(1,2,3-cd) pyrene
Aqueous/Solids	EPA 8270C/D SIM	GC/MS	Naphthalene
Aqueous/Solids	EPA 8270C/D SIM	GC/MS	Phenanthrene
Aqueous/Solids	EPA 8270C/D SIM	GC/MS	Pyrene
Aqueous/Solids	EPA 8290A	HRGC/HRMS	1,2,3,4,7,8,9-Hpcdf
Aqueous/Solids	EPA 8290A	HRGC/HRMS	1,2,3,4,6,7,8,9-OCDD
Aqueous/Solids	EPA 8290A	HRGC/HRMS	1,2,3,4,6,7,8,9-OCDF
Aqueous/Solids	EPA 8290A	HRGC/HRMS	1,2,3,4,6,7,8-Hpcdd
Aqueous/Solids	EPA 8290A	HRGC/HRMS	1,2,3,4,6,7,8-Hpcdf
Aqueous/Solids	EPA 8290A	HRGC/HRMS	1,2,3,4,7,8-Hxcdd
Aqueous/Solids	EPA 8290A	HRGC/HRMS	1,2,3,4,7,8-Hxcdf
Aqueous/Solids	EPA 8290A	HRGC/HRMS	1,2,3,6,7,8-Hxcdd
Aqueous/Solids	EPA 8290A	HRGC/HRMS	1,2,3,6,7,8-Hxcdf
Aqueous/Solids	EPA 8290A	HRGC/HRMS	1,2,3,7,8,9-Hxcdd
Aqueous/Solids	EPA 8290A	HRGC/HRMS	1,2,3,7,8,9-Hxcdf
Aqueous/Solids	EPA 8290A	HRGC/HRMS	1,2,3,7,8-Pecdd
Aqueous/Solids	EPA 8290A	HRGC/HRMS	1,2,3,7,8-Pecdf
Aqueous/Solids	EPA 8290A	HRGC/HRMS	2,3,4,6,7,8-Hxcdf
Aqueous/Solids	EPA 8290A	HRGC/HRMS	2,3,4,7,8-Pecdf
Aqueous/Solids	EPA 8290A	HRGC/HRMS	2,3,7,8-TCDD
Aqueous/Solids	EPA 8290A	HRGC/HRMS	2,3,7,8-TCDF
Aqueous/Solids	EPA 8290A	HRGC/HRMS	Hpcdd, total
Aqueous/Solids	EPA 8290A	HRGC/HRMS	Hpcdf, total
Aqueous/Solids	EPA 8290A	HRGC/HRMS	Hxcdd, total
Aqueous/Solids	EPA 8290A	HRGC/HRMS	Hxcdf, total
Aqueous/Solids	EPA 8290A	HRGC/HRMS	PCDD + PCDF, total
Aqueous/Solids	EPA 8290A	HRGC/HRMS	PCDD, total
Aqueous/Solids	EPA 8290A	HRGC/HRMS	PCDF, total



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Matrix	Standard/Method	Technology	Analyte
Aqueous/Solids	EPA 8290A	HRGC/HRMS	Pecdd, total
Aqueous/Solids	EPA 8290A	HRGC/HRMS	Pecdf, total
Aqueous/Solids	EPA 8290A	HRGC/HRMS	TCDD, total
Aqueous/Solids	EPA 8290A	HRGC/HRMS	TCDF, total
Aqueous/Solids	EPA 8321A	HPLC	3-Hydroxycarbofuran
Aqueous/Solids	EPA 8321A	HPLC	Aldicarb
Aqueous/Solids	EPA 8321A	HPLC	Aldicarb sulfone
Aqueous/Solids	EPA 8321A	HPLC	Aldicarb sulfoxide
Aqueous/Solids	EPA 8321A	HPLC	Ammonium picrate
Aqueous/Solids	EPA 8321A	HPLC	Barban
Aqueous/Solids	EPA 8321A	HPLC	Baygon (Propoxur)
Aqueous/Solids	EPA 8321A	HPLC	Bromacil
Aqueous/Solids	EPA 8321A	HPLC	Carbaryl
Aqueous/Solids	EPA 8321A	HPLC	Carbofuran
Aqueous/Solids	EPA 8321A	HPLC	Chloroxuron
Aqueous/Solids	EPA 8321A	HPLC	Dioxacarb
Aqueous/Solids	EPA 8321A	HPLC	Diuron
Aqueous/Solids	EPA 8321A	HPLC	Linuron
Aqueous/Solids	EPA 8321A	HPLC	Methiocarb
Aqueous/Solids	EPA 8321A	HPLC	Methomyl
Aqueous/Solids	EPA 8321A	HPLC	Oxamyl
Aqueous/Solids	EPA 8321A	HPLC	Picric Acid
Aqueous/Solids	EPA 8321A	HPLC	Promecarb
Aqueous/Solids	EPA 8321A	HPLC	Propham
Aqueous/Solids	EPA 8330A/B	HPLC	1,3,5-Trinitrobenzene
Aqueous/Solids	EPA 8330A/B	HPLC	1,3-Dinitrobenzene
Aqueous/Solids	EPA 8330A/B	HPLC	2,4,6-Trinitrotoluene
Aqueous/Solids	EPA 8330A/B	HPLC	2,4-Dinitrotoluene
Aqueous/Solids	EPA 8330A/B	HPLC	2,6-Dinitrotoluene
Aqueous/Solids	EPA 8330A/B	HPLC	2-Amino-4,6-dinitrotoluene
Aqueous/Solids	EPA 8330A/B	HPLC	2-Nitrotoluene
Aqueous/Solids	EPA 8330A/B	HPLC	3-Nitrotoluene
Aqueous/Solids	EPA 8330A/B	HPLC	4-Amino-2,6-dinitrotoluene
Aqueous/Solids	EPA 8330A/B	HPLC	4-Nitrotoluene
Aqueous/Solids	EPA 8330A/B	HPLC	HMX (Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine)



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Matrix	Standard/Method	Technology	Analyte
Aqueous/Solids	EPA 8330A/B	HPLC	Nitrobenzene
Aqueous/Solids	EPA 8330A/B	HPLC	Nitroglycerin
Aqueous/Solids	EPA 8330A/B	HPLC	Pentaerythritoltetranitrate (PETN)
Aqueous/Solids	EPA 8330A/B	HPLC	RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine)
Aqueous/Solids	EPA 8330A/B	HPLC	Tetryl (Methyl-2,4,6-trinitrophenylnitramine)
Aqueous/Solids	EPA 9010C & 9014	Distillation/UV/Vis	Amenable Cyanide
Aqueous/Solids	EPA 9010C & 9014	Distillation/UV/Vis	Total Cyanide
Aqueous/Solids	EPA 9010C & 9014	UV/Vis	Total Cyanide
Aqueous/Solids	EPA 9010C & 9014	Distillation/UV/Vis	Amenable Cyanide
Aqueous/Solids	EPA 9040C	Ion Selective Electrode	pH/Corrosivity
Aqueous/Solids	EPA 9056A	Ion Chromatography (IC)	Bromide
Aqueous/Solids	EPA 9056A	Ion Chromatography (IC)	Chloride
Aqueous/Solids	EPA 9056A	Ion Chromatography (IC)	Fluoride
Aqueous/Solids	EPA 9056A	Ion Chromatography (IC)	Nitrate as N
Aqueous/Solids	EPA 9056A	Ion Chromatography (IC)	Nitrite + Nitrate as N
Aqueous/Solids	EPA 9056A	Ion Chromatography (IC)	Nitrite as N
Aqueous/Solids	EPA 9056A	Ion Chromatography (IC)	Orthophosphate as P
Aqueous/Solids	EPA 9056A	Ion Chromatography (IC)	Sulfate



Certificate of Accreditation: Supplement
ISO/IEC 17025:2005 and DoD-ELAP

APPL, Inc.

