UNIFORM FEDERAL POLICY FOR QUALITY ASSURANCE PROJECT PLANS
REGION 2 ARCHITECT-ENGINEERING SERVICES CONTRACT
CONTRACT #EP-W-09-009

OPTIMIZED UFP-QAPP
TUTU WELLS SUPERFUND SITE
ST. THOMAS, U.S. VIRGIN ISLANDS
WORK ASSIGNMENT #031-RICO-021D

Prepared For:

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UNIFORM FEDERAL POLICY FOR QUALITY ASSURANCE PROJECT PLANS

FOR

TUTU WELLS SUPERFUND SITE FOCUSED SOURCE REMEDIAL INVESTIGATION/FEASIBILITY STUDY

INTRODUCTION

This Uniform Federal Policy Quality Assurance Project Plan (UFP-QAPP) was developed by the Project Team to confirm that environmental data gathered will be consistent with data quality objectives (DQOs) defined for this phase of the *Tutu Wells Superfund Site Focused Source Remedial Investigation/Feasibility Study (FSRI/FS)* project. The UFP-QAPP was prepared in accordance with the following guidance documents:

- Intergovernmental Data Quality Task Force (IDQTF) *Uniform Federal Policy for Quality Assurance Project Plans, Final, Version 1* (UFP-QAPP) dated March 2005 and Revision 1 dated March 2012.
- EPA *Guidance for Quality Assurance Project Plans (EPA QA/G-5)* dated December 2002.

The UFP-QAPP was developed as a joint initiative between the United States Environmental Protection Agency (EPA), Department of Defense (DoD), and Department of Energy (DoE). Its purpose is to provide a single national consensus document for consistently and systematically implementing the project-specific requirements for Section 6 (Part B) of American National Standards Institute/American Society for Quality (ANSI/ASQ) *Quality Systems for Environmental Data and Technology Programs - Requirements with Guidance for Use,* ANSI/ASQ E4 (February 2004) across the Federal agencies involved in the IDQTF. It is consistent with EPA's Guidance for Quality Assurance Project Plans (EPA QA/G-5) dated December 2002 and *Requirements for Quality Assurance Project Plans* (EPA QA/R-5) dated March 2001. Additionally, implementation of the UFP-QAPP helps to ensure the quality, objectivity, utility, and integrity of environmental information that the Federal government disseminates as required by the *Information Quality Guidelines Staff* (EPA/260R-02-008) dated October 2002.

A series of worksheets were completed (following Part 2A of the UFP-QAPP) for this project. Each worksheet addresses specific requirements of the UFP-QAPP. The Optimized UFP-QAPP Worksheets as revised in March 2012 were used. Table 1 provides a crosswalk between the worksheets and the respective elements of this QAPP.

Site Description

The Tutu Wellfield site is located on the eastern end of St. Thomas, U.S. Virgin Islands (USVI), in the Anna's Retreat section. See Figure 1. The site is situated within the upper Turpentine Run surface drainage basin. This basin, which covers approximately 2.3 square miles, trends roughly north-south and is bounded by the steep slopes of the surrounding hills.

Investigation work began at the Tutu Wellfield site in 1987 in response to complaints from local residents of an odor emanating from their groundwater supply wells. The EPA directed its Technical Assistance Team to collect groundwater samples from several wells in the Tutu area. The sampling results revealed the presence of chlorinated volatile organic compounds (VOCs) and benzene, toluene, ethylbenzene and xylenes (BTEX) contaminants in the groundwater above Federal maximum contaminant levels (MCLs) for drinking water supply. The incident was classified as major, and the Department of Planning and Natural Resources (DPNR) Commissioner requested EPA to assume the role of lead agency. EPA condemned the contaminated supply wells, made arrangements to provide an alternate drinking water supply to the affected residents and initiated investigations to identify the sources of contamination. A Hazard Ranking System package was prepared and the site was added to the National Priorities List (NPL) on September 29, 1995.

Geraghty & Miller (April 1995) conducted remedial investigation/feasibility study (RI/FS) activities at the site from 1992 to 1995 on behalf of the Tutu Environmental Investigation Committee. The Record of Decision (ROD) for the site was signed on August 5, 1996. During the multi-phased RI conducted by Geraghty & Miller, groundwater samples were collected from 51 monitoring wells and 15 supply wells in the Tutu Valley. These samples were analyzed for organic compounds, metals, and various inorganic water quality parameters. In addition, eight rounds of groundwater samples were collected from the water supply well and subsequently analyzed.

