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# FINAL ADDENDUM 4 MASTER SAMPLING AND ANALYSIS PLAN UXO 3, 5, 6, AND 11 REMEDIAL INVESTIGATION ATLANTIC FLEET WEAPONS TRAINING AREA FORMER VIEQUES NAVAL TRAINING RANGE VIEQUES ISLAND PUERTO RICO

01/01/2016

CH2M HILL

**Final**

# Addendum 4
# Master Sampling and Analysis Plan
# UXOs 3, 5, 6, and 11 Remedial Investigation

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

**Contract Task Order 005**

**January 2016**

Prepared for

**Department of the Navy**
**Naval Facilities Engineering Command**
**Atlantic**

Under the

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Prepared by


**Virginia Beach, Virginia**

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# Executive Summary

The Master Sampling and Analysis Plan (SAP), East Vieques Terrestrial UXO Sites, Former Vieques Naval Training Range, Vieques, Puerto Rio (CH2M HILL, 2013), 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 4 to the Master SAP and it includes an update of the conceptual site model (CSM) with additional sampling locations at UXO 6 and UXO 11 based on a refined land use plan provided by United States Fish and Wildlife Service (USFWS) (sampling locations/approach in UXOs 3 and 5 are the same as those developed in the Master SAP because the CSM for those UXOs has not changed). Also included are the laboratory-specific worksheets for analysis of discrete soil and incremental soil samples to be collected from UXOs 3, 5, 6, and 11. 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, 2013). **Figures ES-1 (UXO 3), ES-2 (UXO 5), ES-3 (UXO 6 East), ES-4 (UXO 6 West), ES-5 (UXO 11 East),** and **ES-6 (UXO 11 Central)** show the locations of UXOs 3, 5, 6, and 11 and the historical features relevant to the planned investigation.

The original sampling approach for UXOs 3, 5, 6, and 11 was established in the Master SAP (CH2M HILL, 2013), 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, a refined land use plan has been provided by USFWS indicating that three rest areas are intended along the roads in UXOs 6 and 11. In order to ensure the original objective (sampling in the most conservative areas) will still be met, one additional sampling unit has been added to UXO 6, and two additional sampling units have been added to UXO 11. This approach is in accordance with the Master SAP. In total, 28 incremental surface soil and 56 discrete subsurface soil samples will be collected from UXOs 3, 5, 6, and 11. Sample locations are shown in **Figures ES-1 (UXO 3), ES-2 (UXO 5), ES-3 (UXO 6 East), ES-4 (UXO 6 West), ES-5 (UXO 11 East),** and **ES-6 (UXO 11 Central)**. 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), pH, and TOC
- ALS Environmental in Keslo, WA for analysis of soil oxidation reduction potential (ORP)

NOTE: THIS SUMMARY IS PRESENTED IN ENGLISH AND SPANISH FOR THE CONVENIENCE OF THE READER. EVERY EFFORT HAS BEEN MADE FOR THE TRANSLATIONS TO BE AS ACCURATE AS REASONABLY POSSIBLE. HOWEVER, READERS SHOULD BE AWARE THAT THE ENGLISH VERSION OF THE TEXT IS THE OFFICIAL VERSION.

NOTA: ESTE RESUMEN SE PRESENTA EN INGLÉS Y EN ESPAÑOL PARA LA CONVENIENCIA DEL LECTOR. SE HAN HECHO TODOS LOS ESFUERZOS PARA QUE LA TRADUCCIÓN SEA PRECISA EN LO MÁS RAZONABLEMENTE POSIBLE. SIN EMBARGO, LOS LECTORES DEBEN ESTAR AL TANTO QUE EL TEXTO EN INGLÉS ES LA VERSIÓN OFICIAL.

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# Resumen Ejecutivo

El Plan Maestro Final de Muestreo y Análisis (SAP, por sus siglas en inglés) de los Sitios UXO Terrestres en el Este de Vieques, Antiguo Campo de Adiestramiento Naval de Vieques, Vieques, Puerto Rico (CH2M HILL, 2013), en lo sucesivo referido como el SAP Maestro, fue preparado para guiar las actividades de la Investigación para la Remediación (RI, por sus siglas en inglés) en múltiples sitios UXO en el antiguo Campo de Adiestramiento Naval de Vieques (VNTR, por sus siglas en inglés), las cuales se llevarán a cabo durante varios años. Debido a la naturaleza robusta y el largo plazo de las actividades cubiertas por el SAP Maestro, éste intencionalmente no identifica un laboratorio específico, en cambio incluye los protocolos que se requiere que cualquier laboratorio seleccionado cumpla. Por lo tanto, está diseñado para ser usado en conjunto con los anejos de sitios específicos que proveen las hojas de trabajo de laboratorio relacionados a los análisis químicos en específico y cualquier actualización a las actividades planificadas, basado en información recopilada desde que se emitió el SAP Maestro.

Este es el Anejo 4 al SAP Maestro e incluye una actualización del modelo conceptual del sitio (CSM, por sus siglas en inglés) con localizaciones de muestreo adicionales para UXO 6 y UXO 11 en base a un plan refinado de uso del terreno provisto por USFWS (las localizaciones de muestreo/enfoque en los UXOs 3 y 5 son los mismos que se desarrollaron en el SAP Maestro porque el CSM para esos UXOs no ha cambiado). También se incluyen las hojas de trabajo específicas a cada laboratorio para el análisis de las muestras de suelos discretas y las muestras de suelo incrementales a ser colectadas de los UXOs 3, 5, 6 y 11. Para el resto de las hojas de trabajo (es decir, aquellas sin cambios o sin cambios sustanciales por selección de laboratorios específicos), por favor consulte el SAP Maestro (CH2M HILL, 2013). Las **Figuras ES-1 (UXO 3), ES-2 (UXO 5), ES-3 (UXO 6 Este), ES-4 (UXO 6 Oeste), ES-5 (UXO 11 Este),** y **ES-6 (UXO 11 Central)** muestran la localización de los UXOs 3, 5, 6, y 11 y las características históricas relevantes para la investigación planificada.

El método de muestreo original para UXOs 3, 5, 6 y 11 se estableció en el SAP Maestro (CH2M HILL, 2013), el cual incluye las técnicas de obtención, análisis y localizaciones de las muestras. Las localizaciones se basaron en la información que se había obtenido hasta octubre del 2012 sobre las municiones y explosivos de preocupación (MEC, por sus siglas en inglés). Sin embargo, desde que ese documento fue finalizado, USFWS proveyó un plan refinado de uso del terreno indicando que se planifican tres áreas de descanso a lo largo de los caminos en UXOs 6 y 11. Con el fin de asegurarse de que el objetivo original (muestreo en las zonas más conservadoras) todavía se cumpla, se añadió una unidad de muestreo adicional a UXO 6 y dos unidades de muestreo adicionales se añadieron a UXO 11. Este enfoque es de acuerdo con el SAP Maestro. En total, se obtendrán 28 muestras incrementales de suelo superficial y 56 muestras discretas de subsuelo en UXOs 3, 5, 6, y 11. La ubicación de los puntos de muestreo se muestran en las **Figuras ES-1 (UXO 3), ES-2 (UXO 5), ES -3 (UXO 6 al Este), ES-4 (UXO 6 Oeste), ES-5 (UXO 11 Este), y ES-6 (UXO 11 Central).** Los puntos de muestreo actualizados reflejan un esfuerzo colaborativo entre la Marina, las agencias regulatorias, y el administrador de los terrenos para seleccionar las localizaciones y los tipos de muestreo para asegurar que se cumplan los objetivos de la RI.

Los siguientes laboratorios fueron seleccionados para realizar los análisis de las muestras. Las hojas específicas para cada laboratorio que se encuentran en este documento demuestran que los laboratorios cumplen con los protocolos del SAP Maestro, o, si aplica, provee justificación para la desviación.

- APPL, Inc. en Clovis, CA para análisis de explosivos, inorgánicos (metales), pH, y TOC
- ALS Environmental en Keslo, WA para análisis de potencial de oxidación y reducción de suelos ORP)

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CONVOY
RR TUNNEL
VE-UXO3-1DU03
VE-UXO3-1DU04
VE-UXO3-1DU05
VE-UXO3-1DU01
VE-UXO3-1DU02
VE-UXO3-1DU06
VE-UXO3-1DU07
VE-UXO3-1DU08
PI-1
Laguna Gato
Laguna Icacos
Laguna Anones
ECA Lagoon
SAM EAST
SAM WEST
AMMO DUMP
OPEN BURNING PIT
SWMU 3
SWMU 9
AIRSTRIP
FUEL FARM
T1
T2
T3
T4
T5
T6
T7

**Subsurface Anomalies/Finds 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

**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.

- Sampling Unit
- Bombs
- Flares-Pyrotechnics
- Grenades
- MEC Component
- Projectiles / Mortars
- Rockets / Guided Missiles
- Scrap (Munitions Debris)
- Submunitions
- Decision Unit

- Topographic Contours (10 Meter)
- Stream
- Crater
- Historical Air-To-Ground (ATG) Target
- Historical Naval Gunfire Support (NGFS) Target
- Bulls Eye Target
- LIDAR (Light Detection and Radar) Identified Target Feature
- North Convoy Target Area
- Central Processing Center

- Target Area
- Open Burn Pit
- Open Detonation Area
- Naval Gunfire Support (NGFS) Target Area
- Photo Identified Area
- Preliminary Area of Concern
- Solid Waste Management Unit
- Grid (30 Meter)
- Lagoon

2005 Aerial Imagery
2005 Hillshade

**Density of MEC and Munitions Debris 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

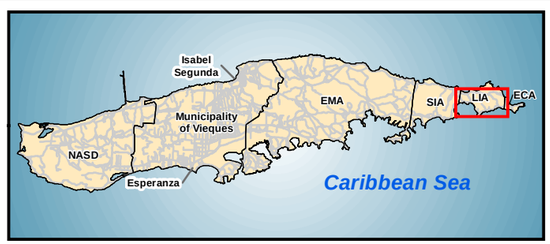


**Figure ES-1**
**UXO 3 LIA Road Sampling Approach**
*Master Sampling and Analysis Plan Addendum 4*
*Former VNTR*
*Vieques, Puerto Rico*

N
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S
0 250 500
Feet

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Road Sample Units
Decision Unit

Bombs
Flares-Pyrotechnics
Grenades
MEC Component
Projectiles / Mortars
Rockets / Guided Missiles
Scrap (Munitions Debris)
Submunitions
Transect -3 Foot Width was Investigated
Topographic Contours (10 Meter)
Stream

Crater
Historical Air-To-Ground (ATG) Target
Historical Naval Gunfire Support (NGFS) Target
Bulls Eye Target
Central Processing Center
Gun Positions

Target Area
Observation Point
Range
Naval Gunfire Support (NGFS) Target Area
Photo Identified Area
Preliminary Area of Concern
Solid Waste Management Unit
Grid (30 Meter)
Yellow Shading Indicates No MEC Investigation
Lagoon

2005 Aerial Imagery
2005 Hillshade

**Density of MEC and Munitions Debris 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

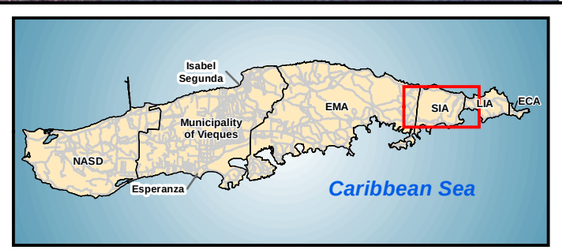


**Figure ES-2**
**UXO 5 Sampling Approach**
*Master Sampling and Analysis Plan Addendum 4*
*Former VNTR*
*Vieques, Puerto Rico*

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G-32
G-20
G-22
Range 11
PAOC Y
SWMU 11
G-21
G-33
G-34
G-35
G-36 (1964)
GP-1
OP-1
Lagoon 16
Lagoon 14
Lagoon 15
Lagoon 15
Range 10
Lagoon 13
Lagoon 12
Laguna Matias
PI-17
Lagoon 11
Lagoon 5
Lagoon 6
VE-UXO6-1DU01
VE-UXO6-1DU02
VE-UXO6-1DU03
VE-UXO6-1DU04

**Subsurface Anomalies/Finds 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

**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.

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

2005 Aerial Imagery
2005 Hillshade

- Topographic Contours (10 Meter)
- Stream
- Gun Positions
- Target Area
- Observation Point
- Range
- Photo Identified Area
- Preliminary Area of Concern
- Solid Waste Management Unit
- Grid (30 Meter)
- Yellow Shading Indicates No MEC Investigation
- Lagoon

**Density of MEC and Munitions Debris 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


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**Figure ES-3**
**UXO 6 (East Portion) Sampling Approach**
*Master Sampling and Analysis Plan Addendum 4*
*Former VNTR*
*Vieques, Puerto Rico*

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Newly Proposed Rest Area

VE-UXO6-1DU05

G-5
G-24
G-31
G-32
G-33
G-30
PI-3
PI-2
PI-19 possible gun position
Laguna Yanuel
Laguna La Plata
Lagoon 16
Lagoon 14
Lagoon 15
Lagoon 15

**Subsurface Anomalies/Finds 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

**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.

- Decision Unit
- New Sampling Unit
- Bombs
- 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
- Photo Identified Area
- Grid (30 Meter)
- Yellow Shading Indicates No MEC Investigation
- Lagoon
- Newly Proposed Rest Area

2005 Aerial Imagery
2005 Hillshade

**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

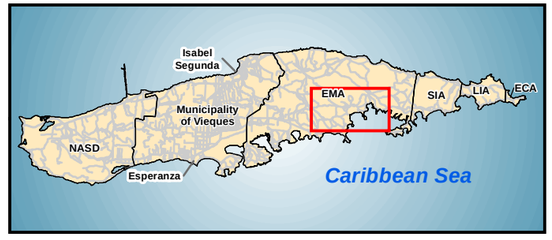


**Figure ES-4**
**UXO 6 (West Portion) Sampling Approach**
*Master Sampling and Analysis Plan Addendum 4*
*Former VNTR*
*Vieques, Puerto Rico*

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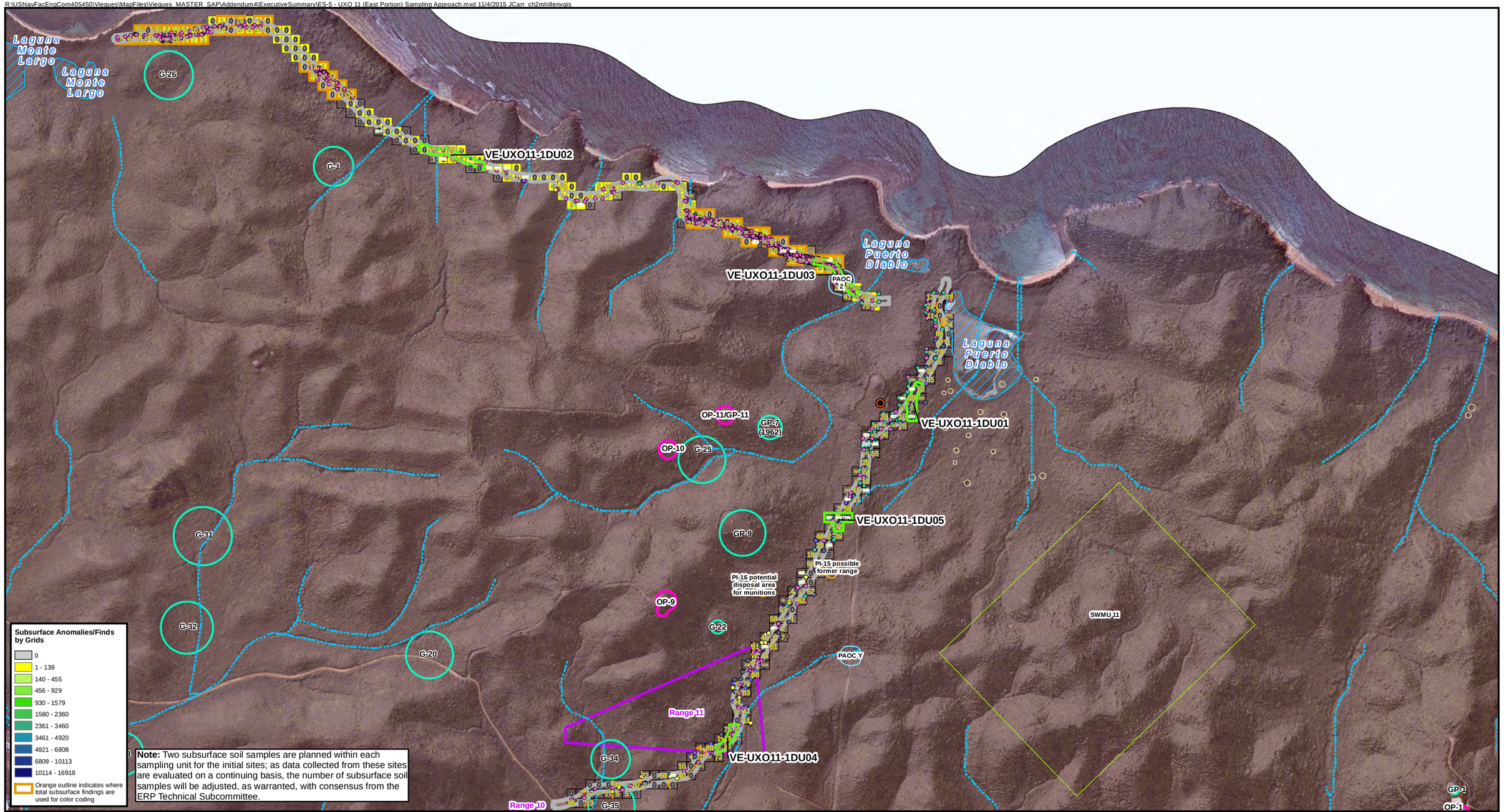