908 N. Temperance Avenue, Clovis, CA 93611
Diane Anderson Phone: 559-275-2175

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

Matrix	Standard/Method	Technology	Analyte
Aqueous	EPA 3010A	Hot Block	Acid digestion for metals analysis
Aqueous	EPA 3015A	Microwave	Microwave assisted acid digestion for metals analysis
Aqueous	EPA 3510C	Separatory funnel	Separatory funnel extraction
Aqueous	EPA 3520C	Liquid-liquid extractor	Liquid-Liquid extraction
Aqueous	EPA 3535A	SPE	SPE extraction for explosives
Aqueous	EPA 5030B/C	Purge and trap	Purge and trap
Aqueous	EPA 7470A	Hotplate digestion	Mercury digestion
Solids	CCR Chapter 11, Article 5, Appendix II	Rotary tumbler	Waste Extraction test (WET) (STLC)
Solids	EPA 1311	Rotary tumbler	TCLP Extraction
Solids	EPA 1312	Rotary tumbler	SPLP Extraction
Solids	EPA 3050B	Hotplate digestion	Acid digestion for metals analysis
Solids	EPA 3051A	Microwave	Microwave assisted acid digestion for metals analysis
Solids	EPA 3060A	Hotplate digestion	Alkaline digestion for hexavalent chromium
Solids	EPA 3550B	Ultrasonic waterbath	Ultrasonic extraction
Solids	EPA 5035/A	Closed-system purge and trap	Closed-system purge and trap extraction
Solids	EPA 7471B	Hotplate digestion	Mercury digestion
Solids	EPA 8330B, Appendix A	Puck mill grinder	Incremental sampling
Aqueous/Solids	EPA 3540C	Soxhlet	Soxhlet extraction
Aqueous/Solids	EPA 3630C	Cleanup	Silica gel cleanup
Aqueous/Solids	EPA 3660B	Cleanup	Sulfuric acid cleanup
Aqueous/Solids	EPA 3665A	Cleanup	Sulfuric acid - Permanganate cleanup
Aqueous/Solids	EPA 8151A	Separatory funnel	Herbicide extraction

Scope of Accreditation For TestAmerica Burlington

30 Community Drive, Suite 11
South Burlington, VT 05403
Sara S. Goff
802-923-1027

In recognition of a successful assessment to ISO/IEC 17025:2005 and the requirements of the DoD Environmental Laboratory Accreditation Program (DoD ELAP) as detailed in the DoD Quality Systems Manual for Environmental Laboratories (DoD QSM v4.2) based on the National Environmental Laboratory Accreditation Conference Chapter 5 Quality Systems Standard (NELAC Voted Revision June 5, 2003), accreditation is granted to TestAmerica Burlington to perform the following tests:

Accreditation granted through: **February 25, 2017**

Testing - Environmental

Non-Potable Water		
Technology	Method	Analyte
GC/FID	EPA RSK-175	Methane
GC/FID	EPA RSK-175	Ethane
GC/FID	EPA RSK-175	Ethene
GC/TCD	EPA RSK-175	Carbon Dioxide
HPLC	EPA 6850	Perchlorate
HPLC	EPA 8330B	1,3,5-Trinitrobenzene
HPLC	EPA 8330B	1,3-Dinitrobenzene
HPLC	EPA 8330B	2,4,6-Trinitrophenol
HPLC	EPA 8330B	2,4,6-Trinitrotoluene
HPLC	EPA 8330B	2,4-diamino-6-nitrotoluene
HPLC	EPA 8330B	2,4-Dinitrotoluene
HPLC	EPA 8330B	2,6-diamino-4-nitrotoluene
HPLC	EPA 8330B	2,6-Dinitrotoluene
HPLC	EPA 8330B	2-Amino-4,6-dinitrotoluene
HPLC	EPA 8330B	4-Amino-2,6-dinitrotoluene
HPLC	EPA 8330B	HMX
HPLC	EPA 8330B	m-Nitrotoluene
HPLC	EPA 8330B	Nitrobenzene
HPLC	EPA 8330B	Nitroglycerin
HPLC	EPA 8330B	o-Nitrotoluene
HPLC	EPA 8330B	PETN

Non-Potable Water		
Technology	Method	Analyte
HPLC	EPA 8330B	p-Nitrotoluene
HPLC	EPA 8330B	RDX
HPLC	EPA 8330B	Tetryl
GC/MS	EPA 8260B	1,1,1,2-Tetrachloroethane
GC/MS	EPA 8260B	1,1,1-Trichloroethane
GC/MS	EPA 8260B	1,1,2,2-Tetrachloroethane
GC/MS	EPA 8260B	1,1,2-Trichloroethane
GC/MS	EPA 8260B	1,1-Dichloroethane
GC/MS	EPA 8260B	1,1-Dichloroethene
GC/MS	EPA 8260B	1,1-Dichloropropene
GC/MS	EPA 8260B	1,2,3-Trichlorobenzene
GC/MS	EPA 8260B	1,2,3-Trichloropropane
GC/MS	EPA 8260B	1,2,4-Trichlorobenzene
GC/MS	EPA 8260B	1,2,4-Trimethylbenzene
GC/MS	EPA 8260B	1,2-Dibromo-3-Chloropropane
GC/MS	EPA 8260B	1,2-Dibromoethane
GC/MS	EPA 8260B	1,2-Dichlorobenzene
GC/MS	EPA 8260B	1,2-Dichloroethane
GC/MS	EPA 8260B	1,2-Dichloroethene, Total
GC/MS	EPA 8260B	1,2-Dichloropropane
GC/MS	EPA 8260B	1,3,5-Trimethylbenzene
GC/MS	EPA 8260B	1,3-Dichlorobenzene
GC/MS	EPA 8260B	1,3-Dichloropropane
GC/MS	EPA 8260B	1,4-Dichlorobenzene
GC/MS	EPA 8260B	1,4-Dioxane
GC/MS	EPA 8260B	2,2-Dichloropropane
GC/MS	EPA 8260B	2-Butanone
GC/MS	EPA 8260B	2-Chloroethyl vinyl ether
GC/MS	EPA 8260B	2-Chlorotoluene
GC/MS	EPA 8260B	2-Hexanone
GC/MS	EPA 8260B	4-Chlorotoluene
GC/MS	EPA 8260B	4-Isopropyltoluene
GC/MS	EPA 8260B	4-Methyl-2-pentanone
GC/MS	EPA 8260B	Acetone
GC/MS	EPA 8260B	Benzene
GC/MS	EPA 8260B	Bromochloromethane
GC/MS	EPA 8260B	Bromodichloromethane
GC/MS	EPA 8260B	Bromoform
GC/MS	EPA 8260B	Bromomethane
GC/MS	EPA 8260B	Carbon disulfide
GC/MS	EPA 8260B	Carbon tetrachloride

Non-Potable Water		
Technology	Method	Analyte
GC/MS	EPA 8260B	Chlorobenzene
GC/MS	EPA 8260B	Chloroethane
GC/MS	EPA 8260B	Chloroform
GC/MS	EPA 8260B	Chloromethane
GC/MS	EPA 8260B	cis-1,2-Dichloroethene
GC/MS	EPA 8260B	cis-1,3-Dichloropropene
GC/MS	EPA 8260B	Cyclohexane
GC/MS	EPA 8260B	Dibromochloromethane
GC/MS	EPA 8260B	Dibromomethane
GC/MS	EPA 8260B	Dichlorodifluoromethane
GC/MS	EPA 8260B	Ethylbenzene
GC/MS	EPA 8260B	Freon TF
GC/MS	EPA 8260B	Hexachlorobutadiene
GC/MS	EPA 8260B	Isobutyl alcohol
GC/MS	EPA 8260B	Isopropylbenzene
GC/MS	EPA 8260B	m&p-Xylene
GC/MS	EPA 8260B	Methyl acetate
GC/MS	EPA 8260B	Methyl iodide
GC/MS	EPA 8260B	Methyl t-butyl ether
GC/MS	EPA 8260B	Methylcyclohexane
GC/MS	EPA 8260B	Methylene Chloride
GC/MS	EPA 8260B	Naphthalene
GC/MS	EPA 8260B	n-Butylbenzene
GC/MS	EPA 8260B	n-Propylbenzene
GC/MS	EPA 8260B	o-Xylene
GC/MS	EPA 8260B	sec-Butylbenzene
GC/MS	EPA 8260B	Styrene
GC/MS	EPA 8260B	tert-Butylbenzene
GC/MS	EPA 8260B	Tetrachloroethene
GC/MS	EPA 8260B	Tetrahydrofuran
GC/MS	EPA 8260B	Toluene
GC/MS	EPA 8260B	trans-1,2-Dichloroethene
GC/MS	EPA 8260B	trans-1,3-Dichloropropene
GC/MS	EPA 8260B	Trichloroethene
GC/MS	EPA 8260B	Trichlorofluoromethane
GC/MS	EPA 8260B	Vinyl acetate
GC/MS	EPA 8260B	Vinyl chloride
GC/MS	EPA 8260B	Xylenes, Total
ICP-AES	EPA 6010C	Aluminum
ICP-AES	EPA 6010C	Antimony
ICP-AES	EPA 6010C	Boron

Non-Potable Water		
Technology	Method	Analyte
ICP-AES	EPA 6010C	Beryllium
ICP-AES	EPA 6010C	Cadmium
ICP-AES	EPA 6010C	Calcium
ICP-AES	EPA 6010C	Cobalt
ICP-AES	EPA 6010C	Copper
ICP-AES	EPA 6010C	Iron
ICP-AES	EPA 6010C	Lead
ICP-AES	EPA 6010C	Magnesium
ICP-AES	EPA 6010C	Manganese
ICP-AES	EPA 6010C	Nickel
ICP-AES	EPA 6010C	Molybdenum
ICP-AES	EPA 6010C	Potassium
ICP-AES	EPA 6010C	Selenium
ICP-AES	EPA 6010C	Silver
ICP-AES	EPA 6010C	Sodium
ICP-AES	EPA 6010C	Thallium
ICP-AES	EPA 6010C	Vanadium
ICP-AES	EPA 6010C	Zinc
Combustion	EPA 9060A	Total Organic Carbon
Preparation	Method	Type
Digestate	EPA 3010A	Acid Digestion
Solvent	EPA 5030B	Purge and Trap

