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TIER II SAMPLING AND ANALYSIS PLAN MODIFICATION (VERSION 2) DECISION UNIT 5-1
AT TANK FARM 5 SITE 13 OPERABLE UNIT 2 (OU 2) NS NEWPORT RI
09/18/2014
RESOLUTION CONSULTANTS

TIER II SAMPLING AND ANALYSIS PLAN
MODIFICATION
Decision Unit 5-1 at Tank Farm 5 (Site 13)
Operable Unit 2
Naval Station Newport
Middletown, Rhode Island
VERSION 2

Prepared for:



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Naval Facilities Engineering Command, Mid-Atlantic
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SAMPLING AND ANALYSIS PLAN (SAP) MODIFICATION
ADDITIONAL SAMPLING BENEATH DRUMS
DU 5-1, TANK FARM 5 (SITE 13), OPERABLE UNIT 2
NAVSTA NEWPORT, MIDDLETOWN, RHODE ISLAND

VERSION 2

Introduction

This Sampling and Analysis Plan (SAP) modification (Version 2) is being provided to the agencies based on further input received during the Remedial Project Manager (RPM) meeting conducted on September 17, 2014. The Navy is preparing to expand the pre-design investigation (PDI) at Tank Farm 5 Decision Unit (DU) 5-1, per this SAP modification.

Background

A PDI for soil at Tank Farm 5 DU 5-1 was initiated in September 2014 to investigate arsenic impacts at this area. In August 2014, Resolution Consultants began clearing dense vegetation from the site to facilitate a site survey and future soil sampling. Upon removing the vegetation, two rusted drums were observed in the southeastern portion of the area to be investigated, approximately 100 feet from the paved parking area for the adjacent Fire Fighter Training Facility.

The Navy provided notification to USEPA and RIDEM of the presence of the drums on August 15, 2014, and USPEA subsequently requested that the drums be removed and that sampling be conducted under these drums. This document summarizes the planned sampling regime and serves as a modification to the *Final Tier II Sampling and Analysis Plan (SAP) for DU 5-1, Tank Farm 5 (Site 13), Operable Unit 2 at NAVSTA Newport, Middletown, RI*, dated August 6, 2014. The first SAP Modification was submitted on September 8, 2014, and comments from RIDEM were discussed during the RPM meeting on September 17, 2014. Version 2 of the SAP Modification incorporates RIDEM's request to consider GA Leachability Criteria and to collect soil samples from just above the groundwater table.

If sampling results indicate that an expanded sampling event is necessary beyond the flexibility provided in this SAP Modification, then an additional SAP Modification will be provided to USEPA and RIDEM prior to that event. Per the Record of Decision (ROD), which was signed on January 9, 2014, and the Federal Facilities Agreement (FFA), the Remedy Implementation Date for the site is April 4, 2015. Therefore, in the interest of completing the soil PDI at Tank Farm 5 so that the Remedial Design for soil can be completed and the Remedy Implementation schedule for DU 5-1 can be maintained, this SAP Modification is considered sufficient to allow for the initial investigation of soil in the vicinity of the abandoned drums. Refer to Figure 1 for the regional location of Tank

Farm 5 and Figure 3 for the location of DU 5-1 within Tank Farm 5, as well as the approximate location of the abandoned drums. (Note that there is no Figure 2 for this document).

Project Quality Objectives

The goal of this additional investigation is to collect soil samples from beneath and in the immediate vicinity of the abandoned drums to determine if soil conditions exceed RIDEM Industrial and Commercial Direct Exposure Criteria (ICDECs) or GA Leachability Criteria within in the top 2 feet of soil or at the groundwater table. The top 2 feet of soil is the remediation depth identified in the ROD for DU 5-1, for comparison and compliance with Remedial Goals (RGs). The following data will be collected to characterize soil beneath the drums:

- Field screening – photoionization detector (PID), PetroFlag Screening Kit
- Soil sampling – volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs that include PAHs), pesticides, polychlorinated biphenyls (PCBs), metals (plus mercury), hexavalent chromium, and total petroleum hydrocarbons (TPH)

Clearing

Additional vegetation clearing should not be required. All samples will be collected with a Geoprobe or handheld samplers.

Utility Clearance

Prior to the initiation of intrusive field work, utility clearance will be conducted in accordance with SOP 3-01.

Soil Sample Collection

Two areas of abandoned drums were noted following vegetation clearing, located approximately 50 feet apart. Approximately 6 soil borings are planned to investigate these two areas. Soil boring locations will be distributed to adequately characterize the two areas observed.

Soil borings will be advanced to the groundwater table (approximately 12 to 15 feet based on previous investigations) using a Geoprobe drill rig. Soil samples will be field screened at each sampling interval using a PID and Petroflag kit, as noted above. Field measurements will be recorded in a field logbook and/or onto field data collection records. Soil will be inspected for the presence of obvious impacts (visual and olfactory), and associated field measurements and observations will be recorded. Field data will be compiled and stored in project folders, for subsequent use in evaluating analytical data and completing the soil investigation summary report which will be used to support the Soil Remedial Design. Soil to be submitted for laboratory analysis

will be selected based on field observations and measurements of impacts (e.g., visual and/or olfactory evidence, PID and Petroflag Screening, etc.); however, two soil samples per boring will be submitted. Soil to be submitted for laboratory analysis will be biased towards any soil exhibiting obvious signs of impacts based on the above observations. In the absence of obvious impacts, soil will be selected from the surface soil (0-2 feet) and the groundwater table interface (presumed to be 12-15 feet). Soil will not be composited.

Samples will be picked up in the field or at a nearby office via laboratory-supplied courier. The samples will be preserved, chilled, etc. in accordance with the August 6, 2014 SAP and the attached worksheets. Samples will be analyzed using applicable analytical methods by a competent analytical laboratory certified by the Department of Defense (DoD) Environmental Laboratory Accreditation Program (ELAP) to reduce measurement errors. All sample shipments will contain appropriate chain of custody (CoC) forms. Samples will be submitted for rush 2-day turnaround time for all analytes included in this SAP modification.

Quality Assurance/Quality Control

The QA/QC sample collection frequency is as follows:

- Equipment blanks – the more frequent of 1 per week of sampling or per 20 samples collected per method and matrix and type of equipment
- Trip blanks – 1 trip blank per day
- Cooler Temperature Blanks
- Field duplicates – (single blind samples) 1 per 10 samples per method and matrix
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) or MS/Matrix Duplicate – 1 per 20 samples per method and matrix

Worksheets #12, #15, #23, and #28 of the original SAP Version 1 have been modified to accommodate the expanded analyte list and analytical method set required for this additional sample testing (attached).

Equipment Decontamination

To the maximum extent possible, Resolution will use dedicated and disposable sampling equipment to avoid the potential for cross contamination of samples. The sampling equipment will include dedicated plastic scoops, disposable gloves, and laboratory supplied sample bottles.

Non-disposable or non-dedicated sampling equipment (e.g., stainless spoons, stainless bowls, etc.) will be decontaminated prior to sampling and between samples. Cleaning of equipment is performed to prevent cross-contamination between samples and to maintain a clean working

environment for all personnel. Decontamination will generally consist of a water rinse station to remove gross contamination (if needed), followed by a non-phosphate detergent (e.g., Alconox) water rinse, and a rinse with de-ionized water.

Investigation-Derived Waste Management

It is not anticipated that any IDW will be generated as part of these investigations, but in the event that IDW is generated, it will be handled in accordance with RIDEM's *Policy Memo 95-01 Guidelines for the Management of Investigation Derived Wastes*, Investigation Derived Waste (IDW).