Results of the groundwater sampling identified four main plumes of contamination at the Tutu Wells Site: two chlorinated volatile organic compound (CVOC plumes) (northern and southern), and two BTEX (Texaco and Esso) plumes. Two sources of CVOC plumes were identified: Curriculum Center and O'Henry. While the plumes from these sources have comingled, they can be distinguished based on concentration levels. The northern plume is located at Curriculum Center while the southern plume is located at O'Henry. The BTEX plumes are not discussed further since they are being remediated by Texaco and Esso.

The Record of Decision (ROD) was signed on August 5, 1996; it calls for area-wide plume/source containment and treatment of contaminated groundwater. Soils that are sources of groundwater contamination will be addressed at the various impacted facilities by a combination of in-situ and ex-situ soil vapor extraction (SVE) and soil disposal methods. On May 1998, EPA issued separate Unilateral Administrative Orders (UAOs) to Texaco, Esso and O'Henry. The focus of this work assignment is the Curriculum Center groundwater; the following sections of the QAPP focus on Curriculum Center only.

Details on the Tutu Site history are available in the Final Pre-Design Report (CDM, 2001). The following historical information has been obtained from the Final Pre-Design Report and the April 2013 Annual Remedial Action Progress Report by CDM Smith.

Curriculum Center Background, History, and Summary of Contamination

The northern-most (upgradient) source of CVOC groundwater contamination is located on the Curriculum Center property, which is currently owned and operated by the USVI Department of Education. According to Arthur D. Little Inc.'s 1994 report, the Curriculum Center building and property were previously occupied by LAGA Industries, Ltd (LAGA), who owned and operated a textile manufacturing plant at this location from 1971 to 1978. The plant included an industrial-sized dry cleaning process that used tetrachloroethene (PCE) as the dry cleaning solvent. Testimony by former LAGA employees (Smith and Richards) indicated that spent PCE and residue from the dry cleaning process were disposed in an outdoor pit located to the north of the building. However, the accuracy of this testimony was questioned by LAGA after re-interviewing the employees and based on the fact that no "pit" was located during the RIs.

The northern CVOC plume, which originates at the Curriculum Center, was identified in the 1995 RI to extend approximately 1,600 feet south, in the direction of the groundwater flow, to a point just southeast of Four Winds Plaza, and was estimated to be 500 feet wide. The highest concentrations of total CVOCs occurred in shallow zone monitoring wells near the source, where CVOC concentrations greater than 1,000 microgram/liter (ug/1) were detected (Figure 2). Concentrations of VOCs in the northern part of the northern plume had not decreased with time, nor had the shape or general extent of VOC contamination changed in this area. This pattern suggested the presence of a continuing source of VOCs to groundwater in the vicinity of the Curriculum Center. Deeper groundwater zones (> 50 feet below ground surface (bgs)) at the Curriculum Center were not investigated during the RI.

The principal CVOCs detected in the northern plume were cis-1,2- dichloroethene (DCE), PCE, and trichloroethene (TCE). Vinyl chloride was also detected at high concentrations in the northern plume, but its detection was restricted to the immediate vicinity of the Curriculum Center. The maximum concentrations detected in the northern plume during the RI were DCE at 2,100 ug/l, vinyl chloride at 1,300 ug/l, PCE at 360 ug/l and TCE at 78 ug/l, all of which exceeded their respective MCLs.

In the southern part of the northern CVOC plume, south of Tillett Gardens, CVOC concentrations were generally lower than near the Curriculum Center. The highest concentrations of VOCs detected in this part of the plume during the RI were PCE at 140 ug/l, DCE at 100 ug/l and TCE at 33 ug/l. Unlike the northern part of this plume, CVOC concentrations in the southern part of the plume were higher in deeper monitoring wells than in shallow wells.

During the RI, underground piping that contained oil and 30% PCE solvent was discovered by EPA and the Department of Planning and Natural Resources (DPNR) beneath the Curriculum Center building. This piping did not appear on the as-built plans provided to EPA. In March 1995, EPA was able to trace the piping from the floor drainpipes to a room that apparently held the PCE reclamation still to the former dry cleaning room. There was no evidence of leakage in the section of pipe investigated; however, the full extent of the piping and its integrity remained unknown.