New Sample Unit
Sample Unit
Decision Unit
Bombs
Flares-Pyrotechnics
Grenades
MEC Component
Projectiles / Mortars
Rockets / Guided Missiles
Scrap (Munitions Debris)

Transect -3 Foot Width was Investigated
Stream
Crater
Bulls Eye Target
Gun Positions
Observation Point
Range
Photo Identified Area
Preliminary Area of Concern
Solidl Waste Management Unit

Grid (30 Meter)
Yellow Shading Indicates No MEC Investigation
Lagoon

2005 Aerial Imagery
2005 Hillshade

**Density of MEC and Munitions Debris 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

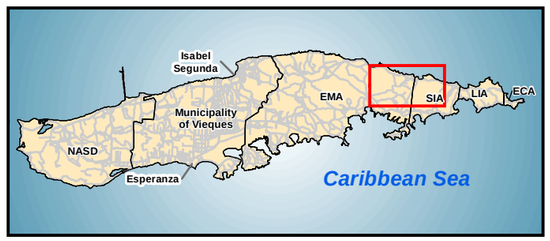


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**Figure ES-5**
**UXO 11 (East Portion) Sampling Approach**
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*Former VNTR*
*Vieques, Puerto Rico*

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PAOC BB
PAOC CC
PAOC DD
PAOC AA
Range 2
Range 3
Range 4
Range 4A
Range 4B
Range 5
Range 6
Range 7
Range 8
Range 9
Laguna Algodones
Laguna Algodones
Laguna Monte Largo
Laguna Monte Largo
G-2
G-3
G-4
G-5
G-6
G-7
G-8
G-10
G-11
G-12
G-13
G-14
G-15
G-16
G-17
G-18
G-19
G-24
G-28
G-29
PI-12
VE-UXO11-1DU06
VE-UXO11-1DU07
Newly Proposed Rest Area
Newly Proposed Rest Area

**Subsurface Anomalies/Finds 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

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

- Gun Positions
- Range
- Photo Identified Area
- Preliminary Area of Concern
- Grid (30 Meter)
- Yellow Shading Indicates No MEC Investigation
- Lagoon
- Newly Proposed Rest Area

2005 Aerial Imagery
2005 Hillshade

**Density of MEC and Munitions Debris 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

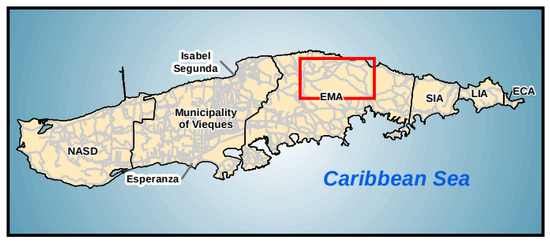


**Figure ES-6**
**UXO 11 (Central Portion) Sampling Approach**
*Master Sampling and Analysis Plan Addendum 4*
*Former VNTR*
*Vieques, Puerto Rico*

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# Contents

## Attachments



## Figures

# Acronyms and Abbreviations

| | |
|---|---|
| ASTM | American Society for Testing and Materials |
| CCV | continue calibration verification |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CLEAN | Comprehensive Long-term Environmental Action—Navy |
| CTO | Contract Task Order |
| DGM | digital geophysical mapping |
| DL | detection limit |
| DoD | Department of Defense |
| DQI | data quality indicator |
| EMA | Eastern Maneuver Area |
| EPA | Environmental Protection Agency |
| ERA | Ecological Risk Assessment |
| ERP | Environmental Restoration Program |
| ESV | ecological soil value |
| EXPLO | explosives |
| 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 | limit of detection |
| LOQ | limit of quantitation |
| LRB | laboratory reagent blank |
| µg/kg | micrograms per kilogram |
| 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 |
| MS/MSD | matrix spike/matrix spike duplicate |
| N/A | not applicable |
| NASD | Naval Ammunition Support Detachment |
| NAVFAC | Naval Facilities Engineering Command |

| | |
|---|---|
| Navy | Department of the Navy |
| NOAA | National Oceanic and Atmospheric Administration |
| ORP | oxidation-reduction potential |
| OU | Operable Unit |
| PAL | project action limit |
| PDS | post digestion spike |
| 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 |
| 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 |
| SIA | surface impact area |
| SMI | multi-incremental sampling |
| SOP | standard operating procedure |
| SSL | soil screening level |
| SW | surface water |
| TBD | to be determined |
| TOC | total organic carbon |
| UCL | upper control limit |
| UFP | Uniform Federal Policy |
| US | United States |
| USFWS | United States Fish and Wildlife Service |
| UTL | upper tolerance limit |
| UXO | unexploded ordnance |
| VNTR | Vieques Naval Training Range |
| VOA | volatile organic analyte |
| WCHEM | wet chemistry |

# SAP Worksheet #1—Title and Approval Page

**Final**
**Addendum 4**
**Master Sampling and Analysis Plan**
**UXOs 3, 5, 6, and 11 Remedial Investigation**

**Atlantic Fleet Weapons Training Area – Vieques**
**Former Vieques Naval Training Range**
**Vieques, Puerto Rico**
**Contract Task Order 0005**
**January 2016**

**Prepared for:**

**Department of the Navy**
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**Prepared by:**

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**Prepared under:**

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

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# SAP Worksheet #2—SAP Identifying Information

**Site Name/Number:** UXOs 3, 5, 6, and 11 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 (UFP)-Quality Assurance Project Plans (QAPP) (Intergovernmental Data Quality Task Force, 2005) and United States (US) Environmental Protection Agency (EPA) Guidance for QAPPs, USEPA QA/G-5, Quality Assurance Management Section (QAMS) (EPA, 2002).
2. Regulatory program: Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).
3. This SAP is prepared as an addendum to the *Master SAP for East Vieques Terrestrial UXO Sites* (denoted as the Master SAP in this SAP Addendum) (CH2M HILL, 2013) to provide the laboratory-specific chemistry worksheets specific to the UXOs 3, 5, 6, and 11 Remedial Investigation (RI). In addition, several sampling units have been added in areas recently identified by United States Fish and Wildlife Service (USFWS) as roadside rest areas.
4. Dates of scoping sessions:

| Scoping Session | Date |
|---|---|
| Scoping sessions are provided in the Master SAP | |

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

| Title | Date |
|---|---|
| *Work Plan for Munitions and Explosives of Concern Subsurface Removal Action Beaches and Select Roadways, Former Vieques Naval Training Range and Former Naval Ammunition Support Detachment (NASD) Solid Waste Management Unit 4, Vieques, Puerto Rico* (CH2M HILL) | October 2008 |
| *Master Standard Operating Procedures, Protocols, and Plans, Environmental Restoration Program, Vieques, Puerto Rico* (CH2M HILL) | April 2010 |
| *Master SAP for East Vieques Terrestrial UXO Sites, Former Vieques Naval Training Range, Vieques, Puerto Rico* (CH2M HILL) | January 2013 |

# SAP Worksheet #2—SAP 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.
   - **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, 2013] for a detailed list of data users):

   - US Department of the Navy (Navy).

8. The omitted SAP elements excluded and provide an explanation for their exclusion below:

   This addendum includes only those worksheets 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 #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 UXOs 3, 5, 6, and 11 to make determinations of whether CERCLA-related releases of munitions constituents 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. For any constituent (e.g., Explosive D [ammonium picrate (picric acid)]) that does not have an RSL, the analytical results will be used for informational purposes (i.e., indication of presence/absence) and will not be used to make risk-based decisions for the sites.
- Vieques ecological screening values for soil, which are listed in the Vieques Master Ecological Risk Assessment (ERA) Protocol (CH2M HILL, 2010c) and associated Master Ecological Risk Assessment Protocol Revision 1 (CH2M HILL, 2015). For any constituent (e.g., Explosive D) that does not have an ecological screening value, the analytical results will be used for informational purposes (i.e., indication of presence/absence) and will not be used to make risk-based decisions for the sites.
- Soil-to-groundwater leaching screening values provided by EPA (2015).
- East Vieques background soil inorganics upper tolerance limits (UTLs) (CH2M HILL, 2007).
- 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. These parameters are identified in **Worksheet #15-3**. There are no project indicator limits (PILs); pH, oxidation-reduction potential (ORP), and total organic carbon (TOC) results will be the only screening data generated.
- 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 still greater than the PAL: 1,3-dinitrobenzene Soil Screening Level (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), nitrobenzene (SSL), nitroglycerin (SSL), PETN (SSL), hexavalent chromium (SSL). Refer to Master SAP (CH2M HILL, 2013) Worksheet #37.
- 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 Site Inspection/Expanded Site Inspection Report [CH2M HILL, 2010c]). Since all instances of where the DL is higher than the PAL are SSLs, no special methods will be utilized for the associated analyses.

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

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

- Soil samples will be submitted to an offsite laboratory for analysis (APPL, Inc., of Clovis, CA; ALS-Kelso of Kelso, WA).
- Chemicals of interest consist of explosives constituents and metals, as shown in **Worksheets #15-1** and **#15-2.**
- **Worksheets #15** and **#18** define the matrices, analytical groups, and, where applicable, specific target analytes for UXOs 3, 5, 6, and 11.

**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 UXOs 3, 5, 6, and 11. Laboratory methods will meet CERCLA, EPA Region 2, and Navy guidance and the data will be validated by a third-party validator using national functional guidance, methodology, and laboratory Standard Operating Procedures (SOPs) as described in Worksheet #36 of the Master SAP.
- 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 US 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 UXOs 3, 5, 6, and 11. **Worksheets #15** contain 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 are anticipated to be collected during one field mobilization planned to occur around February 2016.
- The sampling rationale and locations are described in Worksheets #17 and #18 and are shown on **Figures 2 through 7**.
- Data will be collected and generated in accordance with the procedures outlined in the Master SAP. Specifically, see the SOPs in Appendix D of the Master SAP (CH2M HILL, 2013) 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 being performed by ALS-Kelso of Kelso, WA.

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

- The data will be evaluated and documented in an RI Report. The data will be evaluated and documented in an RI Report. Additional samples may be collected if the data from the samples included in this SAP indicate the nature and extent of contamination has not been sufficiently delineated. In that case, a meeting or call will be held among the Vieques Technical Subcommittee to discuss the findings and recommendations and concur on the additional sample locations. Meeting minutes and updated figures showing sampling locations will constitute the necessary documentation for collecting the additional samples and they will be collected under this SAP. This process will ensure the RI is completed in the most expeditious manner possible to facilitate future planned land use. If additional data are deemed necessary by the ERP Technical Subcommittee, those data will be collected prior to preparing the RI Report.

**8. How will the data be archived?**

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

**9. List the project quality objectives (PQOs) in the form of if/then qualitative and quantitative statements.**

The general objectives of the decision analysis process for the UXO sites in the Master SAP are:

- To sufficiently characterize the nature and extent of munitions and explosives of concern (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 UXOs 3, 5, 6, and 11, the nature and extent of MEC at these sites 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 6-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 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, SMI
**Analytical Group:** EXPLO

| Analyte[1] | CAS # | RSLs Residential Soil Adjusted[2] (µg/kg) | RSLs Industrial Soil Adjusted[2] (µg/kg) | SSLs[2] (µg/kg) | Ecological Soil ESVs[2] (µg/kg) | Project QL Goal[3] (µg/kg) | Laboratory Limits[4] (µg/kg) | | | Lab Control Sample (LCS) and Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recovery Limits and Relative Percent Difference (RPD)[5] (%) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | LOQ | LOD | DL | LCL | UCL | RPD |
| 1,3,5-Trinitrobenzene (1,3,5-TNB) | 99-35-4 | 220,000 | 3,200,000 | 2,100 | NC | 1,050 | 500 | 200 | 79 | 80 | 116 | 20 |
| 1,3-Dinitrobenzene (1,3-DNB) | 99-65-0 | 620 | 8,200 | 2 | NC | 1 | 450 | 200 | 63 | 73 | 119 | |
| 2,4,6-Trinitrotoluene (2,4,6-TNT) | 118-96-7 | 3,600 | 52,000 | 15 | 10,000 | 7.5 | 500 | 200 | 83 | 71 | 120 | |
| 2,4-Dinitrotoluene (2,4-DNT) | 121-14-2 | 1,700 | 7,400 | 0.32 | 11,000 | 0.16 | 500 | 200 | 83 | 75 | 121 | |
| 2,6-Dinitrotoluene (2,6-DNT) | 606-20-2 | 360 | 1,500 | 0.07 | 8,500 | 0.034 | 500 | 200 | 83 | 79 | 117 | |
| 2-Amino-4,6-dinitrotoluene (2-Am-DNT) | 35572-78-2 | 15,000 | 230,000 | 30 | 80,000 | 15 | 500 | 200 | 75 | 71 | 123 | |
| 2-Nitrotoluene (2-NT) | 88-72-2 | 3,200 | 15,000 | NC | NC | 1,600 | 500 | 200 | 66 | 70 | 124 | |
| 3-Nitrotoluene (3-NT) | 99-08-1 | 620 | 8,200 | 1.6 | NC | 0.8 | 500 | 200 | 71 | 67 | 129 | |
| 4-Amino-2,6-dinitrotoluene (4-Am-DNT) | 19406-51-0 | 15,000 | 230,000 | 30 | 80,000 | 15 | 500 | 200 | 75 | 64 | 127 | |
| 4-Nitrotoluene (4-NT) | 99-99-0 | 25,000 | 140,000 | 4 | NC | 2 | 500 | 200 | 80 | 71 | 124 | |
| Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) | 121-82-4 | 6,000 | 28,000 | 0.27 | 10,000 | 0.135 | 500 | 200 | 80 | 67 | 129 | |
| Methyl-2,4,6-trinitrophenylnitramine (Tetryl) | 479-45-8 | 12,000 | 160,000 | 370 | 10,000 | 185 | 500 | 200 | 91 | 68 | 135 | |
| Nitrobenzene (NB) | 98-95-3 | 5,100 | 22,000 | 0.092 | 2,260 | 0.046 | 500 | 200 | 75 | 67 | 129 | |
| Nitroglycerin (NG) | 55-63-0 | 620 | 8,200 | 0.85 | NC | 0.425 | 500 | 200 | 85 | 73 | 124 | |
| Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX) | 2691-41-0 | 380,000 | 5,700,000 | 1,300 | 10,000 | 650 | 500 | 200 | 80 | 74 | 124 | |
| Pentaerythritol tetranitrate (PETN) | 78-11-5 | 12,000 | 160,000 | 28 | NC | 14 | 2500 | 1000 | 579 | 72 | 128 | |
| Perchlorate | 14797-73-0 | 5,500 | 82,000 | NC | 1,000 | 500 | 6 | 4 | 2 | 84 | 121 | 15 |
| Picric Acid[6] | 88-89-1 | NC | NC | NC | NC | 26,700 | 200 | 120 | 60 | **30** | **130** | 20 |

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

**Matrix:** SB, SMI
**Analytical Group:** EXPLO

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 screening values) plus Picric Acid and Perchlorate.

[2] Refer to **Worksheet #11** for specific identification of PALs by matrix. RSLs values are current as of January 2015. SSLs are Risk-Based when an MCL-based value does not exist and are current as of January 2015. ESVs are applicable to SMI samples only.

[3] The PQL Goal is ½ 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.

[6] Results are expressed as “picric acid.” Results will also be reported as “ammonium picrate” using the following formula based on the ratio of molecular weights:
[ammonium picrate (µg/kg)] = [picric acid (µg/kg)] * (246.13/229.10)

NC indicates that there is no criterion for an analyte.