Land Surveying

GPS coordinates for each soil boring will be collected in the field.

Laboratory Coordination, Data Management and Validation

Refer to the August 6, 2014 SAP for details regarding data validation and sample management. The USEPA National Function Guidelines for Organic Methods Data Review (June 2008) are added as an additional reference for Worksheet #34, 35, and 36. Additional data review elements during data validation for organics include internal standard areas and surrogate recoveries, where appropriate.

SAP Worksheet #12-1: Measurement Performance Criteria – Field QC Samples for Metals

Matrix: Soil

Analytical Group: ICP-AES Metals

Concentration Level: Low

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria
Equipment Rinsate Blank	ICP-AES Metals	One per week of sampling or per twenty field samples (whichever is more frequent) per type of equipment used	Accuracy/Bias	No target metals > ½ LOQ (> LOQ for common laboratory contaminants) and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. For negative blanks, absolute value must be < LOD. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).
Field Duplicate		One per ten samples per matrix	Precision	RPD ≤ 50% if both results are ≥ 5 x LOQ. Diff ≤ LOQ if values are < 5x LOQ
Matrix Spike		Submitted: One per twenty samples per matrix. Analyzed: Most frequent of one per twenty samples or SDG per matrix, or one per prep batch per matrix.	Accuracy/Bias	Refer to Worksheet #28-2

SAP Worksheet #12-2: Measurement Performance Criteria Field Quality Control Samples

[\(UFP-QAPP Manual Section 2.6.2\)](#)

Matrix: Soil

Analytical Group: Volatile Organic Compounds (Full Scan)

Concentration Level: Low

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria
Trip Blank	Volatile Organic Compounds (Full Scan)	One per cooler containing VOC Samples	Accuracy/Bias	No target compounds > 1/2 LOQ (> LOQ for common laboratory contaminants) and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).
Equipment Rinsate Blank		One per day of sampling per type of equipment used	Accuracy/Bias	No target compounds > 1/2 LOQ (> LOQ for common laboratory contaminants) and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).
Cooler Temperature Indicator		One per cooler	Accuracy/Representativeness	Temperature ≤ 6 degrees Celsius.
Field Duplicate		One per twenty samples per matrix	Precision	Relative Percent Difference (RPD) ≤ 50% if both results are ≥ 2 x LOQ
Matrix Spike/Matrix Spike Duplicate		Submitted: One per twenty samples per matrix. Analyzed: More frequent of one per twenty samples or SDG per matrix.	Accuracy/Bias/Precision	Refer to Worksheet #28-1

SAP Worksheet #12-3: Measurement Performance Criteria – Field QC Samples
[\(UFP-QAPP Manual Section 2.6.2\)](#)

Matrix: Soil

Analytical Group: Semivolatile Organic Compounds (Full Scan)

Concentration Level: Low

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria
Equipment Rinsate Blank	Semivolatile Organic Compounds (Full Scan)	One per day of sampling per type of equipment used	Accuracy/Bias	No target compounds > 1/2 LOQ (> LOQ for common laboratory contaminants) and > 1/10 the amount measured in any sample or 1/10 the LOQ, whichever is greater. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).
Cooler Temperature Indicator		One per cooler	Accuracy/Representativeness	Temperature ≤ 6 degrees Celsius.
Field Duplicate		One per twenty samples per matrix	Precision	RPD ≤ 50% if both results are ≥ 2 x LOQ
Matrix Spike/Matrix Spike Duplicate		Submitted: One per twenty samples per matrix. Analyzed: More frequent of one per twenty samples or SDG per matrix.	Accuracy/Bias/Precision	Refer to Worksheet #28-2

SAP Worksheet #12-4: Measurement Performance Criteria – Field QC Samples
[\(UFP-QAPP Manual Section 2.6.2\)](#)

Matrix: Soil

Analytical Group: Polycyclic Aromatic Hydrocarbons (Selected Ion Monitoring)

Concentration Level: Low

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria
Equipment Rinsate Blank	Polycyclic Aromatic Hydrocarbons (Selected Ion Monitoring)	One per day of sampling per type of equipment used	Accuracy/Bias	No target compounds > 1/2 LOQ (> LOQ for common laboratory contaminants) and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).
Cooler Temperature Indicator		One per cooler	Accuracy/Representativeness	Temperature ≤ 6 degrees Celsius.
Field Duplicate		One per twenty samples per matrix	Precision	RPD ≤ 50% if both results are ≥ 2 x LOQ
Matrix Spike/Matrix Spike Duplicate		Submitted: One per twenty samples per matrix. Analyzed: More frequent of one per twenty samples or SDG per matrix.	Accuracy/Bias/Precision	Refer to Worksheet #28-3

SAP Worksheet #12-5: Measurement Performance Criteria – Field QC Samples

[\(UFP-QAPP Manual Section 2.6.2\)](#)

Matrix: Soil

Analytical Group: Organochlorine Pesticides

Concentration Level: Low

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria
Equipment Rinsate Blank	Organochlorine Pesticides	One per day of sampling per type of equipment used	Accuracy/Bias	No target compounds > 1/2 LOQ and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).
Cooler Temperature Indicator		One per cooler	Accuracy/Representativeness	Temperature ≤ 6 degrees Celsius.
Field Duplicate		One per twenty samples per matrix	Precision	RPD ≤ 50% if both results are ≥ 2 x LOQ
Matrix Spike/Matrix Spike Duplicate		Submitted: One per twenty samples per matrix. Analyzed: More frequent of one per twenty samples or SDG per matrix.	Accuracy/Bias/Precision	Refer to Worksheet #28-6

SAP Worksheet #12-6: Measurement Performance Criteria – Field QC Samples

[\(UFP-QAPP Manual Section 2.6.2\)](#)

Matrix: Soil

Analytical Group: Polychlorinated Biphenyls (Aroclors)

Concentration Level: Low

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria
Equipment Rinsate Blank	Polychlorinated Biphenyls (Aroclors)	One per day of sampling per type of equipment used	Accuracy/Bias	No target compounds > 1/2 LOQ and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).
Cooler Temperature Indicator		One per cooler	Accuracy/Representativeness	Temperature ≤ 6 degrees Celsius.
Field Duplicate		One per twenty samples per matrix	Precision	RPD ≤ 50% if both results are ≥ 2 x LOQ
Matrix Spike/Matrix Spike Duplicate		Submitted: One per twenty samples per matrix. Analyzed: More frequent of one per twenty samples or SDG per matrix.	Accuracy/Bias/Precision	Refer to Worksheet #28-5

SAP Worksheet #12-7: Measurement Performance Criteria – Field QC Samples

[\(UFP-QAPP Manual Section 2.6.2\)](#)

Matrix: Soil

Analytical Group: ICP-MS Metals

Concentration Level: Low

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria
Equipment Rinsate Blank	ICP-MS Metals	One per day of sampling per type of equipment used	Accuracy/Bias	No target metals > 1/2 LOQ (> LOQ for common laboratory contaminants) and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. For negative blanks, absolute value < LOD. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).
Field Duplicate		One per twenty samples per matrix	Precision	RPD ≤ 50% if both results are ≥ 5 x LOQ. Diff ≤ LOQ if values are < 5x LOQ
Matrix Spike		Submitted: One per twenty samples per matrix. Analyzed: Most frequent of one per twenty samples or SDG per matrix, or one per prep batch per matrix.	Accuracy/Bias	Refer to Worksheet #28-6