During the RI at the Curriculum Center, 3 to 1,800 ug/l of PCE was detected in eight samples at the north-central side of the main building in the vicinity of the former discharge pipe and presumed former waste pit. TCE was detected in four samples at concentrations from 1 to 130 ug/l. One CVOC, 1,1,1-trichloroethane (TCA), was detected above EPA's soil screening levels. Although no samples were collected from beneath the building, it was suspected that higher concentrations of CVOCs may be present in the soil beneath the building or in the unsaturated bedrock. The elevated concentrations of CVOCs in groundwater adjacent to and immediately down gradient of the Curriculum Center indicated a high probability that an additional source of PCE is present in the bedrock. At the northeast corner of the Curriculum Center, in an area where a drain from the paint shop sink discharged to the ground, BTEX compounds exceeded EPA's soil screening levels in two surface soil samples. Benzene was detected at 2,700 ug/l and toluene was detected at 500,000 ug/l.

Pre-design field investigations were completed by CDM Smith for the USEPA (hereon referred to USEPA) from August 1998 through October 1999 to further define the extent of CVOCs in Curriculum Center soil and site-wide groundwater and to collect hydrologic and geologic information to be used in the remedial design (RD). The USEPA installed and/or collected environmental samples from seven shallow interior building soil borings, nine shallow exterior building soil borings, seven deep soil borings, nine monitoring wells, two extraction wells, and 26 vapor probes. Subfloor pipe tracing was completed at the Curriculum Center using building architectural drawings, visual observation, hand augering, and concrete coring. The objective was to determine unknown discharge points. Six core holes inside the building and three hand auger boreholes outside the building were drilled to confirm the existence of known and suspected pipes. Solvents encountered in the pipes was sampled and removed by wet vacuuming. The existence of vadose-zone CVOC contamination at the Curriculum Center was confirmed during the SVE pilot study completed from October to November 2000. Based upon data collected during this test, the extent of vadose-zone contamination is limited to the immediate area of the work shop behind the Curriculum Center. Approximately 40 pounds of CVOCs were removed during a 5-day SVE performance test, with a final mass removal rate of approximately four pounds per day.

The USEPA completed the RD for the Curriculum Center soils and site-wide groundwater in September 2001. The remedial action (RA) construction activities were initiated in September 2003 and completed in April 2004. The treatment facility at the Curriculum Center includes a groundwater treatment system and an SVE system. The groundwater treatment system includes three recovery wells (RW-6, RW-7, and RW-9) and was operated by the USEPA until subsequently operational responsibilities were transferred to the USVI in 2013. The SVE system includes two wells (SVE-1 and SVE-7), and is located within the groundwater treatment building at the Curriculum Center. The SVE system met it's beneficial use goal and was shut down in 2006.

Based on the second 5-year review by the USEPA and the analytical results showing a possible continual contamination in the deep part of the Curriculum Center aquifer, the USEPA created Operable Unit (OU) 2 to further investigate this source. The purpose of this QAPP is to support the OU2 field activities.

The following sections of the QAPP focus on Curriculum Center groundwater only.

Table 1 – UFP QAPP Workbook to 2106-G-05 QAPP Guidance

Optimized UFP-QAPP Worksheets or Crosswalk to Related Documents		**2106-G-05 QAPP Guidance Section**		**Required Information**
1 & 2	Title and Approval Page	2.2.1	Title, Version, and Approval/Sign-off	- Title and Approvals Page - Table of Contents - QAPP Identifying Information
3 & 5	Project Organization and QAPP Distribution	2.2.3	Distribution List	- Distribution List - Project Organizational Chart
		2.2.4	Project Organization and Schedule	
4, 7 & 8	Personnel Qualifications and Sign-Off Sheet	2.2.1	Title, Version, and Approval/Sign-Off	- Project Personnel Sign-off - Personnel responsibilities and qualifications - Special personnel training requirements
		2.2.7	Special Training Requirements and Certification	
6	Communications Pathways	2.2.4	Project Organization and Schedule	- Communication pathways
9	Project Planning Session Summary	2.2.5	Project Background, Overview, and Intended Use of Data	- Project planning session documentation - Project scoping session participants
10	Conceptual Site Model	2.2.5	Project Background, Overview, and Intended Use of Data	- Problem definition, site history and background - Site maps
11	Project/Data Quality Objectives	2.2.6	Data/Project Quality Objectives and Measurement Performance Criteria	- Project objectives - Site-specific PQOs
12	Measurement Performance Criteria	2.2.6	Data/Project Quality Objectives and Measurement Performance Criteria	- Measurement performance criteria tables
13	Secondary Uses and Limitations	Chapter 3	QAPP Elements for Evaluating Existing Data	- Sources of secondary data and information - Secondary data criteria and limitations
14 & 16	Project Tasks & Schedule	2.2.4	Project Organization and Schedule	- Summary of project tasks - Project schedule and timeline
15	Project Action Limits and Laboratory-Specific Detection/Quantitation Limits	2.2.6	Data/Project Quality Objectives and Measurement Performance Criteria	- Reference Limits and Evaluation table
17	Sampling Design and Rationale	2.3.1	Sample Collection Procedure, Experimental Design, and Sampling Tasks	- Sample design and rationale - Sample location map
18	Sampling Locations and Methods	2.3.1	Sample Collection Procedure, Experimental Design, and Sampling Tasks	- Sampling locations and Methods/SOP Requirements