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

**Matrix:** SB, SMI
**Analytical Group:** METAL

| Analyte | CAS # | Method | RSLs Residential Soil Adjusted[1] (mg/kg) | RSLs Industrial Soil Adjusted[1] (µg/kg) | SSLs[1] (mg/kg) | Ecological Soil ESVs[1,2] (mg/kg) | Project QL Goal[3] (mg/kg) | Laboratory Limits[4] (mg/Kg) | | | LCS and MS/MSD Recovery Limits and RPD[5](%) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | LOQ | LOD | DL | LCL | UCL | RPD |
| Aluminum | 7429-90-5 | 6010C | 7,700 | 100,000 | 30,000 | NC | 3,850 | 50 | 4 | 1.98 | 74 | 119 | 20 |
| Antimony | 7440-36-0 | 6020A | 3.1 | 47 | 0.27 | 0.27 | 0.135 | 0.2 | 0.2 | 0.1 | 72 | 124 | |
| Arsenic | 7440-38-2 | 6020A | 0.67 | 3 | 0.29 | 18 | 0.145 | 0.5 | 0.3 | 0.08 | 82 | 118 | |
| Barium | 7440-39-3 | 6010C | 1,500 | 22,000 | 82 | 330 | 41 | 2 | 0.4 | 0.07 | 83 | 113 | |
| Beryllium | 7440-41-7 | 6010C | 16 | 230 | 3 | 21 | 1.6 | 0.5 | 0.2 | 0.04 | 83 | 113 | |
| Cadmium | 7440-43-9 | 6020A | 7 | 98 | 0.38 | 0.36 | 0.18 | 0.1 | 0.08 | 0.03 | 84 | 116 | |
| Calcium | 7440-70-2 | 6010C | NC | NC | NC | NC | 20 | 100 | 20 | 12 | 81 | 116 | |
| Chromium | 7440-47-3 | 6020A | 0.3 | 6.3 | 100,000 | 26 | 0.15 | 0.5 | 0.2 | 0.07 | 83 | 119 | |
| Chromium (hexavalent) | 18540-29-9 | 7199 | 0.3 | 6.3 | 0.00067 | 0.40 | 0.000335 | 0.6 | 0.4 | 0.3 | 80 | 120 | |
| Cobalt | 7440-48-4 | 6020A | 2.3 | 35 | 0.27 | 13 | 0.135 | 0.1 | 0.08 | 0.02 | 84 | 115 | |
| Copper | 7440-50-8 | 6010C | 310 | 4,700 | 46 | 28 | 14 | 5 | 0.4 | 0.21 | 81 | 117 | |
| Iron | 7439-89-6 | 6010C | 5,500 | 82,000 | 350 | NC | 175 | 80 | 4 | 3.5 | 81 | 118 | |
| Lead | 7439-92-1 | 6010C | 400 | 800 | 14 | 11 | 5.5 | 0.9 | 0.8 | 0.25 | 81 | 112 | |
| Magnesium | 7439-95-4 | 6010C | NC | NC | NC | NC | 4 | 30 | 4 | 3.5 | 78 | 115 | |
| Manganese | 7439-96-5 | 6010C | 180 | 2,600 | 28 | 220 | 14 | 4.5 | 0.4 | 0.13 | 84 | 114 | |
| Nickel | 7440-02-0 | 6010C | 150 | 2,200 | 26 | 38 | 13 | 4 | 0.4 | 0.11 | 83 | 113 | |
| Potassium | 7440-09-7 | 6010C | NC | NC | NC | NC | 50 | 300 | 50 | 40 | 81 | 116 | |
| Selenium | 7782-49-2 | 6020A | 39 | 580 | 0.26 | 0.52 | 0.13 | 0.5 | 0.1 | 0.1 | 80 | 119 | |
| Silver | 7440-22-4 | 6020A | 39 | 580 | 0.8 | 4.2 | 0.4 | 0.1 | 0.05 | 0.02 | 83 | 118 | |

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

**Matrix:** SB, SMI
**Analytical Group:** METAL

| Analyte | CAS # | Method | RSLs Residential Soil Adjusted[1] (mg/kg) | RSLs Industrial Soil Adjusted[1] (µg/kg) | SSLs[1] (mg/kg) | Ecological Soil ESVs[1,2] (mg/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 |
| Sodium | 7440-23-5 | 6010C | NC | NC | NC | NC | 50 | 500 | 50 | 45 | 83 | 118 | |
| Thallium | 7440-28-0 | 6020A | 0.078 | 1.2 | 0.14 | 1 | 0.039 | 0.1 | 0.05 | 0.02 | 83 | 118 | |
| Vanadium | 7440-62-2 | 6010C | 39 | 580 | 86 | 7.8 | 3.9 | 2 | 0.4 | 0.1 | 82 | 114 | 20 |
| Zinc | 7440-66-6 | 6010C | 2,300 | 35,000 | 370 | 46 | 23 | 8 | 4 | 1.15 | 82 | 113 | |

Notes:

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

[1] Refer to **Worksheet #11** for specific identification of PALs by matrix. RSLs values are current as of January 2015. SSLs are Risk-Based when an MCL-based value does not exist and are current as of January 2015. ESVs are applicable to SMI samples only.

[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 ½ 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.

NC indicates that there is no criterion for an analyte.

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

**Matrix:** SB, 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.

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## SAP Worksheet #16—Project Schedule / Timeline

The field investigation activities are anticipated to begin around February 2016 and last for several months. However, the Site Management Plan current for the year in which the investigation takes place will be the official project schedule, which is subject to change based on such factors as weather, resource availability, etc.

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# SAP Worksheet #17—Sampling and Design and Rationale

## Sampling Approach

Details of the sampling and design and rationale for UXOs 3, 5, 6, and 11 are provided in the Master SAP and, therefore, are not repeated here. As stated in the Master SAP, the overall approach for sampling is to focus on areas with the highest potential for contamination to provide the most conservative evaluation of releases and nature and extent of contamination. All incremental and discrete soil samples will be collected in accordance with the applicable SOPs in Appendix D of the Master SAP (CH2M HILL, 2013).

Field activities at UXOs 3, 5, 6, and 11 comprise characterization of surface and subsurface soil, as stated in the Master SAP. Each sampling unit is approximately one acre. At a minimum, two subsurface soil samples will be collected within each sampling unit.

**Figures 2 through 7** present the locations of the sampling units along the roads. To facilitate review, sampling units along the roads added since the Master SAP was finalized are shown in pink. Sampling units along the roads approved in the Master SAP are shown in green. The rationale for the sampling units shown in green is provided in the Master SAP. The rationale for the added sampling units is based on the refined land-use plan (**Figure 8**) provided by USFWS and detailed below; however, since submittal of the Master SAP, USFWS has indicated that three rest areas are intended along the road at UXOs 6 and 11 (**Figure 8**). As a result, three sampling units have been added in these areas.

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

- UXO 3 (**Figure 2**): No change to the eight sampling units documented in the Master SAP. Within each sampling unit, one incremental surface sample (0 to approximately 2.5 inches) and two (minimum) discrete subsurface soil samples will be collected.
- UXO 5 (**Figure 3**): No change to the eight sampling units documented in the Master SAP. Within each sampling unit, one incremental surface soil sample (0 to approximately 2.5 inches) and two (minimum) discrete subsurface soil samples will be collected.
- UXO 6 East Portion (**Figure 4**): No change to the four sampling units documented in the Master SAP. Within each sampling unit, one incremental surface soil sample (0 to approximately 2.5 inches) and two (minimum) discrete subsurface soil samples will be collected.
- UXO 6 West Portion (**Figure 5**): One sampling unit that includes one incremental surface soil sample (0 to approximately 2.5 inches) and two (minimum) discrete subsurface soil samples will be collected at the proposed roadside rest area identified by USFWS.
- UXO 11 East Portion (**Figure 6**): No change to the five sampling units documented in the Master SAP. Within each sampling unit, one incremental surface soil sample (0 to approximately 2.5 inches) and two (minimum) discrete subsurface soil samples will be collected.
- UXO 11 Central Portion (**Figure 7**): Two sampling units; two incremental surface soil samples (0 to 2.5 inches) and four (minimum) discrete subsurface soil samples will be collected at the proposed roadside rest areas identified by USFWS.

## Soil Sampling

Because gravel has been placed along portions of the roads within UXOs 3, 5, and 6, the gravel will be pushed aside to expose the underlying soil prior to collection of the soil samples.

- Each soil sample will be analyzed for explosives, inorganic constituents, pH, ORP, and TOC.
- Explosives and inorganics are the potential contaminants released at this site from past munitions-related activities.
- pH, ORP, and TOC data help interpret the potential contaminant data.

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

(UFP-QAPP Manual Section 3.1.1)

| Sampling Location / ID Number | Matrix | Depth | Analytical Group[1] | Number of Samples | Sampling SOP Reference |
|---|---|---|---|---|---|
| **UXO 3** | | | | | |
| **Decision Unit 1 – UXO 3 LIA Roads** | | | | | |
| **SMI Samples** | | | | | |
| VE-UXO3-1DU01 / VE-UXO3-1SMI01-MMYY<br>VE-UXO3-1DU01 / VE-UXO3-1SMI01T-MMYY<br>VE-UXO3-1DU01 / VE-UXO3-1SMI01TT-MMYY | SMI | 0 – 2.5 inches | EXPLO, METAL, WCHEM (pH, TOC, and ORP) | 3 (Triplicate) | See **Worksheet #21** |
| VE-UXO3-1DU02 / VE-UXO3-1SMI02-MMYY<br>VE-UXO3-1DU02 / VE-UXO3-1SMI02-MMYY-MS<br>VE-UXO3-1DU02 / VE-UXO3-1SMI02-MMYY-MSD | | | | 3 (MS/MSD) | |
| VE-UXO3-1DU03 / VE-UXO3-1SMI03-MMYY | | | | 1 | |
| VE-UXO3-1DU04 / VE-UXO3-1SMI04-MMYY | | | | 1 | |
| VE-UXO3-1DU05 / VE-UXO3-1SMI05-MMYY | | | | 1 | |
| VE-UXO3-1DU06 / VE-UXO3-1SMI06-MMYY | | | | 1 | |
| VE-UXO3-1DU07 / VE-UXO3-1SMI07-MMYY | | | | 1 | |
| VE-UXO3-1DU08 / VE-UXO3-1SMI08-MMYY | | | | 1 | |
| **Discrete Subsurface Soil Samples** | | | | | |
| VE-UXO3-1SO01 / VE-UXO3-1SB01-TDBD<br>VE-UXO3-1SO01 / VE-UXO3-1SB01-TDBD-MS<br>VE-UXO3-1SO01 / VE-UXO3-1SB01-TDBD-MSD | SB | (in accordance with modified Vieques Protocols) | EXPLO, METAL, WCHEM (pH, TOC, and ORP) | 3 (MS/MSD) | See **Worksheet #21** |
| VE-UXO3-1SO02 / VE-UXO3-1SB02-TDBD<br>VE-UXO3-1SO02 / VE-UXO3-1SB02P-TDBD | | | | 2 (FD) | |
| VE-UXO3-1SO03 / VE-UXO3-1SB03-TDBD | | | | 1 | |
| VE-UXO3-1SO04 / VE-UXO3-1SB04-TDBD | | | | 1 | |
| VE-UXO3-1SO05 / VE-UXO3-1SB05-TDBD | | | | 1 | |
| VE-UXO3-1SO06 / VE-UXO3-1SB06-TDBD | | | | 1 | |
| VE-UXO3-1SO07 / VE-UXO3-1SB07-TDBD | | | | 1 | |
| VE-UXO3-1SO08 / VE-UXO3-1SB08-TDBD | | | | 1 | |
| VE-UXO3-1SO09 / VE-UXO3-1SB09-TDBD | | | | 1 | |
| VE-UXO3-1SO10 / VE-UXO3-1SB10-TDBD<br>VE-UXO3-1SO10 / VE-UXO3-1SB10P-TDBD | | | | 2 (FD) | |
| VE-UXO3-1SO11 / VE-UXO3-1SB11-TDBD | | | | 1 | |
| VE-UXO3-1SO12 / VE-UXO3-1SB12-TDBD | | | | 1 | |

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

(UFP-QAPP Manual Section 3.1.1)

| Sampling Location / ID Number | Matrix | Depth | Analytical Group[1] | Number of Samples | Sampling SOP Reference |
|---|---|---|---|---|---|
| VE-UXO3-1SO13 / VE-UXO3-1SB13-TDBD | SB | (in accordance with modified Vieques Protocols) | EXPLO, METAL, WCHEM (pH, TOC, and ORP) | 1 | See **Worksheet #21** |
| VE-UXO3-1SO14 / VE-UXO3-1SB14-TDBD | | | | 1 | |
| VE-UXO3-1SO15 / VE-UXO3-1SB15-TDBD | | | | 1 | |
| VE-UXO3-1SO16 / VE-UXO3-1SB16-TDBD | | | | 1 | |
| **UXO 5 – SIA Restricted Roads** | | | | | |
| **Decision Unit 1 – UXO 5 SIA Restricted Roads** | | | | | |
| **SMI Samples** | | | | | |
| VE-UXO5-1DU01 / VE-UXO5-1SMI01-MMYY<br>VE-UXO5-1DU01 / VE-UXO5-1SMI01T-MMYY<br>VE-UXO5-1DU01 / VE-UXO5-1SMI01TT-MMYY | SMI | 0 – 2.5 inches | EXPLO, METAL, WCHEM (pH, TOC, and ORP) | 3 (Triplicate) | See **Worksheet #21** |
| VE-UXO5-1DU02 / VE-UXO5-1SMI02-MMYY<br>VE-UXO5-1DU02 / VE-UXO5-1SMI02-MMYY-MS<br>VE-UXO5-1DU02 / VE-UXO5-1SMI02-MMYY-SD | | | | 3 (MS/MSD) | |
| VE-UXO5-1DU03 / VE-UXO5-1SMI03-MMYY | | | | 1 | |
| VE-UXO5-1DU04 / VE-UXO5-1SMI04-MMYY | | | | 1 | |
| VE-UXO5-1DU05 / VE-UXO5-1SMI05-MMYY | | | | 1 | |
| VE-UXO5-1DU06 / VE-UXO5-1SMI06-MMYY | | | | 1 | |
| VE-UXO5-1DU07 / VE-UXO5-1SMI07-MMYY | | | | 1 | |
| VE-UXO5-1DU08 / VE-UXO5-1SMI08-MMYY | | | | 1 | |
| **Discrete Subsurface Soil Samples** | | | | | |
| VE-UXO5-1SO01 / VE-UXO5-1SB01-TDBD<br>VE-UXO5-1SO01 / VE-UXO5-1SB01P-TDBD | SB | (in accordance with modified Vieques Protocols) | EXPLO, METAL, WCHEM (pH, TOC, and ORP) | 2 (FD) | See **Worksheet #21** |
| VE-UXO5-1SO02 / VE-UXO5-1SB02-TDBD<br>VE-UXO5-1SO02 / VE-UXO5-1SB02-TDBD-MS<br>VE-UXO5-1SO02 / VE-UXO5-1SB02-TDBD-SD | | | | 3 (MS/MSD) | |
| VE-UXO5-1SO03 / VE-UXO5-1SB03-TDBD | | | | 1 | |
| VE-UXO5-1SO04 / VE-UXO5-1SB04-TDBD | | | | 1 | |
| VE-UXO5-1SO05 / VE-UXO5-1SB05-TDBD | | | | 1 | |
| VE-UXO5-1SO06 / VE-UXO5-1SB06-TDBD | | | | 1 | |
| VE-UXO5-1SO07 / VE-UXO5-1SB07-TDBD | | | | 1 | |

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

(UFP-QAPP Manual Section 3.1.1)

| Sampling Location / ID Number | Matrix | Depth | Analytical Group[1] | Number of Samples | Sampling SOP Reference |
|---|---|---|---|---|---|
| VE-UXO5-1SO08 / VE-UXO5-1SB08-0802<br>VE-UXO5-1SO08 / VE-UXO5-1SB08P-0802 | SB | (in accordance with modified Vieques Protocols) | EXPLO, METAL, WCHEM (pH, TOC, and ORP) | 2 (FD) | See **Worksheet #21** |
| VE-UXO5-1SO09 / VE-UXO5-1SB09-0109 | | | | 1 | |
| VE-UXO5-1SO10 / VE-UXO5-1SB10-TDBD | SB | (in accordance with modified Vieques Protocols) | EXPLO, METAL, WCHEM (pH, TOC, and ORP) | 1 | See **Worksheet #21** |
| VE-UXO5-1SO11 / VE-UXO5-1SB11-TDBD | | | | 1 | |
| VE-UXO5-1SO12 / VE-UXO5-1SB12-TDBD | | | | 1 | |
| VE-UXO5-1SO13 / VE-UXO5-1SB13-TDBD | | | | 1 | |
| VE-UXO5-1SO14 / VE-UXO5-1SB14-TDBD | | | | 1 | |
| VE-UXO5-1SO15 / VE-UXO5-1SB15-TDBD | | | | 1 | |
| VE-UXO5-1SO16 / VE-UXO5-1SB16-TDBD | | | | 1 | |
| **UXO 6 – SIA Public Roads** | | | | | |
| **Decision Unit 1 – UXO 6 SIA Public Roads** | | | | | |
| **SMI Samples** | | | | | |
| VE-UXO6-1DU01 / VE-UXO6-1SMI01-MMYY<br>VE-UXO6-1DU01 / VE-UXO6-1SMI01T-MMYY<br>VE-UXO6-1DU01 / VE-UXO6-1SMI01TT-MMYY | SMI | 0 – 2.5 inches | EXPLO, METAL, WCHEM (pH, TOC, and ORP) | 3 (Triplicate) | See **Worksheet #21** |
| VE-UXO6-1DU02 / VE-UXO6-1SMI02-MMYY<br>VE-UXO6-1DU02 / VE-UXO6-1SMI02-MMYY-MS<br>VE-UXO6-1DU02 / VE-UXO6-1SMI02-MMYY-SD | | | | 3 (MS/MSD) | |
| VE-UXO6-1DU03 / VE-UXO6-1SMI03-MMYY | | | | 1 | |
| VE-UXO6-1DU04 / VE-UXO6-1SMI04-MMYY | | | | 1 | |
| VE-UXO6-1DU05 / VE-UXO6-1SMI05-MMYY | | | | 1 | |
| **Discrete Subsurface Soil Samples** | | | | | |
| VE-UXO6-1SO01 / VE-UXO6-1SB01-TDBD<br>VE-UXO6-1SO01 / VE-UXO6-1SB01P-TDBD | SB | (in accordance with modified Vieques Protocols) | EXPLO, METAL, WCHEM (pH, TOC, and ORP) | 2 (FD) | See **Worksheet #21** |
| VE-UXO6-1SO02 / VE-UXO6-1SB02-TDBD<br>VE-UXO6-1SO02 / VE-UXO6-1SB02-TDBD-MS<br>VE-UXO6-1SO02 / VE-UXO6-1SB02-TDBD-SD | | | | 3 (MS/MSD) | |
| VE-UXO6-1SO03 / VE-UXO6-1SB03-TDBD | | | | 1 | |
| VE-UXO6-1SO04 / VE-UXO6-1SB04-TDBD | | | | 1 | |