SAP Worksheet #12-8: Measurement Performance Criteria – Field QC Samples

[\(UFP-QAPP Manual Section 2.6.2\)](#)

Matrix: Soil

Analytical Group: Mercury (CVAA)

Concentration Level: Low

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria
Equipment Rinsate Blank	Mercury (CVAA)	One per day of sampling per type of equipment used	Accuracy/Bias	No mercury > 1/2 LOQ and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. For negative blanks, absolute value < LOD. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).
Cooler Temperature Indicator		One per cooler	Accuracy/Representativeness	Temperature ≤ 6 degrees Celsius.
Field Duplicate		One per twenty samples per matrix	Precision	RPD ≤ 50% if both results are ≥ 5 x LOQ. Diff ≤ LOQ if values are < 5x LOQ
Matrix Spike		Submitted: One per twenty samples per matrix. Analyzed: Most frequent of one per twenty samples or SDG per matrix, or one per prep batch per matrix.	Accuracy/Bias	Refer to Worksheet #28-8

SAP Worksheet #12-9: Measurement Performance Criteria – Field QC Samples

[\(UFP-QAPP Manual Section 2.6.2\)](#)

Matrix: Soil

Analytical Group: Hexavalent Chromium (SW-846 Method 7196A)

Concentration Level: Low

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria
Equipment Rinsate Blank	Hexavalent Chromium	One per day of sampling per type of equipment used	Accuracy/Bias	No analyte detected > 1/2 the reporting limit and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not otherwise affect sample results (see DoD QSM Box D-1).
Cooler Temperature Indicator		One per cooler	Accuracy/Representativeness	Temperature ≤ 6 degrees Celsius.
Field Duplicate		One per twenty samples per matrix	Precision	RPD ≤ 50% if both results are ≥ 5 x LOQ. Diff ≤ LOQ if values are < 5x LOQ
Matrix Spike		Submitted: One per twenty samples per matrix. Analyzed: Most frequent of one per twenty samples or SDG per matrix, or one per prep batch per matrix.	Accuracy/Bias	Refer to Worksheet #28-9

SAP Worksheet #12-10: Measurement Performance Criteria – Field QC Samples for Diesel Range Organics

[\(UFP-QAPP Manual Section 2.6.2\)](#)

Matrix: Soil

Analytical Group: Total Petroleum Hydrocarbons (C9-C36)

Concentration Level: Low

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria
Equipment Rinsate Blank	Total Petroleum Hydrocarbons (C8-C44)	One per day of sampling per type of equipment used	Accuracy/Bias	No analytes detected > ½ LOQ in any sample or 1/10 the PAL (whichever is greater). Blank result must not otherwise affect sample results (see DoD QSM Box D-1).
Cooler Temperature Indicator		One per cooler	Accuracy/Representativeness	Temperature ≤ 6 degrees Celsius.
Field Duplicate		One per twenty samples per matrix	Precision	RPD ≤ 50% if both results are > 5 x LOQ
Matrix Spike/Matrix Spike Duplicate		Submitted: One per twenty samples per matrix. Analyzed: More frequent of one per twenty samples or SDG per matrix.	Accuracy/Bias/Precision	Refer to Worksheet 28-11

SAP Worksheet #12-11: Measurement Performance Criteria – Field QC Samples for Gasoline Range Organics

Matrix: Soil

Analytical Group: Gasoline Range Organics (C6-C12)

Concentration Level: Low

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria
Trip Blank	Gasoline Range Organics (C6-C12)	One per cooler containing VOC samples	Accuracy/Bias	No target compounds > ½ LOQ (> LOQ for common laboratory contaminants) and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).
Equipment Rinsate Blank		One per day of sampling per type of equipment used	Accuracy/Bias	No analytes detected > ½ LOQ and > 1/10 the amount measured in any sample or 1/10 the PAL (whichever is greater). Blank result must not otherwise affect sample results (see DoD QSM Box D-1).
Cooler Temperature Indicator		One per cooler	Accuracy/Representativeness	Temperature ≤ 6 degrees Celsius.
Field Duplicate		One per ten samples per matrix	Precision	RPD ≤ 50% if both results are > 5 x LOQ

SAP Worksheet #23-1: Analytical SOP References Table

Laboratory Name and Address: Spectrum Analytical, RI Division, 646 Camp Avenue, North Kingstown, RI 02852¹

Point of Contact Name: Edward Lawler

Phone Number: 401.732.3400 x 315

Lab SOP Number	Title, Revision Date, and Number ²	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Variance to QSM	Modified for Project Work? (Y/N)
100.0111	Metals in Water and Wastes by Inductively Coupled Argon Plasma Atomic Emission Spectrometry by SW846 Method 6010C, Rev. 13, 12/10	Definitive	Soil and Aqueous QC Samples / Metals	ICP/AES	None	N
100.0104	Sample Preparation of Soils by Acid Digestion for ICP/AES (3050B/6010C), Rev.8, 3/10	Definitive	Soil / Metals	NA	None	N
100.0003	Sample Preparation of Aqueous Samples by Acid Digestion ICP and ICP/MS (3005/3010), Rev. 8, 2/10	Definitive	Aqueous QC Samples / Metals	NA	None	N

SAP Worksheet #23-2: Analytical SOP References Table

Laboratory Name and Address: Katahdin Analytical Services, 600 Technology Way, Scarborough, Maine 04074¹

Point of Contact Name: Jennifer Obrin

Phone Number: 207.874.2400 x17

Lab SOP Number	Title, Revision Date, and Number ²	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Variance to QSM	Modified for Project Work? (Y/N)
CA-315	Determination of Extractable Petroleum Hydrocarbons or Diesel Range Organics (DRO) by Modified Methods 8015 and 8100, 04/14, Revision 12.	Definitive	Sediment / DRO	Gas Chromatography (GC)/Flame Ionization Detector (FID)	No Variance	N
CA-316	Method for Determining Volatile Petroleum Hydrocarbons or Gasoline Range Organics (GRO) by Modified Method 8015, 04/14, Revision 12.	Definitive	Sediment / GRO	GC/FID	No Variance	N
CA-527	Preparation Of Sediment/Soil Samples By Soxhlet Extraction Using Method 3540 For Subsequent Extractable Total Petroleum Hydrocarbon (TPH) or Diesel Range Organic (DRO) Analysis, 04/12, Revision 7.	Definitive	Sediment / DRO	Not applicable (extraction)	No Variance	N
CA-535	Preparation of Sediment/Soil Samples By Sonication Using Method 3550 For Subsequent Diesel Range Organics (DRO) or Total Petroleum Hydrocarbons (TPH) Analysis, 04/12, Revision 8.	Definitive	Sediment / DRO	Not applicable (extraction)	No Variance	N
CA-202	Analysis of VOAs by Purge and Trap GC/MS: SW-846 Method 8260, 04/14, Revision 15.	Definitive	Soil, Sediment, Groundwater / VOCs	GC/MS	No Variance	N
CA-214	Closed-System Purge-And-Trap And Extraction For Volatile Organics In Soil And Waste Samples Using SW846 Method 5035, 03/12, Revision 6.	Definitive	Soil, Sediment / VOCs	Not applicable (extraction)	No Variance	N

Sampling and Analysis Plan Modification for Soil Pre-Design Investigation
DU 5-1 at Tank Farm 5 (Site 13), OU2, NAVSTA Newport, Middletown, RI