Solid and Chemical Materials		
Technology	Method	Analyte
HPLC	EPA 6850	Perchlorate
HPLC	EPA 8330B	1,3,5-Trinitrobenzene
HPLC	EPA 8330B	1,3-Dinitrobenzene
HPLC	EPA 8330B	2,4,6-Trinitrophenol
HPLC	EPA 8330B	2,4,6-Trinitrotoluene
HPLC	EPA 8330B	2,4-diamino-6-nitrotoluene
HPLC	EPA 8330B	2,4-Dinitrotoluene
HPLC	EPA 8330B	2,6-diamino-4-nitrotoluene
HPLC	EPA 8330B	2,6-Dinitrotoluene
HPLC	EPA 8330B	2-Amino-4,6-dinitrotoluene
HPLC	EPA 8330B	4-Amino-2,6-dinitrotoluene
HPLC	EPA 8330B	HMX
HPLC	EPA 8330B	m-Nitrotoluene
HPLC	EPA 8330B	Nitrobenzene

Solid and Chemical Materials		
Technology	Method	Analyte
HPLC	EPA 8330B	Nitroglycerin
HPLC	EPA 8330B	o-Nitrotoluene
HPLC	EPA 8330B	PETN
HPLC	EPA 8330B	p-Nitrotoluene
HPLC	EPA 8330B	RDX
HPLC	EPA 8330B	Tetryl
GC/MS	EPA 8260B	1,1,1,2-Tetrachloroethane
GC/MS	EPA 8260B	1,1,1-Trichloroethane
GC/MS	EPA 8260B	1,1,2,2-Tetrachloroethane
GC/MS	EPA 8260B	1,1,2-Trichloroethane
GC/MS	EPA 8260B	1,1-Dichloroethane
GC/MS	EPA 8260B	1,1-Dichloroethene
GC/MS	EPA 8260B	1,1-Dichloropropene
GC/MS	EPA 8260B	1,2,3-Trichlorobenzene
GC/MS	EPA 8260B	1,2,3-Trichloropropane
GC/MS	EPA 8260B	1,2,4-Trichlorobenzene
GC/MS	EPA 8260B	1,2,4-Trimethylbenzene
GC/MS	EPA 8260B	1,2-Dibromo-3-Chloropropane
GC/MS	EPA 8260B	1,2-Dibromoethane
GC/MS	EPA 8260B	1,2-Dichlorobenzene
GC/MS	EPA 8260B	1,2-Dichloroethane
GC/MS	EPA 8260B	1,2-Dichloroethene, Total
GC/MS	EPA 8260B	1,2-Dichloropropane
GC/MS	EPA 8260B	1,3,5-Trimethylbenzene
GC/MS	EPA 8260B	1,3-Dichlorobenzene
GC/MS	EPA 8260B	1,3-Dichloropropane
GC/MS	EPA 8260B	1,4-Dichlorobenzene
GC/MS	EPA 8260B	1,4-Dioxane
GC/MS	EPA 8260B	2,2-Dichloropropane
GC/MS	EPA 8260B	2-Butanone
GC/MS	EPA 8260B	2-Chloroethyl vinyl ether
GC/MS	EPA 8260B	2-Chlorotoluene
GC/MS	EPA 8260B	2-Hexanone
GC/MS	EPA 8260B	4-Chlorotoluene
GC/MS	EPA 8260B	4-Isopropyltoluene
GC/MS	EPA 8260B	4-Methyl-2-pentanone
GC/MS	EPA 8260B	Acetone
GC/MS	EPA 8260B	Benzene
GC/MS	EPA 8260B	Bromochloromethane
GC/MS	EPA 8260B	Bromodichloromethane
GC/MS	EPA 8260B	Bromoform

Solid and Chemical Materials		
Technology	Method	Analyte
GC/MS	EPA 8260B	Bromomethane
GC/MS	EPA 8260B	Carbon disulfide
GC/MS	EPA 8260B	Carbon tetrachloride
GC/MS	EPA 8260B	Chlorobenzene
GC/MS	EPA 8260B	Chloroethane
GC/MS	EPA 8260B	Chloroform
GC/MS	EPA 8260B	Chloromethane
GC/MS	EPA 8260B	cis-1,2-Dichloroethene
GC/MS	EPA 8260B	cis-1,3-Dichloropropene
GC/MS	EPA 8260B	Cyclohexane
GC/MS	EPA 8260B	Dibromochloromethane
GC/MS	EPA 8260B	Dibromomethane
GC/MS	EPA 8260B	Dichlorodifluoromethane
GC/MS	EPA 8260B	Ethylbenzene
GC/MS	EPA 8260B	Freon TF
GC/MS	EPA 8260B	Hexachlorobutadiene
GC/MS	EPA 8260B	Isobutyl alcohol
GC/MS	EPA 8260B	Isopropylbenzene
GC/MS	EPA 8260B	m&p-Xylene
GC/MS	EPA 8260B	Methyl acetate
GC/MS	EPA 8260B	Methyl iodide
GC/MS	EPA 8260B	Methyl t-butyl ether
GC/MS	EPA 8260B	Methylcyclohexane
GC/MS	EPA 8260B	Methylene Chloride
GC/MS	EPA 8260B	Naphthalene
GC/MS	EPA 8260B	n-Butylbenzene
GC/MS	EPA 8260B	n-Propylbenzene
GC/MS	EPA 8260B	o-Xylene
GC/MS	EPA 8260B	sec-Butylbenzene
GC/MS	EPA 8260B	Styrene
GC/MS	EPA 8260B	tert-Butylbenzene
GC/MS	EPA 8260B	Tetrachloroethene
GC/MS	EPA 8260B	Tetrahydrofuran
GC/MS	EPA 8260B	Toluene
GC/MS	EPA 8260B	trans-1,2-Dichloroethene
GC/MS	EPA 8260B	trans-1,3-Dichloropropene
GC/MS	EPA 8260B	Trichloroethene
GC/MS	EPA 8260B	Trichlorofluoromethane
GC/MS	EPA 8260B	Vinyl acetate
GC/MS	EPA 8260B	Vinyl chloride
GC/MS	EPA 8260B	Xylenes, Total

Solid and Chemical Materials		
Technology	Method	Analyte
ICP-AES	EPA 6010C	Aluminum
ICP-AES	EPA 6010C	Antimony
ICP-AES	EPA 6010C	Boron
ICP-AES	EPA 6010C	Beryllium
ICP-AES	EPA 6010C	Cadmium
ICP-AES	EPA 6010C	Calcium
ICP-AES	EPA 6010C	Cobalt
ICP-AES	EPA 6010C	Copper
ICP-AES	EPA 6010C	Iron
ICP-AES	EPA 6010C	Lead
ICP-AES	EPA 6010C	Magnesium
ICP-AES	EPA 6010C	Manganese
ICP-AES	EPA 6010C	Nickel
ICP-AES	EPA 6010C	Molybdenum
ICP-AES	EPA 6010C	Potassium
ICP-AES	EPA 6010C	Selenium
ICP-AES	EPA 6010C	Silver
ICP-AES	EPA 6010C	Sodium
ICP-AES	EPA 6010C	Thallium
ICP-AES	EPA 6010C	Vanadium
ICP-AES	EPA 6010C	Zinc
Preparation	Method	Type
Digestate	EPA 3050B	Acid Digestion
Solvent	EPA 5035 /5035A	Purge and Trap

Air and Emissions		
Technology	Method	Analyte
GC/MS	TO-15	1,1,1-Trichloroethane
GC/MS	TO-15	1,1,2,2-Tetrachloroethane
GC/MS	TO-15	1,1,2-Trichloroethane
GC/MS	TO-15	1,1-Dichloroethane
GC/MS	TO-15	1,1-Dichloroethene
GC/MS	TO-15	1,2,4-Trichlorobenzene
GC/MS	TO-15	1,2,4-Trimethylbenzene
GC/MS	TO-15	1,2-Dibromoethane
GC/MS	TO-15	1,2-Dichlorobenzene
GC/MS	TO-15	1,2-Dichloroethane
GC/MS	TO-15	1,2-Dichloroethene, Total
GC/MS	TO-15	1,2-Dichlorotetrafluoroethane