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

(UFP-QAPP Manual Section 3.1.1)

| Sampling Location / ID Number | Matrix | Depth | Analytical Group[1] | Number of Samples | Sampling SOP Reference |
|---|---|---|---|---|---|
| VE-UXO6-1SO05 / VE-UXO6-1SB05-TDBD | SB | (in accordance with modified Vieques Protocols) | EXPLO, METAL, WCHEM (pH, TOC, and ORP) | 1 | See **Worksheet #21** |
| VE-UXO6-1SO06 / VE-UXO6-1SB06-TDBD | | | | 1 | |
| VE-UXO6-1SO07 / VE-UXO6-1SB07-TDBD | | | | 1 | |
| VE-UXO6-1SO08 / VE-UXO6-1SB08-TDBD | | | | 1 | |
| VE-UXO6-1SO08 / VE-UXO6-1SB09-TDBD | | | | 1 | |
| VE-UXO6-1SO08 / VE-UXO6-1SB10-TDBD | | | | 1 | |
| **UXO 11 – EMA Restricted Roads** | | | | | |
| **Decision Unit 1 – UXO 11 EMA Restricted Roads** | | | | | |
| **SMI Samples** | | | | | |
| VE-UXO11-1DU01 / VE-UXO11-1SMI01-MMYY<br>VE-UXO11-1DU01 / VE-UXO11-1SMI01T-MMYY<br>VE-UXO11-1DU01 / VE-UXO11-1SMI01TT-MMYY | SMI | 0 – 2.5 inches | EXPLO, METAL, WCHEM (pH, TOC, and ORP) | 3 (Triplicate) | See **Worksheet #21** |
| VE-UXO11-1DU02 / VE-UXO11-1SMI02-MMYY<br>VE-UXO11-1DU02 / VE-UXO11-1SMI02-MMYY-MS<br>VE-UXO11-1DU02 / VE-UXO11-1SMI02-MMYY-SD | | | | 3 (MS/MSD) | |
| VE-UXO11-1DU03 / VE-UXO11-1SMI03-MMYY | | | | 1 | |
| VE-UXO11-1DU04 / VE-UXO11-1SMI04-MMYY | | | | 1 | |
| VE-UXO11-1DU05 / VE-UXO11-1SMI05-MMYY | | | | 1 | |
| VE-UXO11-1DU06 / VE-UXO11-1SMI06-MMYY | | | | 1 | |
| VE-UXO11-1DU07 / VE-UXO11-1SMI07-MMYY | | | | 1 | |
| **Discrete Subsurface Soil Samples** | | | | | |
| VE-UXO11-1SO01 / VE-UXO11-1SB01-TDBD<br>VE-UXO11-1SO01 / VE-UXO11-1SB01P-TDBD | SB | (in accordance with modified Vieques Protocols) | EXPLO, METAL, WCHEM (pH, TOC, and ORP) | 2 (FD) | See **Worksheet #21** |
| VE-UXO11-1SO02 / VE-UXO11-1SB02-TDBD<br>VE-UXO11-1SO02 / VE-UXO11-1SB02-TDBD-MS<br>VE-UXO11-1SO02 / VE-UXO11-1SB02-TDBD-MSD | | | | 3 (MS/MSD) | |
| VE-UXO11-1SO03 / VE-UXO11-1SB03-TDBD | | | | 1 | |
| VE-UXO11-1SO04 / VE-UXO11-1SB04-TDBD | | | | 1 | |
| VE-UXO11-1SO05 / VE-UXO11-1SB05-TDBD | | | | 1 | |
| VE-UXO11-1SO06 / VE-UXO11-1SB06-TDBD | | | | 1 | |

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

(UFP-QAPP Manual Section 3.1.1)

| Sampling Location / ID Number | Matrix | Depth | Analytical Group[1] | Number of Samples | Sampling SOP Reference |
|---|---|---|---|---|---|
| VE-UXO11-1SO07 / VE-UXO11-1SB07-TDBD<br>VE-UXO11-1SO07 / VE-UXO11-1SB07P-TDBD | SB | (in accordance with modified Vieques Protocols) | EXPLO, METAL, WCHEM (pH, TOC, and ORP) | 2 (FD) | See **Worksheet #21** |
| VE-UXO11-1SO08 / VE-UXO11-1SB08-TDBD | | | | 1 | |
| VE-UXO11-1SO09 / VE-UXO11-1SB09-TDBD | | | | 1 | |
| VE-UXO11-1SO10 / VE-UXO11-1SB10-TDBD | | | | 1 | |
| VE-UXO11-1SO11 / VE-UXO11-1SB11-TDBD | | | | 1 | |
| VE-UXO11-1SO12 / VE-UXO11-1SB12-TDBD | | | | 1 | |
| VE-UXO11-1SO13 / VE-UXO11-1SB13-TDBD | SB | (in accordance with modified Vieques Protocols) | EXPLO, METAL, WCHEM (pH, TOC, and ORP) | 1 | See **Worksheet #21** |
| VE-UXO11-1SO14 / VE-UXO11-1SB14-TDBD | | | | 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] FDs, triplicates, and MS/MSDs do not require WCHEM analysis.

Sample depths will be determined by the FTL and /or the project manager following the depth selection procedures presented in the Modified Soil Sample Depth Selection Protocol included in Appendix D of the Master SAP to ensure the appropriate sample intervals are selected to meet the objectives of the RI.

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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 | EXPLO | SW-846 8330B / HPL8330, MSE018MIS | 1 gallon bag (s) | 10 g | ≤ 6°C but not frozen | 14 days / 40 days |
| | | 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 / PREMETALSIS, PRE3050B, ANA6010, ANA6020 | | 10 g[6] | ≤ 6°C but not frozen | 180 days |
| | | SW-846 3060ª, SW-846 7199/ PREMETALSIS, 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 | | 10 g | | 30 days |
| SB | EXPLO | SW-846 8330B / HPL8330, MSE018 | 1 x 8 oz amber glass wide-mouth jar with Teflon lined screw cap | 20 g[4] | ≤ 6°C but not frozen | 14 days / 40 days |
| | | SW-846 8321A / MSE018, HPL8321 | | | | |
| | | SW-846 6850 / HPL6850 | | 10 g[5] | Headspace in jar; ≤ 6°C but not frozen | 28 days |
| | METAL | SW-846 3050B, 6010C, 6020ª / PRE3050B, ANA6010, ANA6020 | 1 x 8 oz amber glass wide-mouth jar with Teflon lined screw cap | 1 g | ≤ 6°C but not frozen | 180 days |
| | | SW-846 3060ª, SW-846 7199/ ANA3060A, ANA218.6-7199 | | 2.5 g | | 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 | 1 x 4 oz glass jar | 10 g | | 30 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 |
|---|---|---|---|---|---|---|

Notes:

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

[2] All fractions are shipped to APPL. APPL will ship ORP fractions to ALS-Kelso.

[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.

[6] APPL will digest 10g of SMI for metals rather than the typical 1g. This is intended to provide a more-representative digestion.

# SAP Worksheet #20—Field Quality Control Sample Summary Table

(UFP-QAPP Manual Section 3.1.1)

| Matrix | Analytical Group | No. of Sampling Locations | No. of Field Triplicates | No. of Field Duplicates | No. of MS/MSD Pairs | No. of Field Blanks | No. of Equipment Blanks[1] | No. of VOA Trip Blanks | Total No. of Samples to Lab |
|---|---|---|---|---|---|---|---|---|---|
| **UXO-3 Decision Unit 1 – UXO 3 LIA Roads** | | | | | | | | | |
| SMI | EXPLO | 8 | 1 | | 1 | | 2 | | 14 |
| | METAL | 8 | 1 | | 1 | | 2 | | 14 |
| | WCHEM (pH and TOC) | 8 | | | | | | | 8 |
| SB | EXPLO | 16 | | 2 | 1 | | 1 | | 21 |
| | METAL | 16 | | 2 | 1 | | 1 | | 21 |
| | WCHEM (pH and TOC) | 16 | | | | | | | 16 |
| **UXO-5 Decision Unit 1 – UXO 5 SIA Restricted Roads** | | | | | | | | | |
| SMI | EXPLO | 8 | 1 | | 1 | | 2 | | 14 |
| | METAL | 8 | 1 | | 1 | | 2 | | 14 |
| | WCHEM (pH and TOC) | 8 | | | | | | | 8 |
| SB | EXPLO | 16 | | 2 | 1 | | 1 | | 21 |
| | METAL | 16 | | 2 | 1 | | 1 | | 21 |
| | WCHEM (pH and TOC) | 16 | | | | | | | 16 |
| **UXO-6 Decision Unit 1 – UXO 6 SIA Public Roads** | | | | | | | | | |
| SMI | EXPLO | 5 | 1 | | 1 | | 2 | | 11 |
| | METAL | 5 | 1 | | 1 | | 2 | | 11 |
| | WCHEM (pH and TOC) | 5 | | | | | | | 5 |
| SB | EXPLO | 10 | | 1 | 1 | | 1 | | 14 |
| | METAL | 10 | | 1 | 1 | | 1 | | 14 |
| | WCHEM (pH and TOC) | 10 | | | | | | | 10 |
| **UXO-11 Decision Unit 1 – UXO 11 EMA Restricted Roads** | | | | | | | | | |
| SMI | EXPLO | 7 | 1 | | 1 | | 2 | | 13 |
| | METAL | 7 | 1 | | 1 | | 2 | | 13 |
| | WCHEM (pH and TOC) | 7 | | | | | | | 7 |
| SB | EXPLO | 14 | | 2 | 1 | | 1 | | 19 |
| | METAL | 14 | | 2 | 1 | | 1 | | 19 |
| | WCHEM (pH and TOC) | 14 | | | | | | | 14 |

Notes:

[1] The number of equipment blanks is based on a fundamental assumptions. For multi-incremental samples, it was assumed that four samples can be collected per day. For surface and subsurface soil samples, it was assumed that 20 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; 10/2014; Rev. 5 | | Definitive | SMI / EXPLO | N/A (extraction) | 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; 10/2014; Rev. 8 | | Definitive | SB/SMI / METAL | ICP-AES | APPL | None | N |
| ANA6020 | Inductively Coupled Plasma-Mass Spectrometry by EPA Method 6020; 10/2014; Rev. 5 | | Definitive | SB/SMI / METAL | ICP-MS | APPL | None | N |
| ANA218.6-7199 | Hexavalent Chromium Analysis EPA Method 7199/218.6; 06/2014; Rev. 5 | | Definitive | SB/SMI / METAL | IC | APPL | None | N |
| ANAWALKLEY | Total Organic Carbon (TOC) in Soil (Walkley-Black, Modified); 06/2014; Rev. 1 | | Screening | SB/SMI / WCHEM | N/A (titration) | APPL | None | N |
| HPL6850 | Analysis of Perchlorate in Environmental Samples by EPA 6850; 07/2014; Rev. 3 | | Definitive | SB/SMI / EXPLO | HPLC | APPL | None | Y[3] |
| HPL8321 | Method 8321 LC-Mass Spectrometer Analysis of Carbamate / Urea and Nitroaromatic / Nitrosamine Compounds; 08/2014; Rev. 3 | | Definitive | SB/SMI / EXPLO (Picric Acid Only) | HPLC-MS | APPL | None | N |
| HPL8330 | Explosive Compounds: Diode Array Detector by High Pressure Liquid Chromatography; 08/2014; Rev. 5 | | Definitive | SB/SMI / EXPLO | HPLC | APPL | None | N |
| PRE3050B | Acid Digestion of Sediments, Sludges, and Soils by EPA Method 3050B; 05/2014; Rev. 3 | | Definitive | SB/SMI / METAL | N/A (digestion) | APPL | None | Y[4] |
| ANA3060A | Alkaline Digestion for Hexavalent Chromium (Method 3060A); 06/2014; Rev. 1 | | Definitive | SB/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/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/SMI / WCHEM | ORP Probe | ALS – Kelso | None | N |
| SHR001 | Receiving Samples; 09/2014; Rev. 0 | | N/A (Receiving) | SB/SMI / EXPLO, METAL, WCHEM | N/A (Receiving) | APPL | None | N |
| SHR003 | Subcontracting Samples to Other Laboratories; 06/24/2014; Rev. 15 | | N/A (Receiving) | SB/SMI / EXPLO, METAL, WCHEM | N/A (Receiving) | APPL | None | N |
| SHR012 | Sample Disposal and Waste Collection, Storage and Disposal; 06/17/2014; Rev. 16 | | N/A (Disposal) | SB/SMI / EXPLO, METAL, WCHEM | N/A (Disposal) | APPL | None | N |
| SMO-SCOC | Sample Tracking and Internal Chain-of-Custody; 04/01/15; Rev. 15 | | N/A (Receiving) | SB/SMI / WCHEM (ORP only) | N/A (Receiving) | ALS – Kelso | None | N |
| SMO-DISP | Sample Disposal; 6/01/14; Rev. 11 | | N/A (Disposal) | SB/SMI / WCHEM (ORP only) | N/A (Disposal) | ALS – Kelso | None | N |
| SMO-GEN | Sample Receiving; 9/01/14; Rev. 31 | | N/A (Receiving) | SB/SMI / WCHEM (ORP only) | N/A (Receiving) | ALS – Kelso | None | N |
| MSE018 | EPA Method 8330 Mechanical Orbital Shaker Extraction for Solid Explosive Samples; 07/2014; Rev. 1 | | Definitive | SB / EXPLO | N/A (extraction) | APPL | None | N |

Notes:

1. This worksheet was prepared in March 2015. 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.
3. Due to regulator request, APPL will extract 10g of soil for perchlorate rather than the typical 1g. This is intended to provide a more-representative extraction.
4. Due to regulator request, APPL will digest 10g of SMI for metals rather than the typical 1g. This is intended to provide a more-representative digestion.

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# SAP Worksheet #24—Analytical Instrument Calibration Table

(UFP-QAPP Manual Section 3.2.2)

| Instrument | Calibration Procedure | Frequency of Calibration | Acceptance Criteria | Corrective Action | Person Responsible for Corrective Action | SOP Reference |
|---|---|---|---|---|---|---|
| HPLC<br>(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:<br>Option 1: RSD for each analyte ≤ 15%;<br>Option 2: linear least squares regression for each analyte: $r^2 \geq 0.99$;<br>Option 3: non-linear least squares regression (quadratic) for each analyte: $r^2 \geq 0.99$ | Correct problem then repeat ICAL | Analyst | HPL8330 |
| | ICV | Once after each initial calibration | Analytes within ± 20% of expected value (initial source) | Correct problem. Rerun ICV. If that fails, repeat ICAL. | | |
| | RT window width | At method set-up and after major maintenance | RT width is ± 3 times standard deviation for each analyte RT from 72-hour study | N/A | | |
| | 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 | N/A | | |
| | Continuing Calibration Verification (CCV) | Before sample analysis, after every 10 field samples, and at the end of the analysis sequence | All reported analytes and surrogates within ± 20% of the true value | Recalibrate, and reanalyze all affected samples since the last acceptable CCV; or immediately analyze two additional consecutive CCVs. If both pass, samples may be reported without reanalysis. If either fails, take corrective action(s) and re-calibrate; then reanalyze all affected samples since the last acceptable CCV. | | |
| HPLC-MS<br>(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<br><br>ICAL must meet one of the three options below:<br>Option 1: RSD for each analyte ≤ 20%;<br>Option 2: linear least squares regression for each analyte: $r^2 \geq 0.99$;<br>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. | N/A | | |
| | 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 | N/A | | |
| | ICV | Once after each ICAL, analysis of a second source standard prior to sample analysis | All reported analytes within established RT windows. All reported analytes within ± 15% of true value. | Correct problem, rerun ICV. If that fails, repeat ICAL. | | |
| | CCV | Before sample analysis, after every 10 field samples, and at the end of the analysis sequence | All reported analytes and surrogates within established RT windows. All reported analytes and surrogates within ± 15% of true value. | Recalibrate, and reanalyze all affected samples since the last acceptable CCV; or immediately analyze two additional consecutive CCVs. If both pass, samples may be reported without reanalysis. If either fails, take corrective action(s) and re-calibrate; then reanalyze all affected samples since the last acceptable CCV. | | |

# 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) | 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. | N/A | Analyst | HPL6850 |
| | Mass Calibration | Instrument must have a valid mass calibration prior to any sample analysis.<br>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<br><br>ICAL must meet one of the two options below:<br>Option 1: RSD for each analyte ≤ 15%;<br>Option 2: linear least squares regression for each analyte: r2 ≥ 0.995 | Correct problem, then repeat ICAL | | |
| | ICV | Once after each ICAL | Perchlorate concentration must be within ± 15% of its true value | Correct problem. Rerun ICV. If that fails, repeat ICAL. | | |
| | CCV | On days an ICAL is performed, after every 10 field samples and at the end of the analytical sequence. On days an ICAL is not performed, at the beginning of the sequence, after every 10 field samples and at the end of the analytical sequence. | Perchlorate concentration must be within ± 15% of its true value | Recalibrate, and reanalyze all affected samples since the last acceptable CCV; or immediately analyze two additional consecutive CCVs. If both pass, samples may be reported without reanalysis. If either fails, take corrective action(s) and re-calibrate; then reanalyze all affected samples since the last acceptable CCV. | | |
| | 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 | | |