Lab SOP Number	Title, Revision Date, and Number ²	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Variance to QSM	Modified for Project Work? (Y/N)
CA-226	Analysis of SVOAs by Capillary Column GC/MS: SW-846 Method 8270D, 04/13 Revision 4.	Definitive	Soil, Sediment, Groundwater / SVOCs and PAHs	GC/MS	No Variance	N
CA-213	Analysis of Semivolatile Organic Compounds By: SW 846 Method 8270 – Modified For Selected Ion Monitoring (SIM), 05/12, Revision 10.	Definitive	Soil, Sediment, Groundwater / PAHs	GC/MS	No Variance	N
CA-302	Analysis of Pesticides by Gas Chromatography/Electron Capture Detector (GC/ECD): SW-846 Method 8081. 06/14, Revision 14.	Definitive	Soil, Sediment, Groundwater / Pesticides	Gas Chromatography (GC)/ Electron Capture Detector (ECD)	No Variance	N
CA-329	Analysis Of PCBs As Total Aroclors By Gas Chromatography/Electron Capture Detector (GC/ECD): SW-846 Method 8082, 02/13, Revision 13.	Definitive	Soil, Sediment, Groundwater / PCBs	GC/ECD	No Variance	N
CA-500	Preparation Of Sediment/Soil Samples By Sonication Using Method 3550 For Subsequent Pesticides/PCBs Analysis, 03/12, Revision 8.	Definitive	Soil, Sediment / Pesticides and PCBs	Not applicable (extraction)	No Variance	N
CA-502	Preparation Of Aqueous Samples For Extractable Semivolatile Analysis, 04/12, Revision 7.	Definitive	Groundwater / SVOCs and PAHs	Not applicable (extraction)	No Variance	N
CA-512	Preparation Of Sediment/Soil Samples By Sonication Using Method 3550 For Subsequent Extractable Semi-Volatiles Analysis, 04/12, Revision 9.	Definitive	Soil, Sediment / SVOCs and PAHs	Not applicable (extraction)	No Variance	N
CA-515	Preparation of Aqueous Samples for Pesticides/PCBs Analysis, 04/12, Revision 8.	Definitive	Groundwater / PCBs	Not applicable (extraction)	No Variance	N
CA-604	Acid Digestion of Aqueous Samples by USEPA Method 3010 for	Definitive	Groundwater / TAL Metals	Not applicable (digestion)	No Variance	N

Sampling and Analysis Plan Modification for Soil Pre-Design Investigation
DU 5-1 at Tank Farm 5 (Site 13), OU2, NAVSTA Newport, Middletown, RI

Lab SOP Number	Title, Revision Date, and Number ²	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Variance to QSM	Modified for Project Work? (Y/N)
	ICP Analysis of Total or Dissolved Metals, 04/10, Revision 5.					
CA-605	Acid Digestion of Solid Samples by USEPA Method 3050 for Metals by ICP-AES and GFAA, 09/10, Revision 5.	Definitive	Soil, Sediment / TAL Metals	Not applicable (digestion)	No Variance	N
CA-608	Trace Metals Analysis By ICP-AES Using USEPA Method 6010, 05/13, Revision 14.	Definitive	Soil, Sediment, Groundwater / TAL Metals	Inductively Coupled Plasma (ICP) – Atomic Emission Spectroscopy (AES)	No Variance	N
CA-611	Digestion and Analysis of Solid Samples for Mercury by USEPA Method 7471, 06/14, Revision 10.	Definitive	Soil, Sediment / Mercury	Mercury Analyzer	No Variance	N
CA-615	Digestion and Analysis of Aqueous Samples for Mercury by USEPA Method 7470, 04/12, Revision 7.	Definitive	Groundwater / Mercury	Mercury Analyzer	No Variance	N
CA-625	Alkaline Digestion and Subsequent Determination of Hexavalent Chromium In Solid Samples Using EPA SW846 Methods 3060 and 7196, 05/13, Revision 6.	Definitive	Soil, Sediment / Hexavalent Chromium	Manual Spectrophotometer	No Variance	N
CA-627	Trace Metals Analysis By ICP-MS Using USEPA Method 6020, 06/14, Revision 10.	Definitive	Soil, Sediment, Groundwater / TAL Metals	ICP-MS	No Variance	N
CA-772	Colorimetric Analysis Of Hexavalent Chromium Using The Automated Konelab Multiwavelength Photometric Analyzer, 02/13, Revision 3.	Definitive	Groundwater / Hexavalent Chromium	Automated Spectrophotometer	No Variance	N

SAP Worksheet #28-1: Laboratory QC Samples Table

Matrix: Soil

Analytical Group: Semivolatile Organic compounds (Full Scan)

Analytical Method/ SOP Reference: SW846 8270D (Full Scan) / LAB SOPs CA-226

QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
Method Blank	One per preparation batch of twenty or fewer samples of similar matrix.	No target compounds > 1/2 LOQ (> LOQ for common laboratory contaminants) and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).	Correct the problem. Report sample results that are <LOD or >10x the blank concentration. Re-prepare and reanalyze the method blank and all associated samples with results > LOD and < 10x the contaminated blank result.	Analyst, Laboratory Department Manager and Data Validator	Bias/contamination	Same as Method/SOP QC Acceptance Limits.
Surrogate	<u>Full Scan</u> - 6 per sample: 2-Fluorophenol Phenol-d6 Nitrobenzene-d5 2-Fluorobiphenyl 2,4,6- Tribromophenol Terphenyl-d14	%R must be within DoD QSM limits, if available; otherwise, within laboratory's statistically-derived QC limits.	For QC and field samples, correct problem then re-prepare and reanalyze all failed samples for failed 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. Contact Client if samples cannot be re-prepared within hold time.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/Bias	Same as Method/SOP QC Acceptance Limits.
LCS	One per preparation batch of twenty or fewer samples of similar matrix.	%R must be within DoD QSM limits, if available; otherwise, within laboratory's statistically-derived QC limits. Allow for the number of marginal exceedances presented in DoD QSM Table G-1.	Correct problem, then re-prepare and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available (see full explanation in Appendix E-1 of DoD QSM v4.2). Contact Client if samples cannot be re-prepared within hold time.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy / Bias	Same as Method/SOP QC Acceptance Limits.

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QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
MS/MSD	One per SDG or every 20 samples.	%R should be within the same limits as for the LCS. RPD should be \leq 30%.	Corrective actions will not be taken for samples when recoveries are outside limits if likely due to matrix, otherwise contact client.	Analyst, Laboratory Department Manager, and Data Validator	Precision/Accuracy/ Bias	Same as Method/SOP QC Acceptance Limits.
IS	Six per sample: 1,4-Dichlorobenzene-d4 Naphthalene-d8 Acenaphthene-d10 Phenanthrene-d10 Chrysene-d12 Perylene-d12	Retention times for internal standards must be \pm 30 seconds and the responses within -50% to +100% of the ICAL midpoint.	Inspect mass spectrometer or gas chromatograph for malfunctions. Mandatory reanalysis of samples analyzed while system was malfunctioning. If obvious chromatographic interference with internal standard is present, reanalysis may not be necessary.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/ Bias	Same as Method/SOP QC Acceptance Limits.
Results between DL and LOQ	NA	Apply "J" qualifier to results between DL and LOQ.	NA	Analyst, Laboratory Department Manager, and Data Validator	Accuracy	Same as QC Acceptance Limits.