Air and Emissions		
Technology	Method	Analyte
GC/MS	TO-15	1,3,5-Trimethylbenzene
GC/MS	TO-15	1,3-Butadiene
GC/MS	TO-15	1,3-Dichlorobenzene
GC/MS	TO-15	1,4-Dichlorobenzene
GC/MS	TO-15	1,4-Dioxane
GC/MS	TO-15	2,2,4-Trimethylpentane
GC/MS	TO-15	2-Chlorotoluene
GC/MS	TO-15	3-Chloropropene
GC/MS	TO-15	4-Ethyltoluene
GC/MS	TO-15	4-Isopropyltoluene
GC/MS	TO-15	Acetone
GC/MS	TO-15	Benzene
GC/MS	TO-15	Benzyl chloride
GC/MS	TO-15	Bromodichloromethane
GC/MS	TO-15	Bromoethene(Vinyl Bromide)
GC/MS	TO-15	Bromoform
GC/MS	TO-15	Bromomethane
GC/MS	TO-15	Carbon disulfide
GC/MS	TO-15	Carbon tetrachloride
GC/MS	TO-15	Chlorobenzene
GC/MS	TO-15	Chloroethane
GC/MS	TO-15	Chloroform
GC/MS	TO-15	Chloromethane
GC/MS	TO-15	cis-1,2-Dichloroethene
GC/MS	TO-15	cis-1,3-Dichloropropene
GC/MS	TO-15	Cumene
GC/MS	TO-15	Cyclohexane
GC/MS	TO-15	Dibromochloromethane
GC/MS	TO-15	Dichlorodifluoromethane
GC/MS	TO-15	Ethylbenzene
GC/MS	TO-15	Freon 22
GC/MS	TO-15	Freon TF
GC/MS	TO-15	Hexachlorobutadiene
GC/MS	TO-15	Isopropyl alcohol
GC/MS	TO-15	m,p-Xylene
GC/MS	TO-15	Methyl Butyl Ketone (2-Hexanone)
GC/MS	TO-15	Methyl Ethyl Ketone
GC/MS	TO-15	Methyl isobutyl ketone
GC/MS	TO-15	Methyl methacrylate
GC/MS	TO-15	Methyl tert-butyl ether
GC/MS	TO-15	Methylene Chloride



Air and Emissions		
Technology	Method	Analyte
GC/MS	TO-15	Naphthalene
GC/MS	TO-15	n-Butane
GC/MS	TO-15	n-Butylbenzene
GC/MS	TO-15	n-Heptane
GC/MS	TO-15	n-Hexane
GC/MS	TO-15	n-Propylbenzene
GC/MS	TO-15	o-Xylene-
GC/MS	TO-15	sec-Butylbenzene
GC/MS	TO-15	Styrene
GC/MS	TO-15	tert-Butyl alcohol
GC/MS	TO-15	tert-Butylbenzene
GC/MS	TO-15	Tetrachloroethene
GC/MS	TO-15	Tetrahydrofuran
GC/MS	TO-15	Toluene
GC/MS	TO-15	trans-1,2-Dichloroethene
GC/MS	TO-15	trans-1,3-Dichloropropene
GC/MS	TO-15	Trichloroethene
GC/MS	TO-15	Trichlorofluoromethane
GC/MS	TO-15	Vinyl chloride
GC/MS	TO-15	Xylene, Total

Notes:

- 1) This laboratory offers commercial testing service.

Approved by: 
R. Douglas Leonard
Chief Technical Officer

Date: February 25, 2014

Reissued: 2/25/14

Attachment B
Final Responses to Regulatory Comments

Final Responses to EPA Comments
Draft Addendum 3, Master Sampling and Analysis Plan,
UXO 13 Remedial Investigation, Former Vieques Naval Training Range,
Vieques, Puerto Rico;
Dated October 2014 (hereinafter referred to as Addendum 3)

GENERAL COMMENTS

1. Addendum 3 indicates it provides the laboratory specific worksheets for the Remedial Investigation (RI) at UXO 13, but Addendum 3 does not provide all of the current information for the laboratories. For example, the laboratory standard operating procedures (SOPs) and laboratory statistically derived quality control (QC) limits are not provided for all of the proposed analytical methods. Additionally, it is unclear if the laboratories can meet the measurement performance criteria defined in Addendum 3 (e.g., the Department of Defense Quality Systems Manual [DOD QSM] limits in Worksheet #15). Without this information, the adequacy of the laboratory methods cannot be evaluated and the information in Addendum 3 cannot be verified. Revise Addendum 3 to include all relevant laboratory-specific information.

Navy Response: Laboratory SOP references for all proposed analytical methods are included in Worksheet #23. Worksheets 15-1 through 15-9 contain laboratory-specific A/P limits, which are also DoD QSM limits. These are the limits to which the lab will adhere. A/P limits were inadvertently omitted for Worksheet #15-5. This worksheet has been revised to include all A/P limits for METALS in SB, SS, SD, and SMI samples.

2. The Addendum 3 does not describe the rationale for the modifications of the RI sampling design in sufficient detail. Worksheet #17 indicates that sampling units were added based on relatively high numbers of munitions and explosives of concern (MEC) and munitions debris (MD) identified during the non-time critical removal action (NTCRA), but it is unclear how the number of sampling units were determined to be sufficient to meet the data quality objectives/goals of the study. For example, as shown on Figure 6, UXO 13 East Northeast Sampling Approach, there are several areas where densities of MEC and munitions scrap are elevated at UXO 13 East Northeast (e.g., the southern portion of the site and directly northeast of Laguna Algodones), but only one sampling unit was added. Revise Addendum 3 to clarify the rationale for the additional sampling units at each decision unit.

Navy Response: The locations of the sample units, as presented in Addendum 3, have been added or adjusted from the original locations presented in the Master SAP due to higher numbers of MEC and MD identified since the Master SAP was finalized, which is in accordance with the process outlined in the Master SAP for adding/adjusting sampling units. The following statement has been added to the "Soil" section on Worksheet #17: "As described in the Master SAP, sample locations are biased toward areas where the highest number of MEC and MD were recovered during the NTCRA as well as locations that are known former firing/target areas or locations where runoff from the decision units could collect; these locations represent "worst-case conditions with regards to potential MC contamination and have the highest potential to identify if a release has occurred at the site as a result of munitions-related activities. In accordance with the Master SAP, sample/sampling unit locations are adjusted and/or added if information collected subsequent to the Final Master SAP alters the conceptual understanding of the site such that these adjustments/additions are warranted to ensure the RI objectives defined in the Master SAP are met."

As concurred upon in the March 2015 Technical Subcommittee meeting, to facilitate review and avoid re-evaluating past decisions made regarding sampling locations, the figures have been revised to show the adjusted/added sampling units in red.

3. Groundwater samples are not included in Addendum 3, but Worksheet #17 of the Master SAP for East Vieques Terrestrial UXO Sites (the Master SAP) indicates three monitoring wells will be installed at UXO 13. Revise Addendum 3 to clarify why groundwater sampling is not included, or to add information related to this sampling to all appropriate SAP worksheets.

Navy Response: The monitoring well installation and subsequent groundwater sampling at UXO 13, as well as the rest of the former VNTR, for the RI has already occurred. The details of the groundwater sampling are included in the Master SAP and the *Master SAP Addendum 1 Laboratory Specific Worksheets for Regional Monitoring Well Soil and Groundwater Sampling* (CH2M HILL, 2013) and the results of the groundwater sampling are provided in the RI Status Report. This information has been added to the Addendum.

4. Worksheet #2 indicates that only those worksheets that are applicable to the modified RI work and the analytical laboratories have been included in the Addendum 3. However, Worksheet #4 should be provided with the project-specific personnel for this RI work to sign that they have received Addendum 3. Revise Addendum 3 to include Worksheet #4.

Navy Response: Worksheet 4 has been added to the SAP Addendum 3.

5. Addendum 3 does not identify all of the personnel and subcontractors for the proposed work. For example, the field team leader in Worksheet #26 is TBD (to be determined). In addition, the third party data validation subcontractor is listed as TBD in the Master SAP but is not identified in this Addendum 3. Revise Addendum 3 to identify the project specific personnel and subcontractors that will perform the proposed RI work or indicate that this information will be included in the Final version of Addendum 3.

Navy Response: The SAP contains the information known at the time of its production. Actual field personnel and, in some cases, subcontractors may not be known until later in the SAP development process or after it is finalized. Since the primary purpose of the addendum is to identify the laboratory-specific information, the analytical laboratory is the only subcontractor necessary to identify in the SAP in order for the SAP addendum to be evaluated. However, all field personnel and other subcontractors will be qualified to perform their associated duties. Field personnel and other subcontractors known at the time the SAP is finalized will be included. Subcontractors identified after the SAP is finalized will be included in the UXO 13 RI Report.

6. Addendum 3 notes in a number of places that sampling analysis for picric acid explosives will be accomplished. However, it does not indicate that analysis for the presence of Explosive D (ammonium picrate) will be accomplished.

While both of these explosives have been used by the U.S. Military in the past, picric acid use as a projectile filler was discontinued during the 1902-1912 time period by most nations and, with the exception of most naval projectiles, trinitrotoluene (TNT) became the standard filler. The Navy selected Explosive D as the standard projectile filler due to its relative insensitivity to impact shock.

It is, therefore, unlikely that any projectiles filled with picric acid would be located on the site under evaluation. However, Explosive D-filled naval projectiles may be present. This would seem to indicate that the sampling analysis for picric acid is unwarranted, and the omission of the analysis for Explosive D is in error.

Review Addendum 3 and correct the explosives analyzed as necessary to ensure that the presence or absence of Explosive D is determined.

Navy Response: The proposed analytical method is the appropriate analytical method for quantifying Explosive D (ammonium picrate). The ammonium picrate analysis evaluates the concentration of the picrate ion, which disassociates from ammonium in liquid. Since the picrate ion is also produced by the dissociation of the hydrogen atom in picric acid, the analytical method quantifies the amount of the picrate ion and reports it as picric acid. Therefore, the reported result is the combination of any picric acid and ammonium picrate present in the sample. Since picric acid is not anticipated to be present, all of the reported result can be attributed to ammonium picrate. The concentration of ammonium picrate is simply calculated by taking

the reported picric acid result and converting it to ammonium picrate using the following equation based on the ratio of molecular weights: [ammonium picrate (ug/kg)] = [picric acid (ug/kg)] * (246.13/229.10). This information has been added to Addendum 3.