# 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-AES (for METAL) | Linear Dynamic Range (LDR) or high-level check standard | At initial set up and checked every 6 months with a high standard at the upper limit of the range | Within ± 10% of true value | Dilute samples within the calibration range, or re-establish/ verify the LDR | Analyst | ANA6010 |
| | ICAL | Daily ICAL prior to sample analysis | Minimum one high standard and a calibration blank. If more than one calibration standard is used, $r^2 \geq 0.99$. | Correct problem, then repeat ICAL | | |
| | ICV | Once after each ICAL, analysis of a second source standard prior to sample analysis | All reported analytes within ± 10% of true value | Correct problem. Rerun ICV. If that fails, repeat ICAL. | | |
| | CCV | After every 10 field samples, and at the end of the analysis sequence | All reported analytes within ± 10% of the true value | Recalibrate, and reanalyze all affected samples since the last acceptable CCV; or immediately analyze two additional consecutive CCVs. If both pass, samples may be reported without reanalysis. If either fails, take corrective action(s) and re-calibrate; then reanalyze all affected samples since the last acceptable CCV. | | |
| | Low-level Calibration Check Standard (Low-level ICV) | Daily | All reported analytes within ± 20% of true value | Correct problem and repeat ICAL | | |
| | Initial and Continuing Calibration Blank (ICB/CCB) | Before beginning a sample run, after every 10 field samples, and at end of the analysis sequence | No analytes detected > LOD | Correct problem and repeat ICAL. All samples following the last acceptable calibration blank must be reanalyzed. | | |
| | ICS (also called Spectral Interference Checks) | After ICAL and prior to sample analysis | ICS-A: Absolute value of concentration for all non- spiked project analytes < LOD (unless they are a verified trace impurity from one of the spiked analytes);<br>ICS-AB: Within ± 20% of true value.<br>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 ±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 ± 10% of true value | Correct problem. Rerun ICV. If that fails, repeat ICAL. | | |
| | CCV | After every 10 field samples and at the end of the analysis sequence | All reported analytes within ± 10% of the true value | Recalibrate, and reanalyze all affected samples since the last acceptable CCV;<br>or<br>Immediately analyze two additional consecutive CCVs. If both pass, samples may be reported without reanalysis. If either fails, take corrective action(s) and re-calibrate; then reanalyze all affected samples since the last acceptable CCV. | | |
| | Low Level ICV | Daily | All reported analytes within ± 20% of the true value | Correct problem and repeat ICAL | | |
| | ICB/CCB | Before beginning a sample run, after every 10 field samples, and at end of the analysis sequence | No analytes detected > LOD | Correct problem and repeat ICAL. All samples following the last acceptable calibration blank must be reanalyzed. | | |
| | ICS (also called Spectral Interference Checks) | After ICAL and prior to sample analysis | ICS-A: Absolute value of concentration for all non- spiked project analytes < LOD (unless they are a verified trace impurity from one of the spiked analytes);<br>ICS-AB: Within ± 20% of true value. | 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 |
|---|---|---|---|---|---|---|
| IC (for Hexavalent Chromium) | ICAL (minimum three standards and a calibration blank) | Daily ICAL prior to sample analysis | $r^2 \geq 0.99$ | Correct problem, then repeat ICAL | Analyst | ANA218.6-7199 |
| | ICV | Immediately following ICAL | Value of second source within ± 10% of true value | Correct problem and verify second source standard. Rerun ICV. If that fails, correct problem and repeat calibration. | | |
| | CCV | Before and after every 10 field samples and at the end of the run | Value of CCV within ± 10% of true value | Recalibrate, and reanalyze all affected samples since the last acceptable CCV; or immediately analyze two additional consecutive CCVs. If both pass, samples may be reported without reanalysis. If either fails, take corrective action(s) and re-calibrate; then reanalyze all affected samples since the last acceptable CCV | | |
| | CCB | Before and after every 10 field samples and at the end of the run | No analytes detected > LOD | Correct problem. Re-prep and reanalyze calibration blank. All samples following the last acceptable calibration blank must be reanalyzed. | | |
| pH meter | Minimum 3-point calibration | Daily or prior to analyzing samples | ±0.05 unit | Terminate analysis, recalibrate, and verify before sample analysis | Analyst | ANA9045 |
| | CCV | One CCV every 10 samples | ±0.05 unit | Terminate analysis, recalibrate, and verify before sample analysis | | |
| ORP Probe | Electrode zero | Daily | ±0.5mV | Correct the problem and repeat the electrode zero | Analyst | ASTM D1498 |
| | Check to Standard Redox Solution | Daily | Within ±30mV of expected value. A second reading (from fresh solution) within ±10mv of first reading | Correct the problem and repeat the check | | |

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

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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 |
|---|---|---|---|---|---|---|---|---|
| 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 Ftpp frit | Perchlorate | Review pressure profile | As needed based on pressure profile | Part was replaced | Replace them and check often | Analyst / Supervisor | HPL6850 |
| | Chang analytical column | | Check peak tailing, decreased sensitivity, retention time changes, etc. | When chromatography indicates | Analyte separation and calibration curve meets 20% RSD | Replace column, if needed | | |
| | Replace mobile phase daily | | N/A | Daily | minimum noise in the base line | Prepare fresh mobile phase solution | | |

## 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 |

# SAP Worksheet #26—Sample Handling System

(UFP-QAPP Manual Appendix A)

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

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# SAP Worksheet #28-0—Laboratory QC Samples Table

**Matrix:** SMI
**Analytical Group:** EXPLO, METAL, WCHEM
**Analytical Method/SOP Reference:** SW-846 8330B (preparation) / MSE018IS, PREMETALSIS

**Deviations from Master SAP:**

1. 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.
2. WCHEM (pH, TOC, and ORP) do not require grinding. However, they will be hand-ground along with the Picric Acid and METAL fraction.

**Clarifications to Master SAP:**

1. Picric Acid is 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. 5g for TOC
   d. 50g for pH
   e. 10g for ORP
   f. 10g for Picric Acid
   g. 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, SMI
**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 – Note that incremental laboratory processing procedures, shown below, apply to any fractions analyzed from an incremental sample and not just 8330B. Refer to Worksheet #28-0.** | | | | | | |
| 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. | N/A | Analyst / Supervisor | N/A | Same as Method/SOP QC Acceptance Limits |
| Soil sieving procedure (for SMI only) | Each sample, LCS, and Method Blank | Weigh entire sample. Sieve entire sample with a 10 mesh sieve. Breakup pieces of soil (especially clay) with gloved hands. Do not intentionally include vegetation in the portion of the sample that passes through the sieve unless this is a project specific requirement. Collect and weigh any portion unable to pass through the sieve. | N/A | | N/A | |
| Soil grinding Procedure (for SMI only) | Initial demonstration | The laboratory must initially demonstrate that the grinding procedure is capable of reducing the particle size to < 75 µm by passing representative portions of ground sample through a 200 mesh sieve (ASTM E11) | N/A | | N/A | |
| Soil grinding blank (for SMI only) | 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 > ½ 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 | |
| Soil subsampling Process (for SMI only) | Each sample, duplicate, LCS, and Method Blank | Entire ground sample is mixed, spread out on a large flat surface (e.g., baking tray), and 30 or more randomly located increments are removed from the entire depth to sum a ~10 g subsample | N/A | | N/A | |
| Soil sample triplicate (for SMI only) | At the subsampling step, one sample per batch. Cannot be performed on any type of blank sample. Client must designate sample. | Three 10 g subsamples are taken from the designated sample. The RSD for results above the LOQ must not exceed 20%. | Corrective action must be taken if this criterion is not met (e.g., the grinding process should be investigated to ensure that the samples are being reduced to a sufficiently small particle size). If reported per the client, apply J-flag if acceptance criteria are not met and explain in the case narrative. | | Precision | |
| Method Blank | One per preparatory batch | No analytes detected >1/2 LOQ or > 1/10 the amount measured in any sample or 1/10 the regulatory limit, whichever is greater | Correct problem. If required, re-prep and reanalyze method blank and all samples processed with the contaminated blank. If reanalysis cannot be performed, data must be qualified and explained in the case narrative. Apply B-flag to all results for the specific analyte(s) in all samples in the associated preparatory batch. Results may not be reported without a valid method blank. Flagging is only appropriate in cases where the samples cannot be reanalyzed. | | Contamination | |
| Ground Laboratory Control Sample (Ground LCS) | For incremental samples: One per grinding batch | See **Worksheet #15** | Correct problem. Note that, at this point, the associated samples have already been ground. If required, re-prep and reanalyze the LCS and all samples in the associated preparatory batch for the failed analytes, if sufficient sample material is available. If reanalysis cannot be performed, data must be qualified and explained in the case narrative. Apply Q-flag to specific analyte(s) in all samples in the associated preparatory batch. A solid reference material containing all reported analytes must be prepared (e.g. ground and subsampled) and analyzed in exactly the same manner as a field sample. | | Accuracy | |

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

**Matrix:** SB, SMI
**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 |
|---|---|---|---|---|---|---|
| Unground Laboratory Control Sample (Unground LCS) | For discrete samples: One per preparatory batch.<br>For incremental samples: At the discretion of the laboratory, for example, to demonstrate that the analytical system is in control when there are ground LCS failures. If for some reason there is no associated ground LCS, an unground LCS must apply. | See **Worksheet #15** | Correct problem. If required, re-prep and reanalyze the LCS and all samples in the associated preparatory batch for the failed analytes, if sufficient sample material is available.<br>Results may not be reported without a valid LCS. Flagging is only appropriate in cases where the samples cannot be reanalyzed. | Analyst / Supervisor | Accuracy | Same as Method/SOP QC Acceptance Limits |
| **Laboratory QA/QC Samples** | | | | | | |
| 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. | Analyst / Supervisor | Accuracy, Precision | Same as Method/SOP QC Acceptance Limits |
| Surrogate Spike | All field and QC samples | 1,2-Dinitrobenzene: 78-119% | Correct problem, then re-prep and reanalyze all failed samples for all surrogates in the associated preparatory batch, if sufficient sample material is available. If obvious chromatographic interference with surrogate is present, reanalysis may not be necessary. | | Accuracy | |
| Confirmation of positive results (second column) | All positive results must be confirmed | Calibration and QC criteria are the same for the confirmation analysis as for initial or primary column analysis. Results between primary and second column RPD ≤ 40%. | Report from both columns. Apply J-flag if RPD >40%. Discuss in the case narrative. | | Accuracy, Precision | |
| **Field QA/QC Samples** | | | | | | |
| Field Duplicate (for SB) | 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 #28-2—Laboratory QC Samples Table

**Matrix:** SB, SMI
**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 > ½ LOQ or > 1/10 the amount measured in any sample or 1/10 the regulatory limit, whichever is greater | Correct problem. If required, re-prep and reanalyze MB and all samples processed with the contaminated blank. If reanalysis cannot be performed, data must be qualified and explained in the case narrative. Apply B-flag to all results for the specific analyte(s) in all samples in the associated preparatory batch.<br>Results may not be reported without a valid method blank. Flagging is only appropriate in cases where the samples cannot be reanalyzed. | Analyst / Supervisor | Contamination | Same as Method/SOP QC Acceptance Limits |
| Laboratory Control Sample (LCS) | One per preparatory batch | See **Worksheet #15** | Correct problem, then re-prep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available.<br>Results may not be reported without a valid method blank. Flagging is only appropriate in cases where the samples cannot be reanalyzed. | | Accuracy | |
| Matrix Spike (MS) | One per preparatory batch | See **Worksheet #15** | Examine the project- specific requirements. Contact the client as to additional measures to be taken. For the specific analyte(s) in the parent sample, apply qualifier if acceptance criteria are not met and explain in the case narrative. | | Accuracy | |
| Matrix Spike Duplicate (MSD) or Matrix Duplicate (MD) | One per preparatory batch | See **Worksheet #15** | | | Accuracy, Precision | |
| Surrogate Spike | All field and QC samples | 1,2-Dinitrobenzene: 50-150% | Correct problem, then re-prep and reanalyze all failed samples for all surrogates in the associated preparatory batch, if sufficient sample material is available. If obvious chromatographic interference with surrogate is present, reanalysis may not be necessary. | | Accuracy | |
| 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%. | 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) | 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, SMI
**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. Re-prep and reanalyze method blank and all samples processed with the contaminated blank. Flagging is only appropriate in cases where the samples cannot be reanalyzed. Results may not be reported without a valid method blank. Flagging is only appropriate in cases where the samples cannot be reanalyzed. | | Contamination | |
| Laboratory Control Sample (LCS) | One per preparatory batch | See **Worksheet #15** | Correct problem. Re-prep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. Problems must be corrected. Results may not be reported without a valid LCS. Flagging is only appropriate in cases where the samples cannot be reanalyzed. | | Accuracy | |
| Matrix Spike (MS) | One per preparatory batch per matrix | See **Worksheet #15** | Examine the project- specific requirements. Contact the client as to additional measures to be taken. For the specific analyte(s) in the parent sample, apply 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 | |
| Interference Check Sample (ICS) | One ICS is prepared with every batch of 20 samples and must undergo the same preparation and pretreatment steps as the samples in the batch. It verifies the method performance at the matrix conductivity threshold (MCT). At least one ICS must be analyzed daily. The ICS shall be prepared at the LOQ. | Perchlorate concentration must be within ± 20% of its true value | Correct problem. Reanalyze all samples and QC samples in the batch. If poor recovery from the cleanup filters is suspected, a different lot of filters must be used to re-extract all samples in the batch. If column degradation is suspected, a new column must be calibrated before the samples can be reanalyzed. | | Accuracy, Bias | |
| Isotope Ratio $^{35}Cl/^{37}Cl$ | Every sample, batch QC sample, and standard | Monitor for either the parent ion at masses 99/101 or the daughter ion at masses 83/85 depending on which ions are quantitated. Must fall within 2.3 to 3.8. | If criteria are not met, the sample must be rerun. If the sample was not pretreated, the sample must be re- extracted using cleanup procedures. If, after cleanup, the ratio still fails, use alternative techniques to confirm presence of perchlorate, e.g., a post spike sample or dilution to reduce any interference. | | Accuracy | |

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

**Matrix:** SB, SMI
**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 |
|---|---|---|---|---|---|---|
| **Field QA/QC Samples** | | | | | | |
| Field Duplicate (for SB) | 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 #28-4—Laboratory QC Samples Table

**Matrix:** SB, SMI
**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 > ½ LOQ or > 1/10 the amount measured in any sample or 1/10 the regulatory limit, whichever is greater | Correct problem. If required, re-prep and reanalyze method blank and all samples processed with the contaminated blank. Results may not be reported without a valid method blank. Flagging is only appropriate in cases where the samples cannot be reanalyzed. | Analyst / Supervisor | Contamination | Same as Method/SOP QC Acceptance Limits |
| Laboratory Control Sample (LCS) | One per preparatory batch | See **Worksheet #15** | Correct problem, then re-prep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. Must contain all reported analytes. Results may not be reported without a valid LCS. Flagging is only appropriate in cases where the samples cannot be reanalyzed. | | Accuracy | |
| Matrix spike (MS) / Matrix Spike Duplicate (MSD) | One per preparatory batch | See **Worksheet #15** | Examine the project- specific requirements. Contact the client as to additional measures to be taken. For the specific analyte(s) in the parent sample, apply 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 | |
| Method of Standard Additions (MSA) | When dilution or post digestion spike fails and if required by the project | N/A | Document use of MSA in the case narrative | | N/A | |
| **Field QA/QC Samples** | | | | | | |
| Field Duplicate (for SB) | 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 #28-5—Laboratory QC Samples Table

**Matrix:** SB, SMI
**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 > ½ LOQ or > 1/10 the amount measured in any sample or 1/10 the regulatory limit, whichever is greater | Correct problem. If required, re-prep and reanalyze method blank and all samples processed with the contaminated blank.<br>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.<br>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 | |
| Method of Standard Additions (MSA) | When dilution or post digestion spike fails and if required by project | N/A | Document use of MSA in the case narrative | | N/A | |
| **Field QA/QC Samples** | | | | | | |
| Field Duplicate (for SB) | 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 #28-6—Laboratory QC Samples Table

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

| QC Sample | Frequency & Number | Method/SOP QC Acceptance Limits | Corrective Action | Person(s) Responsible for Corrective Action | Data Quality Indicator (DQI) | Measurement Performance Criteria |
|---|---|---|---|---|---|---|
| **Laboratory QA/QC Samples** | | | | | | |
| Method blank | One per preparatory batch of up to 20 samples | No analytes detected >1/2 LOQ and >1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not otherwise effect sample results for common laboratory contaminants no analytes >LOQ. | Correct problem, then re-prep and reanalyze the MB and all samples in the associated batch for failed analytes, except when sample results are below the LOD if sufficient material is available. | Analyst / Supervisor | 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 re-prep and reanalyze the LCS and all samples in the associated batch for failed analytes, if sufficient material is available. Results may not be reported without a valid LCS. Flagging is only appropriate in cases where the samples cannot be reanalyzed. | | 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) | 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 #28-7—Laboratory QC Samples Table

**Matrix:** SB, SMI
**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 #28-8—Laboratory QC Samples Table

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

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

# SAP Worksheet #28-9—Laboratory QC Samples Table

**Matrix:** SB, SMI
**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 |

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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, SMI | EXPLO | | SW-846 8330B / MSE018MIS, MSE018, HPL8330 | Standard 28 calendar-day TAT | APPL, Inc.<br>908 North Temperance Ave.<br>Clovis, CA<br>559 275-2175<br>POC: Cynthia Clark | TBD |
| | EXPLO (Picric Acid) | | SW-846 8321A / MSE018, HPL8321 | | | |
| | EXPLO (Perchlorate) | | SW-846 6850 / HPL6850 | | | |
| | METAL | | SW-846 6010C, 6020ª / PREMETALSIS, PRE3050B, ANA6010, ANA6020 | | | |
| | METAL (Hexavalent Chromium) | | SW-846 7199 / PREMETALSIS, ANA3060A, ANA218.6-7199 | | | |
| | WCHEM (pH) | | SW-846 9045D / ANA9045D | | | |
| | WCHEM (TOC) | | Walkley Black / ANAWALKLEY | | | |
| | WCHEM (ORP) | | ASTM D1498 | | ALS – Kelso<br>1317 South 13th Ave.<br>Kelso, WA 98626<br>360-577-7222<br>POC: Howard Holmes | |

Notes:

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

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# References

CH2MHILL. 2004. *Revised Draft Expanded Range Assessment and Phase I Site Inspection Report Former Vieques Naval Training Range (VNTR) Vieques, Puerto Rico.* November.