SAP Worksheet #28-2: Laboratory QC Samples Table

Matrix: Soil

Analytical Group: Metals (ICP-AES)

Analytical Method/ SOP Reference: SW846 6010C / Lab SOPs 100.0111 and CA-608

QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
Method Blank	One per digestion batch of 20 or fewer samples of similar matrix.	No target metals > ½ LOQ (> LOQ for common laboratory contaminants) and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. For negative blanks, absolute value must be < LOD. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).	Correct the problem. Report sample results that are <LOD or >10x the blank concentration. Re-prepare and reanalyze the method blank and all associated samples with results > LOD and < 10x the contaminated blank result.	Analyst, Laboratory Department Manager and Data Validator	Bias/contamination	Same as Method/SOP QC Acceptance Limits.
LCS	One per digestion batch of 20 or fewer samples of similar matrix (varies by lot).	%R must be within DoD QSM limits, allowing for the marginal exceedances presented in DoD QSM Table G-1.	Re-digest and reanalyze all associated samples for affected analyte.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/Bias/Contamination	Same as Method/SOP QC Acceptance Limits.
MS	One per digestion batch or SDG or every 20 samples.	%R should be within the DoD QSM limits for LCS, if sample < 4x spike added.	Flag results for affected analytes for all associated samples with "N."	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/Bias	Same as Method/SOP QC Acceptance Limits for LCS.
Post-digestion Spike	When dilution test fails or analyte concentration in all samples < 50x LOD	%R within 75-125%.	Run associated samples by method of standard addition or flag results.	Analyst, Laboratory Department Manager	Accuracy/Bias	Same as Method/SOP QC Acceptance Limits.
Laboratory Duplicate	One per digestion batch or SDG or every 20 samples.	Project-specific criteria: If values are ≥ 5x LOQ, RPD should be ≤ 20%. If values are < 5x LOQ, Absolute Difference should be ≤ LOQ.	Flag results for affected analytes for all associated samples.	Analyst, Laboratory Department Manager, and Data Validator	Precision	RPD < 20%
ICP Serial Dilution	One per preparation batch of 20 or fewer samples of similar matrix.	If original sample result is at least 50x LOQ, 5-fold dilution must agree within ± 10% of the original result.	Flag results for affected analytes for all associated samples with "E."	Analyst, Laboratory Department Manager	Accuracy/Bias	Same as Method/SOP QC Acceptance Limits.

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QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
Results between DL and LOQ	NA	Apply "J" qualifier to results between DL and LOQ.	NA	Analyst, Laboratory Department Manager, and Data Validator	Accuracy	Same as QC Acceptance Limits.

SAP Worksheet #28-3: Laboratory QC Samples Table
[\(UFP-QAPP Manual Section 3.4\)](#)

Matrix: Surface and Subsurface Soil

Analytical Group: Gasoline Range Organics (C6-C12)

Analytical Method/ SOP Reference: SW-846 8015C / CA-316

QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
Method Blank	One per preparation batch of twenty or fewer samples of similar matrix.	No analytes detected > 1/2 LOQ and > 1/10 the amount measured in any sample or 1/10 the PAL (whichever is greater). Blank result must not otherwise affect sample results (see DoD QSM Box D-1).	Investigate source of contamination. Evaluate the samples and associated QC: i.e., if the blank results are above the LOQ, report samples results which are < LOQ and >10X the blank. Otherwise, reprepare a blank and the remaining samples.	Analyst, Supervisor, QA Manager	Accuracy/Bias, Contamination	Same as Method/SOP QC Acceptance Limits.
Surrogates	Bromofluorobenzene	%R must be within Katahdin's statistically-derived QC limits	For QC and field samples, correct problem then reprep and reanalyze all failed samples for failed 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. Contact Client if samples cannot be repped within hold time.	Analyst, Supervisor, QA Manager	Accuracy/Bias	Same as Method/SOP QC Acceptance Limits.
LCS	One per preparation batch of twenty or fewer samples of similar matrix.	%R must be within Katahdin's statistically-derived QC limits.	Correct problem, then reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. Contact Client if samples cannot be repped within hold time.	Analyst, Supervisor, QA Manager	Accuracy/Bias	Same as Method/SOP QC Acceptance Limits.

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QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
MS/MSD	One per SDG or every 20 samples.	%R should be within Katahdin's statistically-derived QC limits. RPD ≤ 30%	Corrective actions will not be taken for samples when recoveries are outside limits if likely due to matrix; otherwise contact client.	Analyst, Supervisor, QA Manager	Precision/Accuracy/Bias	Same as Method/SOP QC Acceptance Limits.

SAP Worksheet #28-4: Laboratory QC Samples Table

[\(UFP-QAPP Manual Section 3.4\)](#)

Matrix: Surface and Subsurface Soil

Analytical Group: Diesel Range Organics (C9-C36)

Analytical Method/ SOP Reference: SW-846 8015C / CA-315

QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
Method Blank	One per preparation batch of twenty or fewer samples of similar matrix.	No analytes detected > ½ LOQ in any sample or 1/10 the PAL (whichever is greater). Blank result must not otherwise affect sample results (see DoD QSM Box D-1).	Investigate source of contamination. Evaluate the samples and associated QC: i.e., if the blank results are above the LOQ, report samples results which are < LOQ and >10X the blank. Otherwise, reprepare a blank and the remaining samples.	Analyst, Supervisor, QA Manager	Accuracy/Bias, Contamination	Same as Method/SOP QC Acceptance Limits
Surrogates	ortho-Terphenyl,	%R must be within Katahdin's statistically-derived QC limits.	For QC and field samples, correct problem then reprep and reanalyze all failed samples for failed 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. Contact Client if samples cannot be reprep'd within hold time.	Analyst, Supervisor, QA Manager	Accuracy/Bias	Same as Method/SOP QC Acceptance Limits.
LCS	One per preparation batch of twenty or fewer samples of similar matrix.	%R must be within Katahdin's statistically-derived QC limits.	Correct problem, then reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. Contact Client if samples cannot be reprep'd within hold time.	Analyst, Supervisor, QA Manager	Accuracy/Bias	Same as Method/SOP QC Acceptance Limits.

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QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
MS/MSD	One per SDG or every 20 samples.	%R should be within Katahdin's statistically-derived QC limits. RPD ≤ 30%	Corrective actions will not be taken for samples when recoveries are outside limits if likely due to matrix; otherwise contact client.	Analyst, Supervisor, QA Manager	Precision/Accuracy/Bias	Same as Method/SOP QC Acceptance Limits.

SAP Worksheet #28-5: Laboratory QC Samples Table

[\(UFP-QAPP Manual Section 3.4\)](#)

Matrix: Soil

Analytical Group: Polycyclic Aromatic Hydrocarbons (Selected Ion Monitoring)

Analytical Method/ SOP Reference: SW-846 8270D / CA-213

QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
Method Blank	One per preparation batch of twenty or fewer samples of similar matrix.	No target compounds > 1/2 LOQ (> LOQ for common laboratory contaminants) and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).	Correct the problem. Report sample results that are <LOD or >10x the blank concentration. Reprepare and reanalyze the method blank and all associated samples with results > LOD and < 10x the contaminated blank result.	Analyst, Laboratory Department Manager and Data Validator	Bias/contamination	Same as Method/SOP QC Acceptance Limits.
Surrogate	3 per sample: 2-Methylnaphthalene-d10 Fluorene-d10 Pyrene-d10	%R must be within DoD QSM limits, if available; otherwise, within laboratory's statistically-derived QC limits.	For QC and field samples, correct problem then reprepare and reanalyze all failed samples for failed 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. Contact Client if samples cannot be reprepared within hold time.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/Bias	Same as Method/SOP QC Acceptance Limits.