Follow-up Note: Following this response, additional dialogue was held between the EPA and Navy regarding whether analysis of ammonium picrate degradation products is warranted. The outcome of the dialogue was the following consensus:

- The analytical parameter list proposed in the Draft SAP is appropriate (i.e., analyze for ammonium picrate, but not add ammonium picrate degradation products). If ammonium picrate is detected, the Navy will remobilize to sample the locations where ammonium picrate is detected and analyze the samples for ammonium picrate and its degradation products (i.e., picramic acid and 2,4-DNP).

SPECIFIC COMMENTS

1. **Worksheet #11, Project Quality Objectives/Systematic Planning Process Statements, Page 5:**

The text states that certain analyte limits of detection (LODs) exceed project action limits (PALs), but detection limits (DLs) are closer to the PALs and detections less than the LOD will be reported and qualified. However, Addendum 3 does not discuss why the uncertainty associated with using these qualified results (and the non-detections) to make decisions was deemed acceptable for this project. Revise the Addendum 3 to discuss why the uncertainty associated with using results with LODs greater than the PALs is acceptable for project decisions.

Navy Response: Please see the response to Specific Comment #2 below.

2. **Worksheet #11, Project Quality Objectives/Systematic Planning Process Statements, Page 5:** Several analytes with toxicity reference values (TRVs) and Regional Screening Levels (RSLs) that are less than DLs are not included in the list of analytes with PALs less than DLs. Further, the text indicates that analytes with Soil Screening Levels (SSLs) that are less than DLs are overly conservative, but it is unclear why analytes with TRVs less than DLs (tetryl and nitrobenzene in Worksheet #15-3) and RSLs less than DLs (e.g., arsenic, chromium, hexavalent chromium, and thallium in Worksheet #15-4) are not discussed. Revise this section to discuss why the uncertainty associated with using results with TRVs and RSLs less than the DLs is acceptable for project decisions.

Navy Response: Worksheet #11 has been revised to say “For the following constituents, the DL is greater than the PAL: naphthalene (SSL), 2,4-dinitrotoluene in surface water (RSL), 2,6-dinitrotoluene in surface water (RSL), 1,3-dinitrobenzene (SSL), 2,4,6-trinitrotoluene (SSL), 2,4-dinitrotoluene (SSL), 2,6-dinitrotoluene (SSL), 2-Amino-4,6-dinitrotoluene (SSL), 3-nitrotoluene (SSL), 4-amino-2,6-dinitrotoluene (SSL), 4-nitrotoluene (SSL), RDX (SSL), tetryl (Marine Sediment ESV), nitrobenzene (SSL and Marine Sediment ESV), nitroglycerin (SSL), PETN (SSL), total and dissolved arsenic in surface water (RSL), total and dissolved chromium in surface water (RSL), total and dissolved hexavalent chromium in surface water (RSL), total and dissolved thallium in surface water (RSL), and hexavalent chromium (SSL).

As noted above, the vast majority of these occurrences are for the SSLs. As noted in various Vieques SAPs and reports, SSLs have been consistently demonstrated on Vieques to be unreliable predictors (i.e., overly conservative) of leaching concerns for groundwater. For example, it has been demonstrated across the former VNTR that explosive constituents are largely absent in groundwater, even in areas with significantly higher densities of munitions (e.g., LIA), providing further evidence that while SSLs can help provide some perspective on leachability of constituents, they should not be considered threshold values upon which to draw conclusions about the utility of data. The remainder of the instances where the DL is higher than the PAL are sporadic and other data collected during the RI will help evaluate any associated uncertainty. For example, there are only two surface water explosives with a DL above the PAL. However, there will be data available for

the other explosives in those samples that can be used to help determine if there is an explosives constituent concern in the surface water body. In addition, there are other lines of evidence that can be used, such as whether those constituents are detected in other media (soil, groundwater), to help address any uncertainty associated with non-detect results for those two constituents. With respect to the metals whose surface water PALs are below the DLs, it is important to note that throughout the VNTR where RI surface water sampling has already occurred (many in areas with higher densities of munitions), these metals have been determined to be absent or attributable to background. Based on this information, the occurrence of non-detects for several constituents where the PAL is lower than the DL will not adversely impact the ability to meet the objectives of the RI. Also, in accordance with the provisions of Worksheet #11 of the Master SAP (CH2M HILL, 2013), if there are instances where the laboratory-specific DL is greater than the screening level, then the resulting uncertainty will be discussed in the data quality evaluation.”

3. **Worksheet #11, Project Quality Objectives/Systematic Planning Process Statements, Page 6:** The types of data needed as listed in item 3 of Worksheet #11 are inconsistent with the analytes and matrices presented in Worksheet #15. The first bullet in item 3 indicates only soil and sediment data are needed, but Worksheet #15 includes information for analyses of surface water. In addition, the analytes of interest are indicated to be explosive constituents and metals, but Worksheet #17 states that polycyclic aromatic hydrocarbons (PAHs) will be included in the list of required analyses for Range 4A, and Worksheet #15-1 presents information for semivolatile organic compounds (SVOCs)/PAHs. Revise Item 3 to be consistent with Worksheet #15 and include all types of data and matrices needed for this investigation.

Navy Response: Worksheet #11 has been corrected as indicated in the comment (surface water has been added as a matrix, SVOCs/PAH have been added to the analytical suite).

4. **Worksheet #15-5, Reference Limits and Evaluation Table, Page 15:** This table does not provide the laboratory control sample (LCS) and matrix spike/matrix spike duplicate (MS/MSD) recovery limits and relative percent differences (RPDs) for metals analytes in solid matrices. Revise Worksheet #15-5 to include these limits as referenced in Worksheets #28-5, #28-6, and #28-7.

Navy Response: Worksheet #15-5 has been revised to include the LCS and MS/MSD A/P limits.

5. **Worksheet #15-6, Reference Limits and Evaluation Table, Page 16:** This table for metals analytes in surface water samples presents the same information as Worksheet #15-4. Revise Addendum 3 to remove this duplicate table.

Navy Response: Worksheet #15-6 has been revised to indicate that it is for dissolved metals, rather than total metals.

6. **Worksheet #16, Project Schedule/Timeline, Page 21:** Addendum 3 does not provide a detailed schedule of the proposed project activities, including timeframes for the specific actions to be completed (e.g., sampling, laboratory analysis and reporting, data validation, etc.). Revise Worksheet #16 to include a detailed schedule of the project activities, including timeframes for quality assurance assessments and document reviews, in accordance with Section 2.8.2 of the *Uniform Federal Policy for Quality Assurance Project Plans Manual*, March 2005.

Navy Response: Consistent with the Master SAP, Worksheet #16 has been changed to read: “The official schedule for this investigation is included in the SMP schedule that is updated on a periodic basis.”

7. **Worksheet #17, Sampling Design and Rationale, Page 24:** The text for Laguna Algodones Fringe states, “Since no munitions were identified adjacent to the lagoon, the discrete sample will be biased toward the highest land crab burrow density. The location of one surface water and sediment sample (6SDSW03) was adjusted to be located in a grid with identified MEC.” It is unclear if MEC was identified within the Laguna Algodones Fringe site and why surface water and sediment samples are discussed, since incremental

sampling methodology (ISM) and surface soil samples are proposed at Laguna Algodones Fringe. Revise Worksheet #17 to clarify any modifications made to the proposed sampling at Laguna Algodones and Laguna Algodones Fringe.

Navy Response: The referenced sentence has been revised to read: "Since no munitions were identified within the lagoon fringe..."

The statement regarding the surface water and sediment sample location within the text has been removed.

8. **Worksheet #17, Sampling Design and Rationale, Page 24:** Subsurface samples at each sampling unit are indicated to be collected from locations with the highest potential for a subsurface release, but it is unclear how this potential for a release will be determined. Further, it is unclear how locations will be selected if no potential for subsurface release is found. Revise this worksheet to clarify how the locations of the subsurface soil samples will be selected.

Navy Response: The subsurface soil samples will be collected in accordance with the protocol established in the Master SAP (CH2M HILL, 2013). To reflect the procedure concurred upon in the Master SAP, the text has been revised to read: "In accordance with the approach described in the Master SAP (CH2M HILL, 2013), each subsurface soil sample from each incremental sampling unit will be collected in areas with the highest potential for a subsurface release (i.e., adjacent to or beneath MEC) if deemed safe. If MEC is not identified within the sampling unit, the sample will be collected in areas with elevated MD densities."

9. **Worksheet #19, Field Sampling Requirements Table, Pages 31 to 32:** The container information for solid samples to be analyzed for perchlorate does not indicate that the containers will contain headspace. Method 6850 preservation requirements for perchlorate analyses indicate all sample containers should contain headspace to prevent potential anaerobic biodegradation (see Section 8.6). Revise Worksheet #19 to indicate that all containers with samples for perchlorate analyses will contain headspace.