CH2MHILL. 2007. *East Vieques Background Soil Inorganics Investigation Report, Former Vieques Naval Training Range, Vieques, Puerto Rico*. October.

CH2MHILL. 2008. *Work Plan for Munitions and Explosives of Concern, Subsurface Removal Action, Beaches and Select Roadways, Former Vieques Naval Training Range and Former NASD Solid Waste Management Unit 4, Vieques, Puerto Rico.* October.

CH2M HILL. 2010a. *Vieques Environmental Master Health and Safety Plan.* February.

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

CH2MHILL. 2010c. *Master Ecological Risk Assessment Protocol for Vieques Environmental Restoration Program – Update 1 (Addendum)*. April.

CH2M HILL. 2010d. *Expanded Range Assessment/Site Inspection Report, Former Vieques Naval Training Range, Vieques, Puerto Rico*. September.

CH2MHILL. 2013. Master Sampling and Analysis Plan, East Vieques Terrestrial UXO Sites, Former Vieques Naval Training Range, Vieques, Puerto Rico, January.

CH2M HILL. 2015. *Master Ecological Risk Assessment Protocol for Vieques Environmental Restoration Program – Draft Revision 1, Vieques, Puerto Rico.* March.

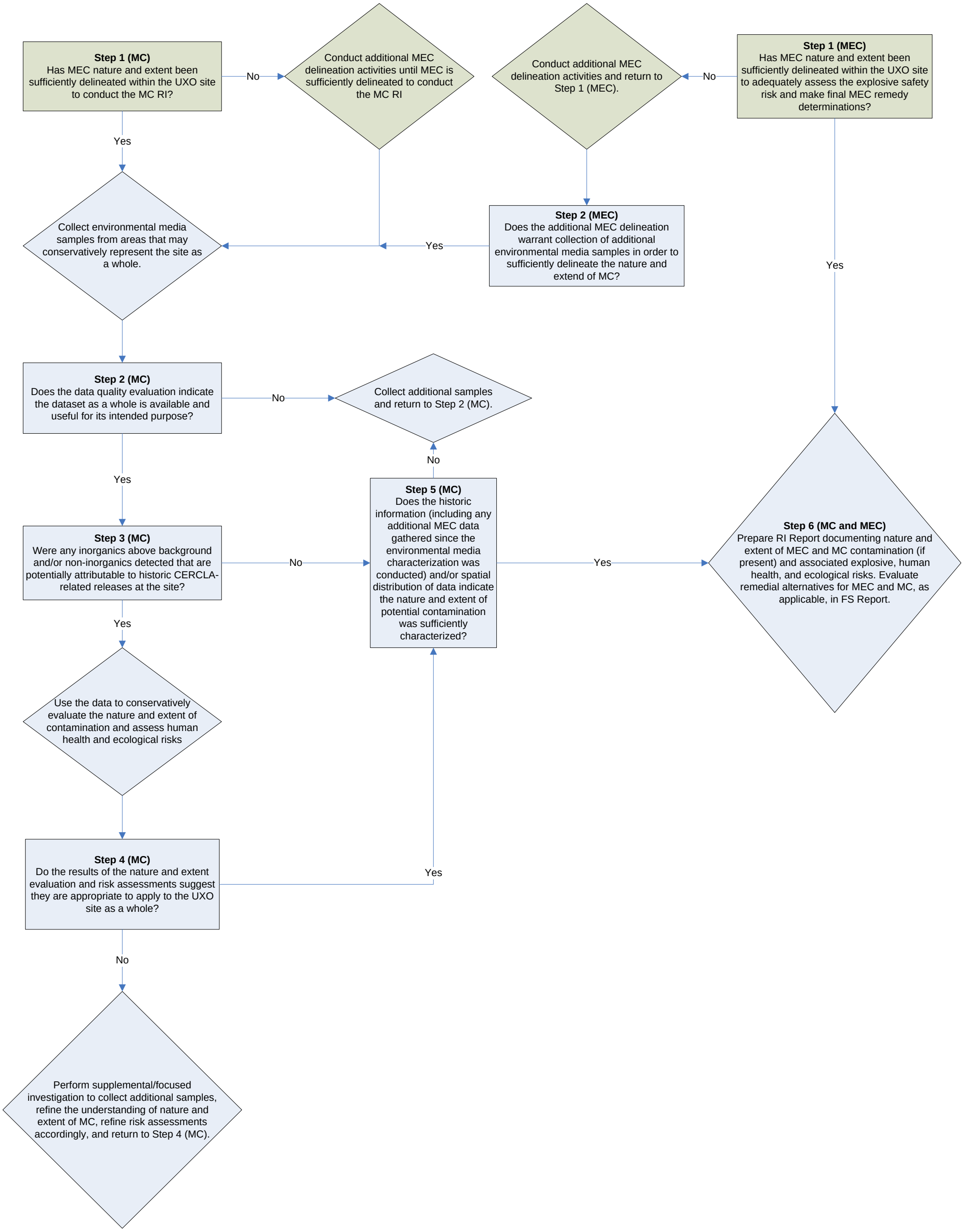
Intergovernmental Data Quality Task Force. 2005. *EPA Uniform Federal Policy for Quality Assurance Project Plans* (UFP-QAPPs).

US Environmental Protection Agency (EPA). 2002. *Guidance for QAPPs, USEPA Quality Assurance (QA)/G-5, Quality Assurance Management Section (QAMS)*. October.

US Environmental Protection Agency (EPA). 2008. *EPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review*. June.

US Environmental Protection Agency (EPA). 2015. *USEPA Regional Screening Levels for Chemical Contaminants at Superfund Sites.* January.

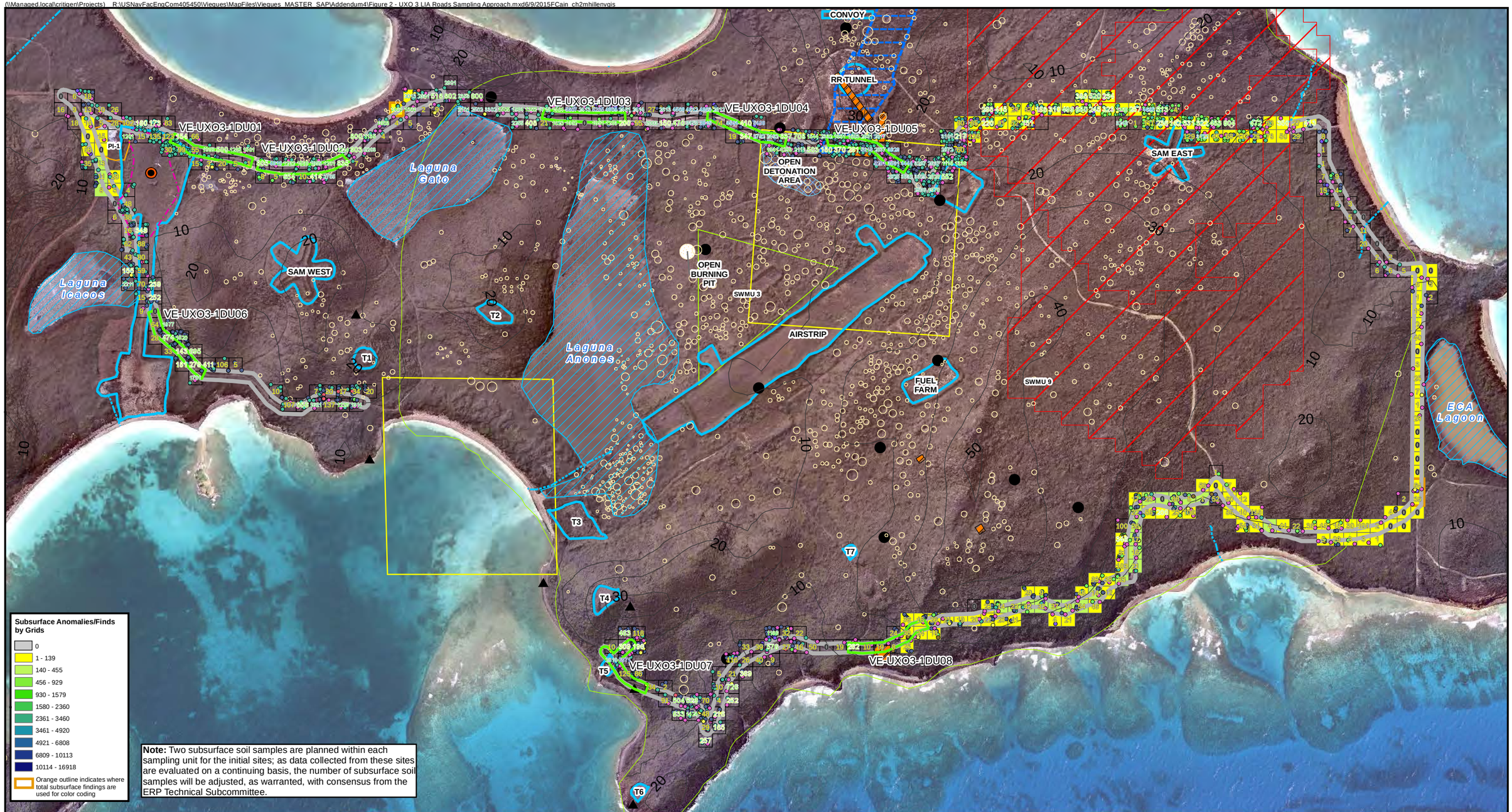
# Figures




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
*UXOs 3, 5, 6, and 11 Master SAP Addendum*
*Former Vieques Naval Training Range*

(\\Managed.local\critigen\Projects) R:\USNavFacEngCom405450\Vieques\MapFiles\Vieques_MASTER_SAP\Addendum4\Figure 2 - UXO 3 LIA Roads Sampling Approach.mxd6/9/2015FCain ch2mhillenvgis




**Subsurface Anomalies/Finds 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

**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.

- Sampling Unit
- Bombs
- Flares-Pyrotechnics
- Grenades
- MEC Component
- Projectiles / Mortars
- Rockets / Guided Missiles
- Scrap (Munitions Debris)
- Submunitions
- Decision Unit

- Topographic Contours (10 Meter)
- Stream
- Crater
- Historical Air-To-Ground (ATG) Target
- Historical Naval Gunfire Support (NGFS) Target
- Bulls Eye Target
- LIDAR (Light Detection and Radar) Identified Target Feature
- North Convoy Target Area
- Central Processing Center

- Target Area
- Open Burn Pit
- Open Detonation Area
- Naval Gunfire Support (NGFS) Target Area
- Photo Identified Area
- Preliminary Area of Concern
- Solid Waste Management Unit
- Grid (30 Meter)
- Lagoon

2005 Aerial Imagery
2005 Hillshade

**Density of MEC and Munitions Debris 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

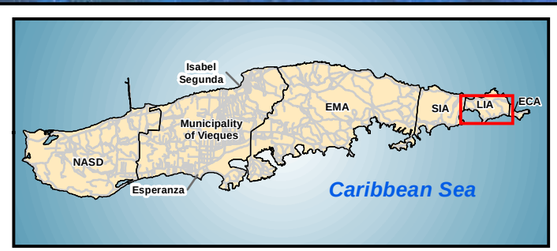



**Figure 2**
**UXO 3 LIA Road Sampling Approach**
*Master Sampling and Analysis Plan Addendum 4*
*Former VNTR*
*Vieques, Puerto Rico*

N W E S

0 250 500 Feet

CH2MHILL


**Figure 3**
**UXO 5 Sampling Approach**
*Master Sampling and Analysis Plan Addendum 4*
*Former VNTR*
*Vieques, Puerto Rico*

CH2MHILL

(\\Managed.local\critigen\Projects) R:\USNavFacEngCom405450\Vieques\MapFiles\Vieques_MASTER_SAP\Addendum4\Figure 4 - UXO 6 (East Portion) Sampling Approach.mxd6/9/2015ECain_ch2mhillenvgis


Sampling Unit
Decision Unit
Bombs
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
Target Area
Observation Point
Range
Photo Identified Area
Preliminary Area of Concern
Solid Waste Management Unit
Grid (30 Meter)
Yellow Shading Indicates No MEC Investigation
Lagoon

2005 Aerial Imagery
2005 Hillshade

**Density of MEC and Munitions Debris 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

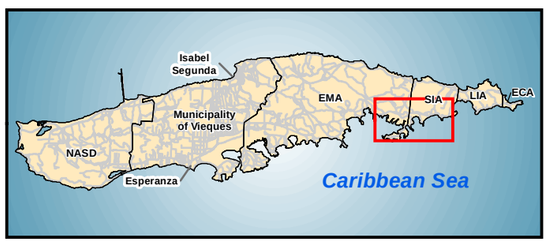



**Figure 4**
**UXO 6 (East Portion) Sampling Approach**
*Master Sampling and Analysis Plan Addendum 4*
*Former VNTR*
*Vieques, Puerto Rico*

N
W E
S

0 500 1,000
Feet

CH2MHILL

(\\Managed.local\critigen\Projects) R:\USNavFacEngCom405450\Vieques\MapFiles\Vieques_MASTER_SAP\Addendum4\Figure 5 - UXO 6 (West Portion) Sampling Approach.mxd6/9/2015FCain_ch2mhillenvgis

Newly Proposed Rest Area

VE-UXO6-1DU05

G-5
G-24
G-31
G-32
G-33
G-30
PI-3
PI-2
PI-19 possible gun position
Laguna Yanuel
Laguna La Plata
Lagoon 16
Lagoon 14
Lagoon 15
Lagoon 15

**Subsurface Anomalies/Finds 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

**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.

- Decision Unit
- New Sampling Unit
- Bombs
- 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
- Photo Identified Area
- Grid (30 Meter)
- Yellow Shading Indicates No MEC Investigation
- Lagoon
- Newly Proposed Rest Area

2005 Aerial Imagery
2005 Hillshade

**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

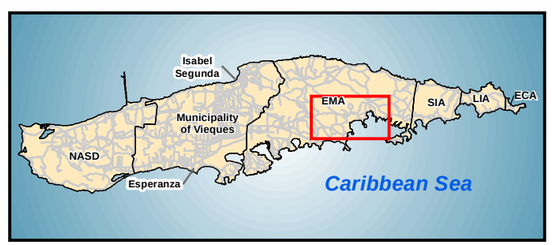



**Figure 5**
**UXO 6 (West Portion) Sampling Approach**
*Master Sampling and Analysis Plan Addendum 4*
*Former VNTR*
*Vieques, Puerto Rico*

N
W E
S

0 500 1,000
Feet

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(\\Managed.local\critigen\Projects) R:\USNavFacEngCom405450\Vieques\MapFiles\Vieques_MASTER_SAP\Addendum4\Figure 6 - UXO 11 (East Portion) Sampling Approach.mxd 6/9/2015 FCain ch2mhillenvgis

Laguna Monte Largo

Laguna Monte Largo

G-26

VE-UXO11-1DU02

G-1

Luguna Puerto Diablo

VE-UXO11-1DU03

PI-10

Luguna Puerto Diablo

OP-11/GP-11

GP-7 (1982)

VE-UXO11-1DU01

OP-10

G-25

G-31

GP-9

VE-UXO11-1DU05

PI-16 potential disposal area for munitions

PI-15 possible former range

OP-9

G-22

G-32

G-20

SWMU 11

PAOC Y

Range 11

VE-UXO11-1DU04

G-34

Range 10

G-35

GP-1

OP-1

**Subsurface Anomalies/Finds 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

**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.

- New Sample Unit
- Sample Unit
- Decision Unit
- Bombs
- Flares-Pyrotechnics
- Grenades
- MEC Component
- Projectiles / Mortars
- Rockets / Guided Missiles
- Scrap (Munitions Debris)

2005 Aerial Imagery
2005 Hillshade

- Transect -3 Foot Width was Investigated
- Stream
- Crater
- Bulls Eye Target
- Gun Positions
- Observation Point
- Range
- Photo Identified Area
- Preliminary Area of Concern
- Solidl Waste Management Unit

- Grid (30 Meter)
- Yellow Shading Indicates No MEC Investigation
- Lagoon

**Density of MEC and Munitions Debris 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

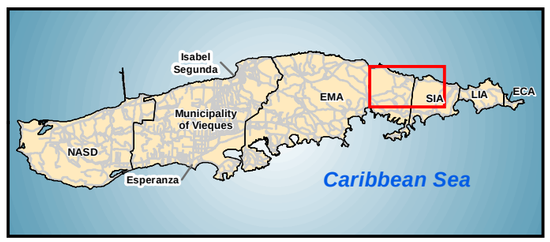


**Figure 6**
**UXO 11 (East Portion) Sampling Approach**
*Master Sampling and Analysis Plan Addendum 4*
*Former VNTR*
*Vieques, Puerto Rico*