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QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
LCS	One per preparation batch of twenty or fewer samples of similar matrix.	%R must be within DoD QSM limits, if available; otherwise, within laboratory's statistically-derived QC limits. Allow for the number of marginal exceedances presented in DoD QSM Table G-1.	Correct problem, then reprepare and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available (see full explanation in Appendix E-1 of DoD QSM v4.2). Contact Client if samples cannot be reprepared within hold time.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy / Bias	Same as Method/SOP QC Acceptance Limits.
MS/MSD	One per SDG or every 20 samples. Full Scan MS/MSD may be applied.	%R should be within the same limits as for the LCS. RPD should be $\leq 30\%$.	Corrective actions will not be taken for samples when recoveries are outside limits if likely due to matrix, otherwise contact client.	Analyst, Laboratory Department Manager, and Data Validator	Precision/Accuracy/Bias	Same as Method/SOP QC Acceptance Limits.
IS	Six per sample: 1,4-Dichlorobenzene-d4 Naphthalene-d8 Acenaphthene-d10 Phenanthrene-d10 Chrysene-d12 Perylene-d12	Retention times for internal standards must be ± 30 seconds and the responses within -50% to +100% of the ICAL midpoint.	Inspect mass spectrometer or gas chromatograph for malfunctions. Mandatory reanalysis of samples analyzed while system was malfunctioning.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/ Bias	Same as Method/SOP QC Acceptance Limits.
Results between DL and LOQ	NA	Apply "J" qualifier to results between DL and LOQ.	NA	Analyst, Laboratory Department Manager, and Data Validator	Accuracy	Same as QC Acceptance Limits.

SAP Worksheet #28-6: Laboratory QC Samples Table

[\(UFP-QAPP Manual Section 3.4\)](#)

Matrix: Soil

Analytical Group: Organochlorine Pesticides

Analytical Method/ SOP Reference: SW846 8081B / CA-302

QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
Method Blank	One per preparation batch of 20 or fewer samples of similar matrix.	No target compounds > 1/2 LOQ and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).	Correct the problem. Report sample results that are <LOD or >10x the blank concentration. Re-prepare and reanalyze the method blank and all associated samples with results > LOD and < 10x the contaminated blank result. Contact Client if samples cannot be re-prepared within hold time.	Analyst, Laboratory Department Manager and Data Validator	Bias/contamination	Same as Method/SOP QC Acceptance Limits.
Surrogates	Two per sample: Decachlorobiphenyl Tetrachloro-m-xylene	%R must be within DoD QSM limits, if available; otherwise, within laboratory's statistically-derived or nominal QC limits.	For QC and field samples, correct problem then re-prepare and reanalyze all failed samples for failed 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. Contact Client if samples cannot be re-prepared within hold time.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/Bias	Same as Method/SOP QC Acceptance Limits.
LCS	One per preparation batch of 20 or fewer samples of similar matrix.	%R must be within DoD QSM limits, if available; otherwise, within laboratory's statistically-derived QC limits (Refer to Worksheet #28-6a). Allow for the number of marginal exceedances presented in DoD QSM Table G-1.	Correct problem, then re-prepare and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. Contact Client if samples cannot be re-prepared within hold time.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/ Bias	Same as Method/SOP QC Acceptance Limits.
MS/MSD	One per SDG or every 20 samples.	%R should be within the same limits as for the LCS. RPD should be ≤ 30%.	Corrective actions will not be taken for samples when recoveries are outside limits if likely due to matrix, otherwise contact client.	Analyst, Laboratory Department Manager, and Data Validator	Precision/ Accuracy/ Bias	Same as Method/SOP QC Acceptance Limits.

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QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
Second Column Confirmation	All positive results must be confirmed.	Results between primary and second column must be RPD \leq 40%.	None. Apply qualifier if RPD >40% and discuss in the case narrative. The higher of the two results will be reported unless matrix interference is apparent.	Analyst, Laboratory Department Manager, and Data Validator	Precision	Same as Method/SOP QC Acceptance Limits.
Results between DL and LOQ	NA	Apply "J" qualifier to results between DL and LOQ.	NA	Analyst, Laboratory Department Manager, and Data Validator	Accuracy	Same as QC Acceptance Limits.

SAP Worksheet #28-7: Laboratory QC Samples Table

[\(UFP-QAPP Manual Section 3.4\)](#)

Matrix: Soil

Analytical Group: Polychlorinated Biphenyls (as Aroclors)

Analytical Method/ SOP Reference: SW846 8082A / CA-329

QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
Method Blank	One per preparation batch of 20 or fewer samples of similar matrix.	No target compounds > ½ LOQ and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).	Correct the problem. Report sample results that are <LOD or >10x the blank concentration. Re-prepare and reanalyze the method blank and all associated samples with results > LOD and < 10x the contaminated blank result. Contact Client if samples cannot be re-prepared within hold time.	Analyst, Laboratory Department Manager and Data Validator	Bias/contamination	Same as Method/SOP QC Acceptance Limits
Surrogates	Two per sample: Decachlorobiphenyl Tetrachloro-m-xylene.	%R must be within DoD QSM limits, if available; otherwise, within laboratory's statistically-derived or nominal QC limits.	For QC and field samples, correct problem then re-prepare and reanalyze all failed samples for failed 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. Contact Client if samples cannot be re-prepared within hold time.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/Bias	Same as Method/SOP QC Acceptance Limits.
LCS	One per preparation batch of 20 or fewer samples of similar matrix.	%R must be within DoD QSM limits, if available; otherwise, within laboratory's statistically-derived QC limits (Refer to Worksheet #28-7a). Allow for the number of marginal exceedances presented in DoD QSM Table G-1.	Correct problem, then re-prepare and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. Contact Client if samples cannot be re-prepared within hold time.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/ Bias	Same as Method/SOP QC Acceptance Limits.

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QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
MS/MSD	One per SDG or every 20 samples.	%R should be within the same limits as for the LCS. RPD should be $\leq 30\%$.	Corrective actions will not be taken for samples when recoveries are outside limits if likely due to matrix, otherwise contact client.	Analyst, Laboratory Department Manager, and Data Validator	Precision/ Accuracy/ Bias	Same as Method/SOP QC Acceptance Limits.
Second Column Confirmation	All positive results must be confirmed.	Results between primary and second column must be $RPD \leq 40\%$.	None. Apply qualifier if $RPD > 40\%$ and discuss in the case narrative. The higher of the two results will be reported unless matrix interference is apparent.	Analyst, Laboratory Department Manager, and Data Validator	Precision	Same as Method/SOP QC Acceptance Limits.
Results between DL and LOQ	NA	Apply "J" qualifier to results between DL and LOQ.	NA	Analyst, Laboratory Department Manager, and Data Validator	Accuracy	Same as QC Acceptance Limits.