Navy Response: On Worksheet #19, the preservation requirement for perchlorate in SMI, SB, SS, SD has been revised to "Headspace in jar; ≤ 6°C but not frozen."

10. **Worksheet #23, Analytical SOP References Table, Page 35:** Four metals preparation SOPs are listed in this worksheet (i.e., Methods 3010A and 3015A for aqueous samples and Methods 3051A and 3050B for samples with solid matrices), but it is unclear which methods will be used. It is noted that Worksheet #19 lists Method 3050B for digestion of solid samples and Method 3010A for digestion of aqueous samples. Revise the table to clarify which preparation methods will be used.

Navy Response: Method SW-846 3050B will be used for solid samples and SW-846 3010A will be used for aqueous samples. The laboratory SOPs for SW-846 3015 and 3051A have been removed from Worksheet #23.

11. **Worksheet #28, Laboratory QC Samples Table, Pages 47 to 60:** Worksheet #28 does not provide tables for analyses of surface water samples. Revise this worksheet to include tables with relevant field and laboratory QC information for the analytical methods to be used for analyses of surface water samples.

Navy Response: Worksheets #28-13 through 28-18 were inadvertently omitted from the draft UFP-SAP. These worksheets have been added to provide tables for analyses of surface water samples.

12. **Worksheet #28, Laboratory QC Samples Table, Pages 47 to 60:** Soil grinding blanks have not been included in this worksheet for the ISM samples. As appropriate, revise this worksheet to include soil grinding blanks for applicable methods that will use ISM.

Navy Response: Worksheet #28-2 has been revised to include soil grinding blanks for SW-846 8330B.

13. **Worksheets #28-1 to #28-6 and #28-9, Laboratory QC Samples Table, Pages 47 to 54 and 57:** The corrective action (CA) information in these tables is incomplete. For example, the corrective action for exceedances of

the MS/MSD acceptance limits is to examine the project-specific requirements and contact the client for the additional measures to be taken. In addition, the corrective action for the dilution test and post-digestion spike (PDS) for metals analyses states, "No specific CA, unless required by the project." However, Addendum 3 should define these project-specific CA requirements (i.e., when and what CAs will be taken). For example, a CA for the metals MS/MSD exceedances is to analyze a dilution test and PDS, as noted in the Frequency & Number column. In addition, at a minimum, CA for the dilution test and PDS should include qualifying the associated sample results. Alternatively, sample analysis by the method of standard additions or an analysis using an internal standard technique should be considered. Revise Worksheet #28 to include the project-specific CAs for the MS/MSDs, dilution test, and PDS.

Navy Response: In Worksheets 28-1 through 28-4 and 28-9, the CA for MS/MSD samples has been revised to state: "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." In Worksheets 28-5 and 28-6, the CA for MS/MSD samples has been revised to state: "Examine the project-specific requirements. Contact the client as to additional measures to be taken. For the specific analyte(s) in the parent sample, J-apply qualifier if acceptance criteria are not met and explain in the case narrative. Perform dilution test or PDS addition." In Worksheets #28-5 and 28-6, the CA for the dilution test and PDS Addition has been revised to state: "No specific CA. For the specific analyte(s) in the parent sample, apply J-qualifier if acceptance criteria are not met and explain in the case narrative."

14. **Worksheets #28-5 and #28-6, Laboratory QC Samples Table, Pages 53 to 54:** The dilution test is indicated to be analyzed when the MS or MSD fails, but a dilution test should be analyzed with each batch. Revise the Frequency & Number column to indicate that a dilution test will be analyzed with each batch.

Navy Response: The specifications as shown are consistent with DoD QSM v5.0 and with the analysis method.

15. **Worksheet #28-12, Laboratory QC Samples Table, Page 60:** This table presents information for the analyses of acid volatile sulfide (AVS) and simultaneously extracted metals (SEM), but the QC information for analyses of SEM is inconsistent with the metals methods. From the SOPs included in Worksheet #23, it appears that Method 6010C will be used for analyzing the SEM (except mercury). Therefore, the Method/SOP QC acceptance limits for the LCS and PDS recoveries should be 80 to 120% in accordance with Method 6010C. However but the QC limits for the LCS and PDS SEM analysis are 75% to 120% (see Worksheet #15-9 for LCS QC limits). In addition, the CA information for the MS/MSDs does not indicate that a PDS will be analyzed when the MS/MSD recoveries exceed acceptance limits. Revise this table to present the Method/SOP QC acceptance limits and CA information consistent with those defined in Method 6010C for the SEM analysis, and also ensure the QC limits for the AVS analysis are accurate in accordance with the method or appropriate QA guidance.

Navy Response: SEM LCS limits were in error and have been corrected to 80-120% recovery. An MS/MSD is not designated (or performed) for metals from the AVS extraction. The requirement for MS/MSD has been removed from Worksheet #28-12. The laboratory replicate is still performed and the PDS frequency is still correct.

16. **Figure 4:** The location of the sample units in this figure were reviewed to assess if their locations allowed for maximizing the potential to characterize grids with the highest number of MEC and munitions scrap. There is a grid with 95 anomalies identified to the east of the location VE-UXO13-1DU06, and grids with 60 and 70 anomalies between locations VE-UXO13-1DU05 and VE-UXO13-1DU08. It is suggested that these sample units be reconfigured to include these grids with high detection of MEC and munitions scrap.

Navy Response: In the original figures, when the number of items in the grid were very high, the number was shrunk down to fit into the square, which appears to have made those numbers difficult for the reviewer to see. This was discussed during the March 2015 Technical Subcommittee meeting. For example, the proposed location of sample unit VE-UXO13-1DU06 contains grids with 514, 254, 579, and 1,522 recovered items.

Adjusting the sample unit to include the grid with 95 items will result in moving the sample unit to include an area with a lesser concentration of items. Similarly, the proposed location of sample unit VE-UXO13-1DU05 contains grids with 1,526, 418, 708, and 401 recovered items. Adjusting the sample unit to include the grids with 60 and 70 items will result in moving the sample unit to include an area with a lesser concentration of items. As discussed in the Technical Subcommittee Meeting, the proposed sampling units will be retained, but the figure will be revised so that the numbers of items in grids are larger/more visible.

One exception is sample unit VE-UXO13-1DU08, which is located at the firing point of Range 4B. The proposed sample unit includes grids where 300, 26, 2, and 6 items were recovered. Based on the comment and discussion at the Technical Subcommittee meeting, the sample unit will be adjusted to replace the grids where the 6 and 2 items were recovered with the grids to the east where 52 and 35 items were recovered.

17. **Figure 6:** There are several grids with high numbers of MEC and munitions scrap that are not targeted for sampling. Grids with anomalies of 200, 285 and 151 have been identified west of Range 6 and east of Laguna Algodones, and grids with anomalies of 301 and 169 have been identified south of Laguna Algodones. These areas should be considered for inclusion in newly identified sample units.

Navy Response: The grids identified for sampling as part of sampling units appropriately represent the most conservative areas, as defined in the Master SAP. Adjustments to these locations or adding additional sampling units is not warranted.

ADDITIONAL EPA COMMENTS RECEIVED FEBRUARY 2, 2015 (ECOLOGICAL BASED COMMENTS)

- a. EPA Comment: SAP Worksheet # 17 – Sampling and Design and Rationale: It is noted that for the initial sites investigated two subsurface soil samples will be collected within each sampling unit, and as further discussed under the bullets, these subsurface samples will be biased toward the location of former gun positions and within firing points and former target areas in multiple ranges. Additional information should be provided regarding the rationale of only collecting two discrete subsurface soil samples from each unit.

Navy Response: The following has been added to Worksheet #17: “In accordance with concurrence reached by the ERP Technical Subcommittee, as documented in Worksheet #17 of the Master SAP (CH2M HILL, 2013), two subsurface soil samples are initially proposed within each sampling unit, and as the data collected from the sites are evaluated on a continuing basis, the number of subsurface soil samples within each sampling unit will be adjusted, as warranted, with consensus from the ERP Technical Subcommittee.”

- b. EPA Comment: SAP Worksheet # 17 – Sampling and Design and Rationale: The discussion of the Laguna Algodones Fringe soil samples indicates that “the incremental and discrete soil samples will be merged and evaluated together for land crabs only.” It is unclear why the discrete soil samples will encompass the depth from 2.5” – 24” rather than 0-24”, which is the depth of concern for land crabs. Rather than relying on the 0-2.5” incremental sample for that horizon, it is recommended that the discrete subsurface sample reflect the 0 – 24” depth. As discussed in the Response to Comments for UXO 18, the Uncertainty Section of the ecological risk assessment should address the uncertainties in merging data from two different depths as well as merging composite samples with discrete samples.