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0 500 1,000
Feet

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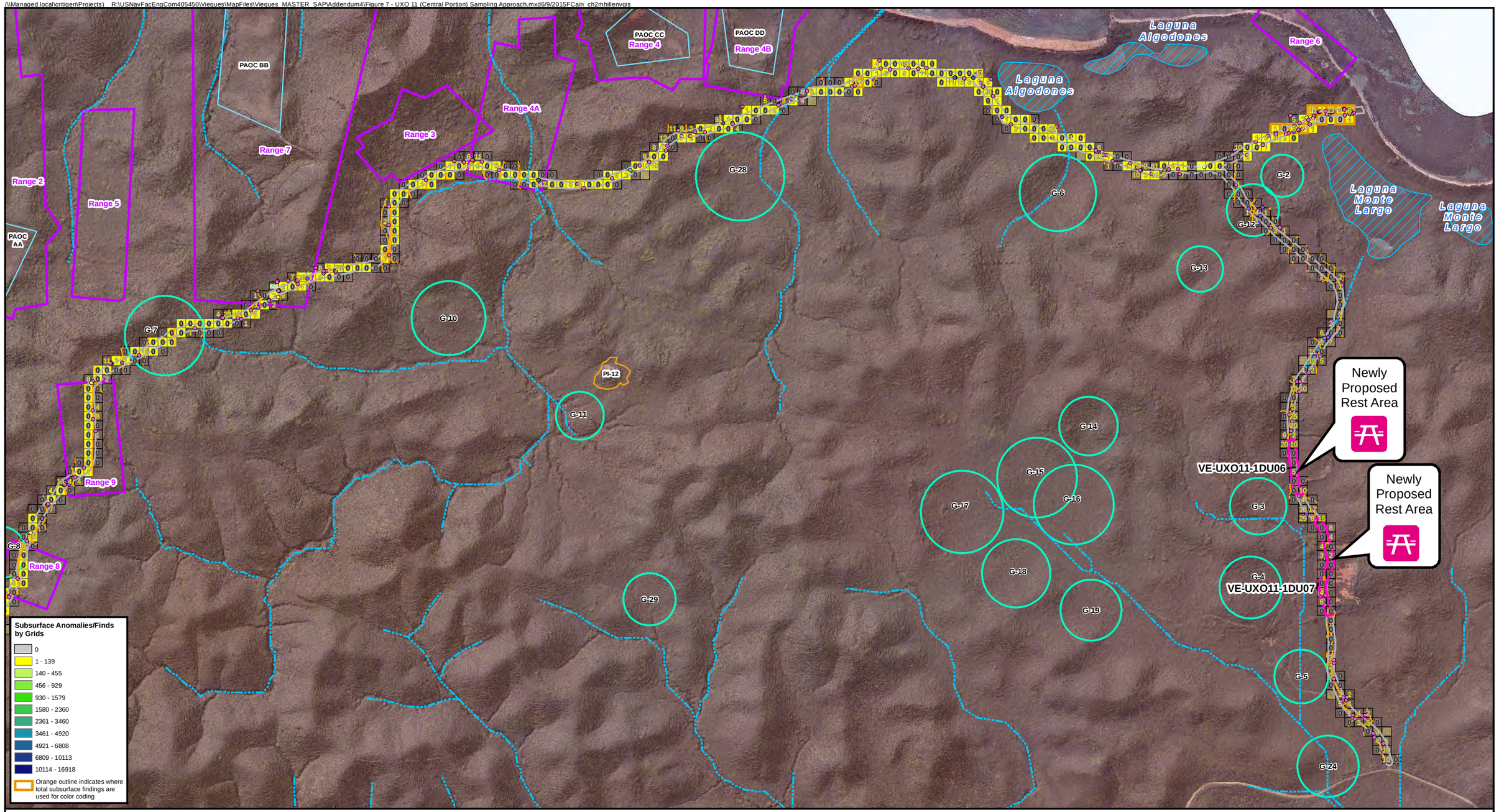


New Sample Unit
Decision Unit
Bombs
Flares-Pyrotechnics
Grenades
MEC Component
Projectiles / Mortars
Rockets / Guided Missiles
Scrap (Munitions Debris)
Transect -3 Foot Width was Investigated
Stream

Gun Positions
Range
Photo Identified Area
Preliminary Area of Concern
Grid (30 Meter)
Yellow Shading Indicates No MEC Investigation
Lagoon
Newly Proposed Rest Area

2005 Aerial Imagery
2005 Hillshade

**Density of MEC and Munitions Debris 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

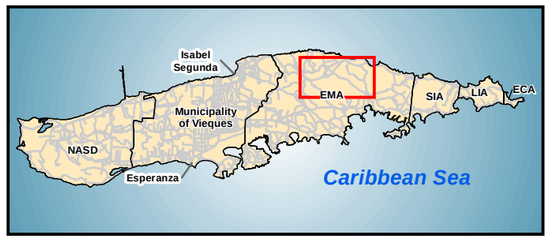


**Figure 7**
**UXO 11 (Central Portion) Sampling Approach**
*Master Sampling and Analysis Plan Addendum 4*
*Former VNTR*
*Vieques, Puerto Rico*

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0 500 1,000
Feet

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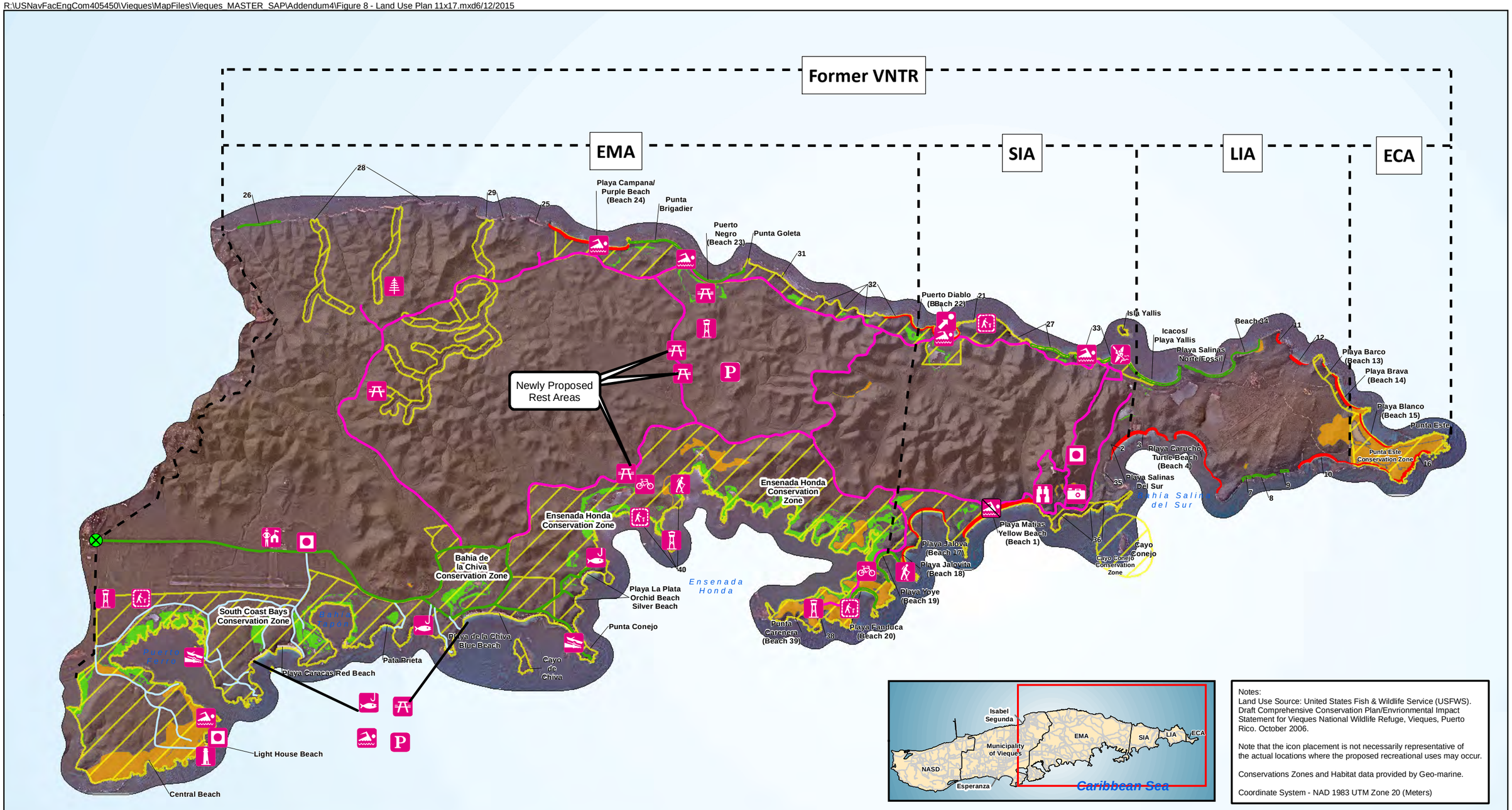
R:\USNavFacEngCom405450\Vieques\MapFiles\Vieques_MASTER_SAP\Addendum4\Figure 8 - Land Use Plan 11x17.mxd6/12/2015




Notes:
Land Use Source: United States Fish & Wildlife Service (USFWS). Draft Comprehensive Conservation Plan/Envrionmental Impact Statement for Vieques National Wildlife Refuge, Vieques, Puerto Rico. October 2006.

Note that the icon placement is not necessarily representative of the actual locations where the proposed recreational uses may occur.

Conservations Zones and Habitat data provided by Geo-marine.

Coordinate System - NAD 1983 UTM Zone 20 (Meters)

**Turtle Beach Setbacks**
- Zone 2 - Minor Restrictions
- Zone 3 - Major Restrictions
- Vehicle Public Use Road Open
- Proposed Hiking/Biking Interpretive Trail
- Vehicle Public Use Road Proposed
- Conservation Zone (Vieques INRMP 2003)
- Mangrove Habitat (Red, White, Black, Button)
- Undelineated Critical Habitat

- Refuge Entrance
- Beach Use
- Bermuda Triangle Interpretive Site
- Biking Trail
- Fishermen's Launch Facilities
- Fishing Access
- Hiking Trail
- Historic Site
- Interpretive Trail
- Kayaking
- Faro Berdiales Lighthouse
- Lookout Area, Binoculars
- Observation Tower
- Parking Area
- Reforestation Area
- Rest Area
- Scenic View
- Seasonal Beach Use
- Beach Use
- Visitor Contact Center

N W E S

0 2,000 4,000 Feet

**Figure 8**
**USFWS Revised Land Use Plan**
*Master Sampling and Analysis Plan Addendum 4*
*Former VNTR*
*Vieques, Puerto Rico*

CH2MHILL

# 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 is accordance with the:*

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

***This accreditation demonstrates technical competence for the defined scope:***

***Environmental Testing***

***(As detailed in the supplement)***

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

For PJLA:

Tracy Szerszen
President/Operations Manager

| *Initial Accreditation Date:* | *Issue Date:* | *Expiration Date:* |
|---|---|---|
| July 19, 2011 | March 13, 2014 | March 13, 2016 |

| *Accreditation No.:* | *Certificate No.:* |
|---|---|
| 65188 | 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.pjlabs.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) |

# *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 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 |

# *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 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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**ALS Environmental-Kelso**

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

| Matrix | Standard / Method | Technology | Analyte |
|---|---|---|---|
| Aqueous/Solid | EPA 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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## ALS Environmental-Kelso

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

| Matrix | Standard / Method | Technology | Analyte |
|---|---|---|---|
| Aqueous/Solid | EPA 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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## ALS Environmental-Kelso

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| 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-Tetrachlorbiphenyl (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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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 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 |

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

| Matrix | Standard / Method | Technology | Analyte |
|---|---|---|---|
| Aqueous/Solid | EPA 8260B, C | GC-MS | 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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| 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) |

# *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 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 |

# *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 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 |

# *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 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-dinitrtoluene |
| 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 |

# *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 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 |

# *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 |
|---|---|---|---|
| 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) |

# *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 |
|---|---|---|---|
| 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 |

# *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 |
|---|---|---|---|
| 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 5.0 July 2013 and is accredited is accordance with the:*

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

***This accreditation demonstrates technical competence for the defined scope:***

***Environmental Testing***

***(As detailed in the supplement)***

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

For PJLA:

Tracy Szerszen
President/Operations Manager

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

| *Initial Accreditation Date:* | *Issue Date:* | *Revision Date:* |
|---|---|---|
| May 13, 2013 | November 28, 2013 | January 16, 2015 |
| *Expiration Date:* | *Accreditation No.:* | *Certificate No.:* |
| November 27, 2015 | 74807 | L13-238-R2 |

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

# *Certificate of Accreditation: Supplement*

ISO/IEC 17025:2005 and DoD-ELAP


**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 (CaCO3) |
| 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 4500-S2 F | 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 5520-BF | Gravimetric | TRPH (Gravimetric) |
| Aqueous | SM 5540C | UV/Vis | MBAS |
| Aqueous | SM3500-Fe Bc | Spectrophotometric | Ferrous Iron |
| Aqueous | SM4500-S2 F | Spectrophotometric | Sulfide |
| Aqueous | SM5310B | Total Organic Carbon Analyzer | Dissolved Organic Carbon |
| Aqueous | SM5310B | Total Organic Carbon Analyzer | Total Organic Carbon |
| 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) |

# *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 |
|---|---|---|---|
| Solids | AK103 | GC/FID | Residuall Range Organics, C25-C36 |
| Solids | EPA 1030 | Manual | Ignitability |
| 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) |
| 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) | Bromide |
| Aqueous/Solids | EPA 300.0 | Ion Chromatography (IC) | Chloride |

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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 300.0 | Ion Chromatography (IC) | Fluoride |
| Aqueous/Solids | EPA 300.0 | Ion Chromatography (IC) | Nitrate as N (NO3- 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) | Orthophosphate as P |
| Aqueous/Solids | EPA 300.0 | Ion Chromatography (IC) | Sulfate (SO4) |
| 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 (NO3 as N) |
| Aqueous/Solids | EPA 353.2 | Flow Injection Analysis (FIA) | Nitriate + 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 |
| 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 |

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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 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 |
| 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 |

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| Matrix | Standard/Method | Technology | Analyte |
|---|---|---|---|
| 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 8015B,C,D | GC/FID | Total Purgeable Hydrocarbons |
| Aqueous/Solids | EPA 8081A,B | GC/NPD | 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 |
| 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) |

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

| Matrix | Standard/Method | Technology | Analyte |
|---|---|---|---|
| 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) |
| 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/NPD | Ametryn |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Atraton |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Atrazine |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Azinphosmethyl |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Bolstar |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Chlorpyrifos |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Coumaphos |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Cyanizine |

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| Matrix | Standard/Method | Technology | Analyte |
|---|---|---|---|
| Aqueous/Solids | EPA 8141A,B | GC/NPD | DEF |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Demeton, (Mix of Isomers O:S) |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Diazinon |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Dichlorvos |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Dimethoate |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Disulfoton |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | EPN |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Ethion |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Ethoprop |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Fenchlorphos (Ronnel) |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Fensulfothion |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Fenthion |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Malathion |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Merphos |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Mevinphos |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Naled |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Parathion ethyl |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Parathion methyl |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Phorate |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Prometon |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Prometryn |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Propazine |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Prowl |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Simazine |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Simetryn |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Sulfotep |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Terbutryn |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Terbutylazine |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Tetrachlorvinphos (Stirophos) |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Tokuthion |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | Trichlorinate |
| Aqueous/Solids | EPA 8141A,B | GC/NPD | 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 |

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| Matrix | Standard/Method | Technology | Analyte |
|---|---|---|---|
| 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 |
| 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 | Cyclohexane |
| Aqueous/Solids | EPA 8260B, C | GC/MS | Methylacetate |
| Aqueous/Solids | EPA 8260B, C | GC/MS | Methylcyclohexane |
| 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 |

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

| Matrix | Standard/Method | Technology | Analyte |
|---|---|---|---|
| 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 |
| 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) |

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Diane Anderson  Phone: 559-275-2175


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| Matrix | Standard/Method | Technology | Analyte |
|---|---|---|---|
| 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 |
| 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 |

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| Matrix | Standard/Method | Technology | Analyte |
|---|---|---|---|
| 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) |
| 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 |

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| Matrix | Standard/Method | Technology | Analyte |
|---|---|---|---|
| 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 |
| 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 |

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

| Matrix | Standard/Method | Technology | Analyte |
|---|---|---|---|
| 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 |
| 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 | 1,2,3,4,6,7,8,9-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 | 1,2,3,4,7,8,9-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 |

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| Matrix | Standard/Method | Technology | Analyte |
|---|---|---|---|
| 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 |
| 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 |

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| Matrix | Standard/Method | Technology | Analyte |
|---|---|---|---|
| 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) |
| 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 | Distillation/UV/Vis | Amenable Cyanide |
| Aqueous/Solids | EPA 9010C | Distillation/UV/Vis | Total Cyanide |
| Aqueous/Solids | EPA 9010C | UV/Vis | Total Cyanide |
| Aqueous/Solids | EPA 9014 | Distillation/UV/Vis | Amenable Cyanide |
| Aqueous/Solids | EPA 9014 | Distillation/UV/Vis | Total Cyanide |
| Aqueous/Solids | EPA 9014 | UV/Vis | Total 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 |

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| 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 5035A | 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 |

# Attachment B
# Responses to Regulatory Agency Comments

**Final Responses to EPA Comments on the
Draft Addendum 4, Master Sampling and Analysis Plan
UXOs 3, 5, 6, and 11 Remedial Investigation
Atlantic Fleet Weapons Training Area – Vieques, Former Vieques Naval Training Range
Vieques, Puerto Rico, dated June 2015 (hereinafter referred to as the SAP Addendum)**

## General Comments

1. The SAP Addendum does not provide the rationale (e.g., number, location, type) for the additional incremental sample to be collected at UXO 6, or the additional two incremental samples and four soil boring samples at UXO 11. Revise the SAP Addendum to provide the rationale for these additional samples.