SAP Worksheet #28-8: Laboratory QC Samples Table

[\(UFP-QAPP Manual Section 3.4\)](#)

Matrix: Soil

Analytical Group: ICP-MS Metals

Analytical Method/ SOP Reference: SW846 6020A / CA-627

QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
Method Blank	One per digestion batch of 20 or fewer samples of similar matrix.	No target metals > ½ LOQ (> LOQ for common laboratory contaminants) and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. For negative blanks, absolute value < LOD. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).	Correct the problem. Report sample results that are <LOD or >10x the blank concentration. Reprep and reanalyze the method blank and all associated samples with results > LOD and < 10x the contaminated blank result.	Analyst, Laboratory Department Manager and Data Validator	Bias/contamination	Same as Method/SOP QC Acceptance Limits
LCS	One per digestion batch of 20 or fewer samples of similar matrix.	%R must be within 80-120%, allowing for the marginal exceedances presented in DoD QSM Table G-1.	Redigest and reanalyze all associated samples for affected analyte.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/Bias/Contamination	Same as Method/SOP QC Acceptance Limits.
MS	One per digestion batch SDG or every 20 samples.	Same as Method/SOP QC Acceptance Limits for LCS.	Flag results for affected analytes for all associated samples with an "N."	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/Bias	Same as Method/SOP QC Acceptance Limits.
Post-digestion Spike	When dilution test fails or analyte concentration in all samples < 50x LOD	%R should be within 75-125%.	Run associated samples by method of standard addition or flag results.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/Bias	Same as Method/SOP QC Acceptance Limits.
Laboratory Duplicate	One per digestion batch or SDG or every 20 samples.	Project-specific criteria: If values are ≥ 5x LOQ, RPD should be ≤ 20%. If values are < 5x LOQ, Absolute Difference should be ≤ LOQ.	Flag results for affected analytes for all associated samples.	Analyst, Laboratory Department Manager, and Data Validator	Precision	RPD < 20%
ICP Serial Dilution	One per preparation batch of twenty or fewer samples of similar matrix.	If original sample result is at least 50x LOQ, 5-fold dilution must agree within ± 10% of the original result.	Flag results for affected analytes for all associated samples with "E."	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/Bias	Same as Method/SOP QC Acceptance Limits.

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QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
IS	Appropriate IS required for all analytes in all samples. Mass of IS must be <50 amu different from that of analyte	For each sample, IS intensity must be within 30-120% of that of initial calibration standard.	Reanalyze affected samples.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/Bias	Same as Method/SOP QC Acceptance Limits.

SAP Worksheet #28-9: Laboratory QC Samples Table

[\(UFP-QAPP Manual Section 3.4\)](#)

Matrix: Soil

Analytical Group: Mercury (CVAA)

Analytical Method/ SOP Reference: SW846 7471B / CA-611

QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
Method Blank	One per digestion batch of 20 or fewer samples of similar matrix.	No mercury > 1/2 LOQ and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. For negative blanks, absolute value < LOD. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).	Correct the problem. Report sample results that are <LOD or >10x the blank concentration. Reprepare and reanalyze the method blank and all associated samples with results > LOD and < 10x the contaminated blank result.	Analyst, Laboratory Department Manager and Data Validator	Bias/contamination	Same as Method/SOP QC Acceptance Limits.
LCS	One per digestion batch of 20 or fewer samples of similar matrix.	Water and Sediment: %R must be within 80-120%.	Redigest and reanalyze all associated samples for affected analyte.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/Bias/Contamination	Same as Method/SOP QC Acceptance Limits.
MS	One per digestion batch or SDG or every 20 samples.	%R should be within 80-120% if sample < 4x spike added.	Flag results for affected analytes for all associated samples with "N."	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/Bias	Same as Method/SOP QC Acceptance Limits for LCS.
Laboratory Duplicate	One per digestion batch or SDG or every 20 samples.	Project-specific criteria: If values are ≥ 5x LOQ, RPD should be ≤ 20%. If values are < 5x LOQ, Absolute Difference should be ≤ LOQ.	Flag results for affected analytes for all associated samples.	Analyst, Laboratory Department Manager, and Data Validator	Precision	RPD < 20%
Results between DL and LOQ	NA	Apply "J" qualifier to results between DL and LOQ	NA	Analyst, Supervisor	Accuracy	Same as QC Acceptance Limits.

SAP Worksheet #28-10: Laboratory QC Samples Table

[\(UFP-QAPP Manual Section 3.4\)](#)

Matrix: Soil

Analytical Group: Hexavalent Chromium (SW-846 7196A)

Analytical Method/ SOP Reference: SW846 7196A / CA-625

QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
Method Blank	One per digestion batch of 20 or fewer samples of similar matrix.	No analyte > 1/2 LOQ and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. For negative blanks, absolute value must be < LOD. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).	Correct the problem. Report sample results that are <LOD or >10x the blank concentration. Re-prepare and reanalyze the method blank and all associated samples with results > LOD and < 10x the contaminated blank result.	Analyst, Laboratory Department Manager and Data Validator	Bias/contamination	Same as Method/SOP QC Acceptance Limits.
LCS	One per digestion batch of 20 or fewer samples of similar matrix (varies by lot).	%R must be within 80-120%	Re-digest and reanalyze all associated samples.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/Bias/Contamination	Same as Method/SOP QC Acceptance Limits.
Sample matrix verification (also known as matrix spike)	Once for every sample matrix analyzed.	Spike recovery within 85–115%.	If check indicates interference, dilute and reanalyze sample; persistent interference indicates the need to use alternative method or analytical conditions, or to use method of standard additions.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/Bias/Contamination	Same as Method/SOP QC Acceptance Limits.
MS (Soluble)	Once for every sample matrix analyzed.	Spike recovery within 75–125%.	First failure: Re-digest and reanalyze all associated samples for affected analyte and MSs and MSi analysis. Conduct ferrous iron, sulfide, and TOC analysis on matrix spike sample. Second failure: If reducing conditions are not indicated by the auxiliary analyses conducted, contact AECOM. Samples may be submitted for analysis by Method 7199.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/Bias	Same as Method/SOP QC Acceptance Limits.

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QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
MS (Insoluble)	Once for every sample matrix analyzed.	Spike recovery within 75–125%.	First failure: Re-digest and reanalyze all associated samples for affected analyte and MSs and MSi analysis. Conduct ferrous iron, sulfide, and TOC analysis on matrix spike sample. Second failure: If reducing conditions are not indicated by the auxiliary analyses conducted, contact AECOM. Samples may be submitted for analysis by Method 7199.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/Bias	Same as Method/SOP QC Acceptance Limits.
Post-digestion Spike	One per preparatory batch	%R within 85-115%.	Correct problem and rehomogenize, redigest, and reanalyze samples. Persistent interference indicates the need to use an alternative method or analytical conditions, or to use method of standard additions.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/Bias	Same as Method/SOP QC Acceptance Limits.
Laboratory Duplicate	One per preparatory batch	Project-specific criteria: If values are $\geq 5x$ LOQ, RPD should be $\leq 30\%$. If values are $< 5x$ LOQ, Absolute Difference should be \leq LOQ.	Flag results for affected analytes for all associated samples.	Analyst, Laboratory Department Manager, and Data Validator	Precision	RPD $< 30\%$
Results between DL and LOQ	NA	Apply "J" qualifier to results between DL and LOQ.	NA	Analyst, Laboratory Department Manager, and Data Validator	Accuracy	Same as QC Acceptance Limits.

SAP Worksheet #28-11: Laboratory QC Samples Table

[\(UFP-QAPP Manual Section 3.4\)](#)

Matrix: Groundwater

Analytical Group: Volatile Organic Compounds (Full Scan)

Analytical Method/ SOP Reference: SW846 8260B / CA-202

QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
Method Blank	One per preparation batch of twenty or fewer samples of similar matrix.	No target compounds > 1/2 LOQ (> LOQ for common laboratory contaminants) and > 1/10 the amount measured in any sample or 1/10 the PAL, whichever is greater. Blank result must not otherwise affect sample results (see DoD QSM Box D-1).	Correct the problem. Report sample results that are <LOD or >10x the blank concentration. Reprepare and reanalyze the method blank and all associated samples with results > LOD and < 10x the contaminated blank result.	Analyst, Laboratory Department Manager, and Data Validator	Bias/Contamination	Same as Method/SOP QC Acceptance Limits.
Surrogate	Four per sample: Dibromofluoromethane 1,2-Dichloroethane-d4 Toluene-d8 4-Bromofluorobenzene (BFB)	%R must be within DoD QSM limits.	For QC and field samples, correct problem then reprepare and reanalyze all failed samples for failed 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. Contact Client if samples cannot be reanalyzed within hold time.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/Bias	Same as Method/SOP QC Acceptance Limits.