Navy Response: The sampling interval (0 – 2.5” for incremental surface and 2.5 – 24” for deeper surface) and the merging of these intervals for the evaluation of ecological risk to land crabs was concurred upon by the Technical Subcommittee and memorialized in the Master SAP (CH2M HILL, 2013). For example, see Worksheet 17c of the Master SAP where it says that for lagoon fringe samples, incremental surface soil samples (0-2.5”) and discrete deeper surface soil samples (2.5”-24”) will be collected and that “[f]or the ecological risk assessment, the incremental and discrete soil samples will be merged and evaluated together for land crabs only.” Reference to this part of the Master SAP has been added to Worksheet #17.

- c. **EPA Comment: SAP Worksheet # 17** – Sampling and Design and Rationale: The first sentence in the last paragraph of this worksheet should refer to “ORP” (oxidation reduction potential) rather than “OPR.”

Navy Response: The text revision has been made.

- d. **EPA Comment:** In addition to those areas identified by Michael Sivak, it is recommended that (as it appears on Figure 5) Sample Unit VE-UXO13-2DU01 be moved west to encompass those grids with MEC and munition scrap. Currently it does not appear as if any MEC/munition scrap have been identified in this sample unit.

Navy Response: The location of sample unit VE-UXO13-2DU01 is at the confluence of two drainages/steams that collect runoff from the nearby ranges. The current location is better suited to identify potential contamination from the nearby areas, as well as from a significant portion of the decision unit, than it would be through moving the sample unit to the location proposed in the comment.

- e. **EPA Comment Figure 9** UXO 13 Laguna Algodones Sampling Approach: Collocated sediment and surface water samples should be collected in areas with the greatest MEC and munition scrap density. Therefore it may make sense to move sample VE-UXO13-6SDSWO6 to the west one grid and to include grids with 4 & 3 munitions from the eastern laguna.

Navy Response: Adjustment made as requested.

Final Responses to PREQB Comments
Draft Addendum 3 Master Sampling and Analysis Plan, UXO 13 Remedial Investigation,
Atlantic Fleet Weapons Training Area – Vieques, Puerto Rico

WORKSHEET-SPECIFIC COMMENTS

1. SAP Worksheet #11:

a. Page 5, Question 2: Many analytes were missing from the discussion of analytes with DLs above the PALs.

- i. Please add the following analytes to the soil discussion: naphthalene (SSL), 2,4,6-trinitrotoluene (SSL), 2-amino-4,6-dinitrotoluene (SSL), 4-amino-2,6-dinitrotoluene (SSL), and tetryl (marine sediment TRV).

Navy Response: The analytes have been added to the discussion. Please see the response to EPA Specific Comment #2.

- ii. Please include a discussion for surface water and include 2,4-dinitrotoluene (RSL), 2,6-dinitrotoluene (RSL), arsenic (RSL), chromium (RSL), hexavalent chromium (RSL), and thallium (RSL).

Navy Response: A discussion has been added for these analytes. Please see the response to EPA Specific Comment #2.

- iii. Please remove 2-nitrotoluene (SSL) from the soil discussion as there is no SSL for this compound per Worksheet #15-3.

Navy Response: 2-nitrotoluene (SSL) has been removed from the soil discussion.

b. Page 6, Question 4: The national functional guidelines are cited for validation. However, EPA Region 2 validation guidelines need to be used instead when applicable. Please revise the text accordingly.

Navy Response: Worksheet #11 has been revised to state: "...the data will be validated by a third-party validator using EPA Region II SOPs, national functional guidance, methodology, and laboratory Standard Operating Procedures (SOPs) as described in Worksheet #36." Worksheet #36 of the Master SAP indicates that qualifiers and guidance from national functional guidelines will be used as applicable when Region II SOPs do not exist.

2. SAP Worksheet #15-5: The LCS and MS/MSD limits are missing from this worksheet. Please note that Worksheet #28 refers to this worksheet for these limits. Please update accordingly.

Navy Response: Worksheet #15-5 has been revised to include the LCS and MS/MSD A/P limits.

3. SAP Worksheet #15-6: Please remove this worksheet as it is a repeat of Worksheet #15-4.

Navy Response: Worksheet #15-6 has been revised to indicate that it is for dissolved metals, rather than total metals.

4. SAP Worksheet #15-7: The TOC LCS and MS/MSD limits are missing from this worksheet. Please note that Worksheet #28 refers to this worksheet for these limits. Please update accordingly.

Navy Response: Worksheet #15-7 has been revised to include the LCS and MS/MSD A/P limits for TOC.

5. Worksheet #17—Sampling and Design and Rationale

- a. Soil: Please clarify in the text why only 63 subsurface soil samples will be collected when the text also states that 2 subsurface soil samples will be collected within each sampling unit and there are 33 sampling units.

Navy Response: The text has been changed to read “In total, 33 incremental surface soil samples (one from each sampling unit), 3 discrete deeper surface soil samples, and 60 discrete subsurface soil samples will be collected.”

- b. Laguna Algodones Fringe:

- i. Please clarify in the text why only one subsurface soil sample will be collected from each lagoon fringe sampling unit.

Navy Response: Worksheet #17 of the Master SAP establishes that: “One subsurface soil sample will still be collected if a subsurface munitions item is not identified.” Because no MEC has been identified in the lagoon fringe, only one subsurface sample is warranted. This information has been added to Worksheet #17.

- ii. It appears that the sentence that starts with “In keeping with the approach described in the Final Master SAP, each subsurface soil sample from each incremental sampling unit will be collected...” applies to all sampling units, not just the Laguna Algodones sampling units and needs to start a new paragraph.

Navy Response: The sentence has been deleted from the section.

- iii. The number of surface water and sediment samples proposed to be collected is confusing as presented in the text. Please revise to clarify the number of samples per lagoon (3 are proposed from each lagoon) and the total number of samples proposed to be collected (six in total).

Navy Response: The text has been changed to read “Laguna Algodones – 3 sediment samples (0 to 6 inches) and 3 surface water samples (at mid-depth) will be collected from each of the two lagoons; 6 sediment and 6 surface water samples in total (Figure 9).

- iv. Background sediment samples from a similar reference lagoon are discussed as a possible line of evidence in evaluating risk. Please clarify whether a similar reference lagoon has been identified.

Navy Response: Because the lagoon is not tidally influenced, a formal reference lagoon has not been identified. However, a significant amount of non-tidal lagoon data have been collected as part of the RI being conducted across multiple UXO sites. A spatial comparison among these lagoons may help in the evaluation of the sediment data collected from the UXO 13 lagoons. The statement about a “...background data collected from a similar lagoon...” has been revised to indicate that the data collected from the UXO 13 lagoons will be compared to data from other non-tidal lagoons across the VNTR (such as the one at UXO 1 that was found not to be impacted by inorganics contamination) as part of the overall evaluation of inorganics detected and whether the concentrations may be attributable to background.

PREQB Evaluation of Response: The approach generally appears acceptable depending on the lagoons selected for comparison and the statistical evaluation conducted.

Navy Response to Evaluation: Comment noted. Any lagoon(s) selected for comparison and the conclusions drawn will include the justification for its selection and the type of comparison conducted. The information will be included in the RI Report, which will be provided to the regulatory agencies for review.

6. SAP Worksheet #19: Please remove SW-846 3060A for the hexavalent chromium analysis of surface water; this method is only applicable to soil/sediment samples.

Navy Response: On Worksheet #19, the Analytical and Preparation Method/SOP reference for surface water has been revised to state: SW-846 7199/ ANA218.6-7199.

7. SAP Worksheet #20:

- a. For the PAH analyses of SMI samples, there should only be 2 locations (not 3) as per Worksheet #18. Please revise as appropriate.

Navy Response: The number of locations has been revised to 2. In addition, the duplicate entry of VE-UXO13-1DU10 in the list of sample units where PAHs will be analyzed has been removed from the text in Worksheet #17.

- b. For the PAH analyses of subsurface soil samples, there should only be 4 locations (not 6) as per Worksheet #18. Please revise as appropriate.

Navy Response: The number of locations has been revised to 4.

8. SAP Worksheet #23: SOPs PRE3050A and PREMETALSIS are listed on this worksheet but not included on Worksheet #19. Please clarify where these SOPs will be utilized.

Navy Response: It is assumed the commented is referring to SOP PRE3051A, since there is no SOP PRE3050A in Worksheet #23. PRE3051A has been removed from Worksheet #23 as it will not be used. PREMETALSIS will be used for incremental sample preparation for metals analysis and has been added to Worksheet #19.

9. SAP Worksheet #24: Please add the appropriate information for the TOC Walkley Black method.

Navy Response: Walkley Black is a titration method; therefore, Worksheet #24 is not applicable as there is no instrument used.

10. SAP Worksheet #25: Please add the appropriate information for the TOC Walkley Black method.

Navy Response: Walkley Black is a titration method; therefore, Worksheet #25 is not applicable as there is no instrument used.

11. SAP Worksheets #28-2, 28-3, 28-4, 28-5, 28-6, and 28-7:

- a. Please include surface water in the list of matrices.

Navy Response: Worksheets 28-13 through 28-18 (applicable to surface water) were inadvertently omitted. These worksheets have been added.

- b. Please add field duplicate criteria for surface water.

Navy Response: Field duplicate criteria for surface water is included in Worksheets 28-13 through 28-18.