   **Navy Response**: Worksheet #17 has been modified to provide additional clarification on the number, type, and location of the new incremental samples. The revised text includes: "UXO 6 West Portion (**Figure 5**): One sampling unit (0 to 2.5 inches) and two discrete subsurface soil samples will be collected at the proposed roadside rest area identified by USFWS." Additionally, the revised text includes: "UXO 11 Central Portion (**Figure 7**): Two sampling units (0 to 2.5 inches) and four discrete subsurface soil samples will be collected at the proposed roadside rest area identified by USFWS."

2. The SAP Addendum (Worksheet # 11- Project Quality Objectives/Systematic Planning Process Statements) notes when screening levels are less than the limits of detection (LODs). While it is understood that this may be due to limitations in the analytical methods, the SAP Addendum should discuss the uncertainty associated with results where the screening levels are less than the limits of quantitation (LOQ). For example, when the screening level is between the LOD and LOQ, the SAP Addendum should include a discussion of sensitivity and uncertainty. This discussion should include (i.e., where applicable) why results are sufficient to meet project data quality objectives (DQOs). Further, in cases where the screening level is less than the LOQ, but above the LOD, this discussion should also include why the level of uncertainty associated with detected results less than the LOQ (i.e., results that are not quantifiably reliable) was deemed acceptable and allowed project DQOs to be met. Revise the SAP Addendum to provide a more detailed discussion on uncertainty in cases where the screening level is less than the LOQ.

   **Navy Response**: Such uncertainty, resulting from proximity of results to reporting limits is discussed in the data quality evaluation described in Worksheet #37 of the Master SAP. For example, Worksheet #37 states that "While all non-rejected data are available for use to the project team, non-detect (and attributable to blank contamination) results may not be useful if the quantitation limit (QL) is greater than the associated project action limit. In these cases, the project team will determine whether or not the laboratory would likely have detected the contaminant if present at above the Project Action Limit (PAL) (i.e., evaluation of the PAL versus the MDL)." In addition, it states that "data usability is not decided upon by any one individual or entity. The project team, as a whole, will decide upon the usability of the data." Worksheet #11 has been revised to include a reference to Master SAP Worksheet #37. However, please note it is relatively common for the laboratory to detect constituents at concentrations between the LOD and LOQ and qualify those data with a "J" flag, indicating the concentration is estimated. As noted in the Master SAP, the uncertainty associated with the use of estimated (i.e., "J"-qualified) data for making project decisions is relatively insignificant and use of the data is appropriate, as has been done for all previous studies on Vieques.

   In addition, please refer to the eighth bullet within Question 2 of Worksheet #11 for the discussion of the DLs being greater than the PALs (which is only for the SSL).

**EPA Evaluation of Response**: It is stated in the Navy's response that "...As noted in the Master SAP, the uncertainty associated with the use of estimated (i.e., "J"-qualified) data for making project decisions is relatively insignificant and use of the data is appropriate, as has been done for all previous studies on Vieques…." The decision on whether or not to use a value flagged "J" should be done on the basis of the individual circumstances surrounding the data points and documented on the Data Usability Report. Use of "J" flagged data should not be automatic.

**Navy Response to Evaluation**: The original response has been modified to read ". . . . As noted in the Master SAP, the uncertainty associated with the use of estimated (i.e., "J"-qualified) data for making project decisions is relatively insignificant and use of the data is generally appropriate, pending their review via the DQE, as has been done for all previous studies on Vieques."

3. The SAP Addendum does not provide the depths of the subsurface soil samples. Specifically, Worksheet #18 – Sampling Locations and Methods/SOP Requirements Table refers to the modified Vieques Protocol rather than providing the actual depth(s) of the subsoil samples. This information should be added as a footnote to Worksheet # 18.

   **Navy Response**: The following text has been added as a footnote to the table: "Sample depths will be determined by the FTL and/or the project manager following the depth selection procedures presented in the Modified Soil Sample Depth Selection Protocol included in Appendix D of the Master SAP to ensure the appropriate sample intervals are selected to meet the objectives of the RI."

4. The SAP does not provide the laboratory standard operating procedures (SOPs) for the analytical methods to be used. Without this information, the adequacy of the laboratory methods cannot be evaluated. Revise the SAP Addendum to include all relevant laboratory-specific SOPs as discussed in Section 3.2.1 of the Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP) Manual, dated March 2005.

   **Navy Response**: Laboratory SOPs, which are proprietary and confidential, represent intellectual property to the companies that own them. Therefore, as is standard protocol for Vieques, they are not attached to a SAP because it becomes public information. APPL and ALS-Kelso have provided permission to distribute the applicable SOPs along with these responses to comments for the purposes of regulatory review. However, the expectation is that the regulatory agencies will abide by the standards of professional conduct associated with proprietary and confidential information.

   **EPA Evaluation of Response**: The SAP should indicate the locations of the laboratory SOPs as well as provide a method for reviewers to access them. EPA does not release laboratory SOPs nor any other Business Confidential information.

   **Navy Response to Evaluation:** The SOPs were inadvertently not included in the e-mail containing the preliminary responses to comments. They were submitted by e-mail.

5. The information on laboratory subsampling is insufficiently detailed. Worksheet #23 indicates that 10 grams of soil will be digested for perchlorate and metals. However, it is unclear if this amount of soil will only be used for the incremental samples, or if all samples for metals and perchlorate will have larger sample sizes. Further, since SOPs are not provided, it is unclear if the laboratory subsampling procedures for soil boring samples will provide representative sample aliquots (i.e., stirring in jar and removing 1 gram for metals analysis will very likely not provide a representative subsample). Revise the SAP Addendum to provide the laboratory subsampling procedures for the soil boring samples (similar to that

provided in Worksheet 28-0-Laboratory QC Samples Table for multi-incremental samples), and ensure that the proposed procedures will provide a representative sample for analysis.

**Navy Response**: These extraction and digestion masses are specifically due to regulatory request on the Master SAP (please see responses to PREQB comment 35c on the Master SAP). Worksheet #23 footnote #3 (increased extraction mass for perchlorate) applies to both discrete and incremental samples. Worksheet #23 footnote #4 (increased digestion mass for metals) applies only to incremental samples as evidenced by the "10g of SMI for metals" statement. Please refer to RTC comment #4, immediately above, as it pertains to lab SOPs. Worksheet #28-0 is intended to describe the soil preparation procedures required for incremental samples with various analysis groups; something similar is not necessary for routine discrete samples where the only unusual requirement is increased extraction mass for perchlorate (described on Worksheet #23).

## Specific Comments

1. **SAP Worksheet #11, Project Quality Objectives/Systematic Planning Process Statements, Page 6:** Item #7 of this worksheet indicates that if additional data are deemed warranted, those data will be collected prior to preparing the Remedial Investigation (RI) Report; however, it is unclear how it will be determined if or how much additional data are required. Revise the SAP Addendum to include this information.

   **Navy Response**: Worksheet #11 has been modified to state, "The data will be evaluated and documented in an RI Report. Additional samples may be collected if the data from the samples included in this SAP indicate the nature and extent of contamination has not been sufficiently delineated. In that case, a meeting or call will be held among the Vieques Technical Subcommittee to discuss the findings and recommendations and concur on the additional sample locations. Meeting minutes and updated figures showing sampling locations will constitute the necessary documentation for collecting the additional samples and they will be collected under this SAP. This process will ensure the RI is completed in the most expeditious manner possible to facilitate future planned land use. If additional data are deemed necessary by the ERP Technical Subcommittee, those data will be collected prior to preparing the RI Report."

2. **SAP Worksheet #11, Project Quality Objectives/Systematic Planning Process Statements, Item 2, Page 5:** Please cite the specific reference for item #3, "soil-to-groundwater leaching screening values."

   **Navy Response:** The citation "(EPA, 2015)" has been added to Worksheet #11 for the soil-to-groundwater leaching screening values.

3. **SAP Worksheet #15, Reference Limits and Evaluation Table, Page 11:** This table does not include 3,5-dinitroanaline, which is a Method 8330B analyte. Revise this table to include 3,5-dinitroanaline.

   **Navy Response**: Footnote #1 on Worksheet #15-1 has been revised to state "Full 8330B-list (excluding 3,5-dinitroaniline [3,5-DNA] due to a lack of screening values) plus Picric Acid and Perchlorate.

4. **SAP Worksheets #18, Sampling Locations and Methods/SOP Requirements Table:** Please indicate that this information pertains to the additional samples only.

   **Navy Response**: Worksheet #18 lists the samples which are planned to support this investigation. There are no "additional samples."

5. **SAP Worksheets #20, Field Quality Control Sample Summary Table:** The information regarding the additional samples should be highlighted.

   **Navy Response**: Worksheet #20 summarizes the samples which are planned to support this investigation and is consistent with Worksheet #18. There are no "additional samples."

6. **SAP Worksheets #28-1 and 28-2, Laboratory QC Samples Table, Pages 46-47:** It is unclear which results will be reported and used if the confirmation of positive results (i.e., second column confirmation results exceed the acceptance limits). Revise the SAP Addendum to discuss this for both Methods 8330B and 8321A.

   **Navy Response**: For both SW-846 8330B and 8321A, reporting is conducted following DoD QSM v. 5.0. Worksheet #28-1 and #28-2 are consistent as they pertain to "Confirmation of positive results (second column)." Worksheet #28-1 (8330B) already indicates that "report from both columns" is part of the corrective action and this missing information has been added to Worksheet #28-2.

7. **SAP Worksheets #28-4 and 28-5, Laboratory QC Samples Table, Pages 50-51:** The corrective action for failing post digestion spikes (PDS) is not consistent with the Final Master SAP for East Vieques Terrestrial UXO Sites, CH2M HILL, 2013 (Master SAP) or the analytical methods. The Master SAP and analytical methods indicate that if the PDS exceeds the acceptance limits, associated samples should be analyzed by the method of standard additions (MSA). Revise the SAP Addendum to correct this apparent discrepancy.

   **Navy Response**: SW-846 6010C and 6020A are performed per DoD QSM v. 5.0 and MSA is required if necessary. Worksheets #28-4 and #28-5 have been revised to indicate that MSA is required "when dilution or post-digestion spike fails and if required by project" and the laboratory must "document use of MSA in the case narrative."

**Final Responses to PREQB Comments on the**
**Draft Addendum 4, Master Sampling and Analysis Plan**
**UXOs 3, 5, 6, and 11 Remedial Investigation**
**Atlantic Fleet Weapons Training Area – Vieques, Former Vieques Naval Training Range**
**Vieques, Puerto Rico, dated June 2015**

## Page-Specific Comments

1. SAP Worksheet #11:

   a. Question #2, Bullet #7: Please add arsenic (SSL) and hexavalent chromium (EPA RSL) to the list of analytes with LODs above PALs.

      **Navy Response**: The list of analytes within bullet #7 for question #2 on Worksheet #11 pertain to analytes with DLs greater than PALs. As evidenced by Worksheet #15-2, the arsenic DL (0.08) is less than the SSL (0.29) and the hexavalent chromium DL (0.3) is at the RSL (0.3). Therefore, these instances are not appropriate to include on the Worksheet #11 question #2 bullet #7 list.

   b. Question #2, Bullet #8: Please add justification for the EPA RSL exceedance for hexavalent chromium.

      **Navy Response**: As stated in bullet 8 of question 2, "…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." Because the RSL and DL for hexavalent chromium are the same (0.3 mg/kg), detections of hexavalent chromium above the DL but below the LOD will be handled in this manner. In addition, the residential RSL for hexavalent chromium has been shaded in Worksheet #15 to indicate that it is below the LOD.

2. SAP Worksheet #15-1:

   a. Note #1 on this worksheet states that the worksheet includes the full 8330B-list. However, 3,5-dinitroaniline is on the 8330B list but not included in this worksheet. Please clarify and correct as needed.

      **Navy Response**: Footnote #1 on Worksheet #15-1 has been revised to state "Full 8330B-list (excluding 3,5-dinitroaniline [3,5-DNA] due to a lack of screening values) plus Picric Acid plus Perchlorate.

   b. An Ecological Soil ESV is not presented for 4-Amino-2,6-dinitrotoluene (4-Am-DNT). The revised ERA Protocol for Vieques uses the ESV for 2-Amino-4,6-dintrotoluene (2-Am-DNT) as a surrogate for 4-Am-DNT. Please include this ESV for 4-Am-DNT.

      **Navy Response**: Worksheet 15-1 has been updated to show 80,000 µg/kg as the ESV for 4-Amino-2,6-dinitrotoluene.

   c. An Ecological Soil ESV of 53,400 ug/kg is presented for picric acid. The revised ERA Protocol for Vieques does not present a soil ESV for this constituent. Please identify the source of the ESV presented for picric acid.

**Navy Response**: In Worksheet 15-1 the soil ESV for picric acid is incorrect; no criterion is available and "NC" has been entered in its place.

3. SAP Worksheet #15-2:

   a. Please shade the EPA RSL for hexavalent chromium since the LOD exceeds this RSL.

      **Navy Response**: The requested change has been made (for adjusted residential soil RSL).

   b. An Ecological Soil ESV is not presented for hexavalent chromium. The revised ERA Protocol for Vieques presents a value of 0.40 mg/kg for a soil ESV for hexavalent chromium. Please include this ESV for hexavalent chromium.

      **Navy Response**: Worksheet #15-2 has been updated to show 0.40 mg/kg as the ESV for hexavalent chromium. The ESV column header has also been corrected to show units as mg/kg (not µg/kg).

Department of Natural and Environmental Resources Comments

| DNER Comments on:<br>MASTER SAMPLING AND ANALYSIS PLAN, UXOS 3, 5, 6, AND 11 REMEDIAL INVESTIGATION, ADDENDUM 4<br>Comments Made by DNER on July 28, 2015 | | | | | |
|---|---|---|---|---|---|
| **PDF Page #** | **Doc. Page #** | **SAP Wkst #** | **Highlighted Document Text/Summary of Content** | **DNER Comments** | **Navy Response** |
| 11 | 5 | 11 | Even though LODs may be greater than certain PALs, detection limits (DLs) may be closer to or less than PALs. | Clarify the difference between a Limit of Detection (LOD) and a Detection Limit (DL) in this context. | When applicable, this document is consistent with DoD QSM v. 5.0. LOQ, LOD, and DL are as defined by DoD QSM v. 4.0 and later. In this context, the limit of detection (LOD) is the reporting limit at which nondetect results are reported. At the LOD, the false negative rate is 1%. The detection limit (DL) is a lower level of detection, and may be based on the MDL. It is used similar to how MDL was previously used, as at the DL, the false positive rate is 1%. |
| 12 | 6 | 11 | **6. Where, when, and how should the data be collected/generated?**<br>− Samples are anticipated to be collected during one field mobilization planned to occur around February 2016.<br>− Data will be collected and generated in accordance with the procedures outlined in the Master SAP.<br>Specifically, see the SOPs in Appendix D of the Final Master SAP (CH2M HILL, 2013a) for more details. | Despite the sections title, this section does not address precisely where within the UXO 3, 5, 6 and 11 the different types of samples will be collected. Suggest referencing Worksheets 17 & 18 and Figures 5 and 7 in this section to address new sampling locations, and Figures 2-7 to identify locations of all sampling. | Worksheet 11 has been modified to state: “The sampling rationale and locations are described in Worksheets #17 and #18 and are shown in Figures 2 through 7.” |

# Final Responses to USFWS Comments on the Draft Addendum 4, Master Sampling and Analysis Plan UXOs 3, 5, 6, and 11 Remedial Investigation Atlantic Fleet Weapons Training Area – Vieques, Former Vieques Naval Training Range Vieques, Puerto Rico, dated June 2015

Some of the Project Action Levels reported are below the limits of detection that lab instruments can find. These results are shown as shaded results on the tables. We recommend additional discussion of these results on the body of the document because it can be confusing. These can be interpreted in two ways: 1) as possible false positive results (if not present) or, 2) if the Action Levels were previously determined, that the lab instruments used cannot detect them. During the risk assessment process this issue should be addressed to determine if changes to the methods are needed.

**Navy Response**: Please refer to the discussion of the Usability Assessment within Worksheet #37 of the Master SAP. For example, Worksheet #37 states that "While all non-rejected data are available for use to the project team, non-detect (and attributable to blank contamination) results may not be useful if the quantitation limit (QL) is greater than the associated project action limit. In these cases, the project team will determine whether or not the laboratory would likely have detected the contaminant if present at above the Project Action Limit (PAL) (i.e., evaluation of the PAL versus the MDL)." In addition, it states that "data usability is not decided upon by any one individual or entity. The project team, as a whole, will decide upon the usability of the data." Worksheet #11 has been revised to include a reference to Master SAP Worksheet #37. However, please note it is relatively common for the laboratory to detect constituents at concentrations between the LOD and LOQ and qualify those data with a "J" flag, indicating the concentration is estimated. As noted in the Master SAP, the uncertainty associated with the use of estimated (i.e., "J"-qualified) data for making project decisions is relatively insignificant and use of the data is appropriate, as has been done for all previous studies on Vieques.

Nondetect LODs at greater than PALs should not be treated as exceedances, even though the reported result (reporting limit is set at the LOD) is greater than the PAL. This is described on each applicable Worksheet 15 as "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." It is previously determined that lab instruments cannot reach PALs which are often established purely based on risk and do not consider current detection technology. Please refer to the eighth bullet within Question 2 of Worksheet #11 for the discussion of the DLs being greater than the PALs (which is only for the SSL).