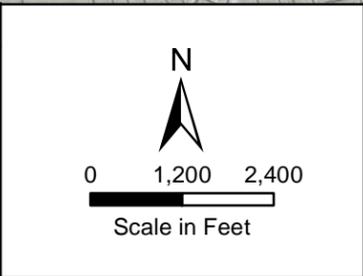
Sampling and Analysis Plan Modification for Soil Pre-Design Investigation
 DU 5-1 at Tank Farm 5 (Site 13), OU2, NAVSTA Newport, Middletown, RI

QC Sample:	Frequency & Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	DQI	Measurement Performance Criteria
LCS	One per preparation batch of twenty or fewer samples of similar matrix.	%R must be within DoD QSM limits, if available; otherwise, within laboratory's statistically-derived QC limits (Refer to Worksheet #28-17a). Allow for the number of marginal exceedances presented in DoD QSM Table G-1.	Correct problem, then reprepare and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available. Contact Client if samples cannot be reanalyzed within hold time.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/ Bias	Same as Method/SOP QC Acceptance Limits.
MS/MSD	One per SDG or every 20 samples.	%R should be within the same limits as for the LCS. RPD should be $\leq 30\%$.	Corrective actions will not be taken for samples when recoveries are outside limits if likely due to matrix; otherwise contact client.	Analyst, Laboratory Department Manager, and Data Validator	Precision/Accuracy/ Bias	Same as Method/SOP QC Acceptance Limits.
IS	Four per sample: Pentafluorobenzene Chlorobenzene-d5 1,4-dichlorobenzene-d4 1,4-difluorobenzene	Retention times for internal standards must be ± 30 seconds and the responses within -50% to +100% of the ICAL midpoint standard.	Inspect mass spectrometer or gas chromatograph for malfunctions; mandatory reanalysis of samples analyzed while system was malfunctioning.	Analyst, Laboratory Department Manager, and Data Validator	Accuracy/ Bias	Same as Method/SOP QC Acceptance Limits.
Results between DL and LOQ	Not applicable (NA)	Apply "J" qualifier to results between DL and LOQ.	NA	Analyst, Laboratory Department Manager, and Data Validator	Accuracy	Same as QC Acceptance Limits.

Figures

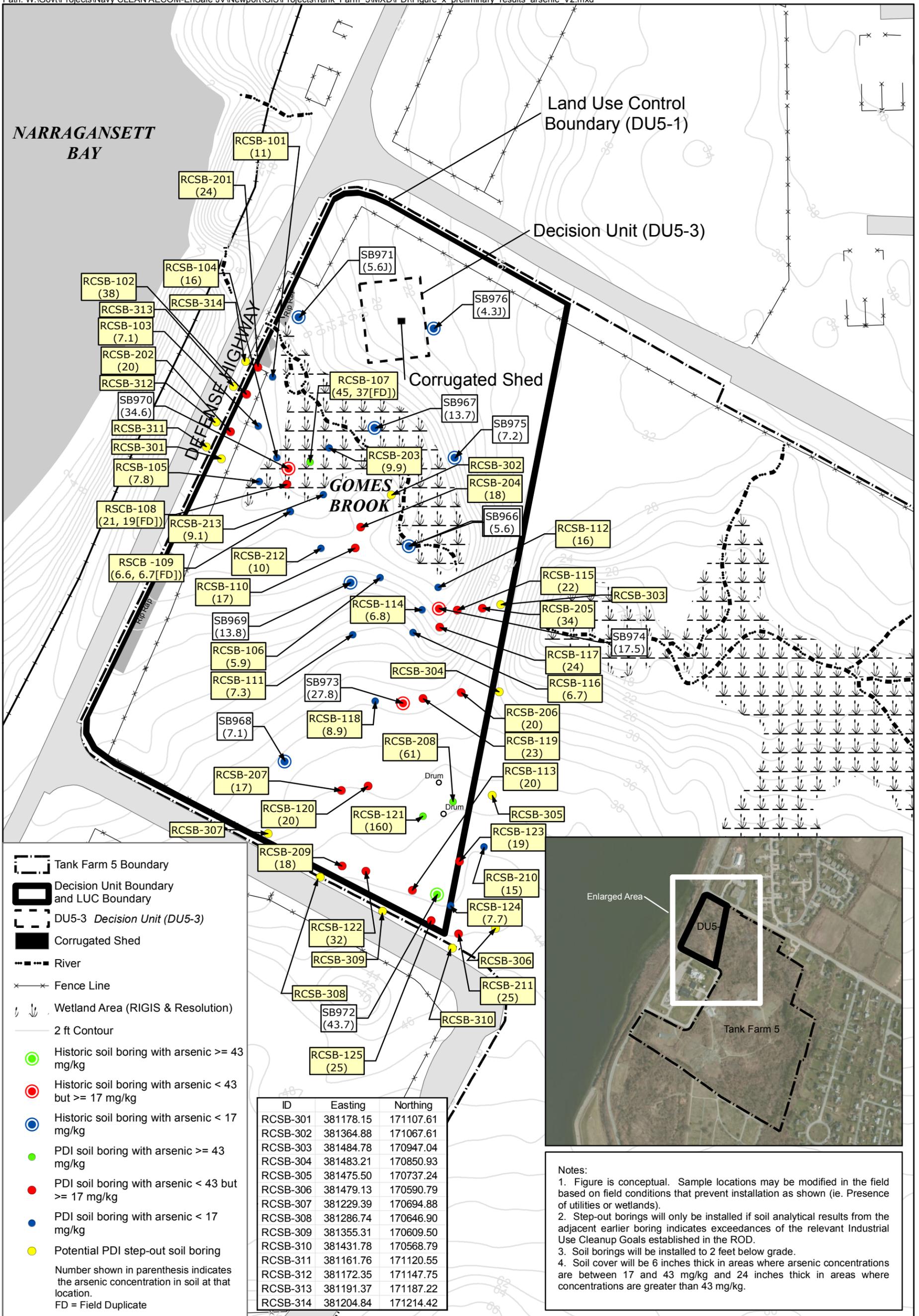


 RESOLUTION CONSULTANTS		
Drawn:	HM	2/19/2014
Approved:	MK	2/19/2014
Project #:	60268619	



**FIGURE 1
SITE MAP**

NAVSTA NEWPORT, RHODE ISLAND



RESOLUTION CONSULTANTS

Drawn: HM 9/18/2014
 Approved: NO 9/18/2014
 Project #: 60274505

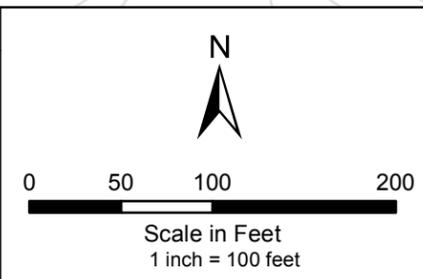


FIGURE 3
TANK FARM 5 CONCEPTUAL
PDI SAMPLING LOCATIONS
 NAVSTA NEWPORT, RHODE ISLAND