12. Figure 4: Sampling Unit 1DU11: Please clarify why the grid with an elevated density of 92 was not selected for inclusion in the SU. Note - due to the number of anomaly dots, the density number for the adjacent grid that was selected is not shown.

Navy Response: The grid with 13 items will be dropped from the sample unit and the grid with 92 items will be added. The sample unit will now comprise grids containing 188, 325, 25, and 92 items.

The note in the comment is referring to a grid in which 325 items were recovered. In order to make this number readable, the font size of the number has been increased.

13. Figure 5:

- a. Please clarify whether the yellow-highlighting means that no MEC investigation completed at the time the report was published or that no MEC investigation will be conducted. Please revise the legend description for clarity.

Navy Response: The shading indicates that no MEC investigation has been completed at the time of the effective date of the figure (through September 2014). Additional MEC investigation is planned as part of the RI throughout the areas shaded yellow (transect inspections) and additional MEC removal will be conducted, as necessary, as part of the UXO 13 surface MEC NTCRA; the locations of the planned transects are presented on Figure 41 of the Master SAP. The legend of Figure 5 has been clarified as requested.

- b. Sampling Unit 2DU03: Please clarify why this area was selected for sampling where no anomalies were detected when an anomaly was identified in two grids two rows down.

Navy Response: The location of sample unit VE-UXO13-2DU01 is at the confluence of two drainages/streams that collect runoff from the nearby ranges. The current location is best suited to identify potential contamination from the nearby areas, as well as from a significant portion of the decision unit. This information has been added to the text.

- c. Sampling Unit 2DU12: Please clarify why this sampling unit was positioned, as it appears a higher MEC density area 6 rows north has a higher density (30, 50, 21, and 40) and similar MEC types.

Navy Response: The current location of 2DU12 has a significantly higher density (grids with 111, 161, 35, and 23 items) than the location proposed and this area corresponds to an historic range impact area. This information has been added to the text.

14. Figure 6:

- a. Please clarify the significance of the bright yellow or grey grids outlined in orange. This comment applies to Figure 9 also.

Navy Response: In these grids, there is information from subsurface MEC investigations/removals in addition to data from the ground surface. As noted in the figure legend, the “[o]range outline indicates where total subsurface findings are used for color coding.” The legend also shows the yellow grid filling represents 1-139 subsurface anomalies (the number of MEC and munitions scrap found on the surface is displayed in the grid) and grey grid filling represents 0 subsurface anomalies.

- b. Range 6: It appears that the majority of the range features for this range are not included within the sampling unit. It also appears that some terrestrial areas along the coast were also not included in the MEC clearance. Please clarify.

Navy Response: The sampling units for UXO 13 were created based on the results of the MEC removal activities and located to correspond to the areas where the higher number of MEC and MD were identified and recovered. Please also note that the areas along the coast are a separate UXO site (UXO 7) and sampling within these range features will be considered for that site.

MEC removal in some areas has not been conducted for a variety of reasons, including requests by USFWS to avoid vegetation clearance in the areas that would be required to conduct surface clearance or other factors such as the presence of steep slopes, inundation with water, etc.).

PREQB Evaluation of Response: Based on the response, it appears that MEC removal will not occur along the coast. Please clarify the basis for not conducting MEC clearance in this area, rather than providing general reasons applicable across all sites as to why MEC would not occur. Please also note whether this information will be provided as part of the UXO 7 investigation.

Navy Response to Evaluation: MEC removal has been conducted along the coast. As noted in the original response, the beach (and the thin vegetated zone immediately adjacent to the beach) is part of UXO 7. Figure 6 has been revised to show the MEC removal information for UXO 7 (as part of the NTCRA) for illustrative purposes only since UXO 7 is not part of the UXO 13 investigation.

- c. Sampling Unit 3DU03: Please provide details on the ephemeral streambed characteristics, i.e., number of depositional areas, if any, and relative presence of fines vs sands and gravels. If relatively few depositional areas or fines are present, then discrete samples may be more appropriate than an incremental sample.

Navy Response: The streambed has not been characterized yet and a summary of the depositional areas and locations where there are more fines than coarse materials is not available. However, like all proposed sampling locations, this sampling unit is subject to change based on observations made in the field, with objective to collect samples in the most conservative areas. When the UXO 13 RI is conducted, the stream will be walked and observations such as those described in the comment will be made. If warranted, the sampling unit location will be adjusted in accordance with the stated objective. If adjustments are made, they will be described, along with the rationale, in the UXO 13 RI Report. This information has been added to the text.

15. Figure 8: It appears that a significant number of the soil sample locations are in topographically elevated areas (i.e., 4SO01, 4SO02, and 4SO04 to 4SO06). Please clarify why these area were selected over potential depositional areas.

Navy Response: The sample locations are “placeholders” (defaults). Actual locations will be selected in the field based on observations and may be adjusted to ensure they are collected in the most conservative areas. If they are adjusted based on field observations, they will be described, along with the rationale, in the UXO 13 RI Report. This information has been added to the text.

Final Responses to Department of Natural and Environmental Resources Comments

DNER Comments on: UXO 13 RI Master SAP Addendum 3 Comments Made by DNER on January 15, 2015					
PDF Page #	Doc. Page #	Section #	Highlighted Document Text/Summary of Content	DNER Comments	Navy Response
11	5	Wksht #11	The Navy, EPA, PREQB, and USFWS will use the data collected during the RI Sampling (as well as relevant historical data) at UXO 13 to make determinations of whether CERCLA-related releases took place and, if so, whether further investigation or action is warranted.	Edit to: The Navy, EPA, PREQB, <u>PRDNER</u> , and USFWS will use the data collected during the RI Sampling (as well as relevant historical data) at UXO 13 to make determinations of whether CERCLA-related releases took place and, if so, whether further investigation or action is warranted.	The edit specified in the comment has been made.
12	6	Wksht #11	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 safety risk for the intended land use, and (2) environmental media can be appropriately characterized	Edit as follows: 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 safety <u>and contaminant toxicity</u> risk for the intended land use, and (2) environmental media can be appropriately characterized	The referenced text is accurate as written. Toxicity associated with chemical constituents is addressed in the second bullet in Section 9 of Worksheet #11, which states: "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."

DNER Comments on: UXO 13 RI Master SAP Addendum 3 Comments Made by DNER on January 15, 2015					
PDF Page #	Doc. Page #	Section #	Highlighted Document Text/Summary of Content	DNER Comments	Navy Response
30	24	Wksht #17	Sampling and Design and Rationale	In order to assess bioavailability of contaminants, add land crab tissue (from Laguna Algodones) sample collection and analyses. This change would be reflected in other worksheets such as Worksheets 18 & 19 as well. This would facilitate accurate ecological risk characterization.	As discussed in the March 2015 Technical Subcommittee meeting, land crab tissue sampling is not warranted, at least at this stage of the RI. If evaluation of RI soil data suggest there may be a concern associated with land crab, land crab tissue sampling may be considered.

Final Responses to USFWS Comments
Draft Addendum 3, Master Sampling and Analysis Plan,
UXO 13 Remedial Investigation

1. SAP Worksheet 17 – Sampling and Design and Rationale, Sampling Approach, Soil, page 23: It would be useful if the introductory paragraph were to indicate that several types of sampling will occur in each sampling unit including multi-incremental sampling, discrete subsurface soil sampling, discrete deeper subsurface soil sampling, surface water sampling and sediment sampling, and that nature of these samples are defined by the Vieques sampling protocol. Additionally, it should be mentioned that the initial sampling design was developed several years ago and detailed in the Master SAP and that the following text represents a fine tuning of the approach.

Navy Response: The requested information has been added to Worksheet #17.

2. Soil from the sampling units will be collected from the 0 to 2.5 inch depth. Please add that this soil will be collected and composted as a multi-incremental sample.

Navy Response: The requested statement has been added to Worksheet #17.

3. A number of multi-incremental sampling units are located in ephemeral stream corridors. Please indicate that these samples will be treated as soil, not sediment.

Navy Response: The following statement has been added to the first paragraph discussing the soil sampling: "There are several sampling units that are located within ephemeral streams at the site. Due to the nature of these streams (they are dry except during and immediately following precipitation events), the samples collected from these locations will be soil samples, not sediment samples."

4. Please indicate that the sampling units that were adjusted were done so relative to the initial configuration detailed in the Master SAP and on the basis of the NTCRA data.

Navy Response: The following text has been added before the first paragraph of Worksheet #17 in the Sampling Approach section: "The sampling approach for UXO 13 was established in the Master SAP (CH2M HILL, 2013), which included the sample collection techniques, analyses, and locations. The locations were based on the MEC information that had been collected through October 2012. However, since that document was finalized, additional information has been gathered from the site and used to adjust the sample locations, as appropriate, in order to ensure the original objective (sampling in the most conservative areas) will still be met. This approach is in accordance with the Master SAP."

5. Sampling unit VE-UX013-1DU1 1 is referred to as a "Former target area within Range 4A" on Table 1. This should be changed to "Former target area within Range 4."

Navy Response: The requested edit has been made.

6. The acronym for oxidation-reduction potential is incorrectly stated as QPR. Please revise.

Navy Response: The requested edit has been made.