		2.3.2	Sampling Procedures and Requirements	
19 & 30	Sample Containers, Preservation, and Hold Times	2.3.2	Sampling Procedures and Requirements	- Sample container information - Analytical services table - Data management SOPs
20	Field QC	2.3.5	Quality Control Requirements	- Field quality control sample summary
21	Field SOPs	2.3.2	Sampling Procedures and Requirements	- Sampling SOPs - Project sampling SOP references
22	Field Equipment Calibration, Maintenance, Testing, and Inspection	2.3.6	Instrument/Equipment Testing, Calibration and Maintenance Requirements, Supplies and Consumables	- Field equipment calibration, maintenance, testing and inspection
23	Analytical SOPs	2.3.4	Analytical Methods Requirements and Task Description	- Analytical SOPs - Analytical SOP references table
24	Analytical Instrument Calibration	2.3.6	Instrument/Equipment Testing, Calibration and Maintenance Requirements, Supplies and Consumables	- Analytical instrument calibration table
25	Analytical Instrument	2.3.6	Instrument/Equipment Testing, Calibration and Maintenance Requirements, Supplies and Consumables	- Analytical instrument and equipment maintenance, testing and inspection table
26 & 27	Sample Handling, Custody, and Disposal	2.3.3	Sample Handling, Custody Procedures, and Documentation	- Sample collection documentation, handling, tracking and custody SOPs - Sample container identification - Sample handling flow diagram - Example chain-of-custody form and seal
28	Analytical Quality Control and Corrective Action	2.3.5	Quality Control Requirements	- QC samples table - Analysis decision tree
29	Project Document and Records	2.2.8	Documentation and Records Requirements	- Project documents and records table
31, 32 & 33	Assessments and Corrective Action	2.4	Assessments	- Assessments and response outcomes - Planned project assessments table - Audit checklists - Assessment findings and corrective action responses table - QA management reports table
34	Data Verification and Validation Inputs	2.5.1	Data Verification and Validation Targets and Methods	- Verification (Step I) process
35	Data Verification Procedures	2.5.1	Data Verification and Validation Targets and Methods	- Verification (Steps IIa and IIb) process
36	Data Validation Procedures	2.5.1	Data Verification and Validation Targets and Methods	- Verification (Steps IIa and IIb) summary

37	Data Usability Assessment	2.5.2	Quantitative and Qualitative Evaluations of Usability	- Usability assessment
		2.5.3	Potential Limitations on Data Interpretation	
		2.5.4	Reconciliation with Project Requirements	

QAPP Worksheets #1 & 2 Title and Approval Page

(UFP-QAPP Section 2.1)
(EPA 2106-G-05 Section 2.2.1)

Project Identifying Information:

Site Name/Project Name: Tutu Wells Superfund Site FSRI/FS

Site Location: St. Thomas/ USVI

Contract/Work Assignment No(s): 031-RICO-021D

Document Title: Quality Assurance Project Plan

Lead Organization: United States Environmental Protection Agency Region 2 (EPA Region 2)

Preparer's Name and Organizational Affiliation: Yashodhara Saha, HDR

Preparer's Address, Telephone Number, and E-mail Address: 500 Seventh Avenue, 15th Floor

New York, NY 10018, (212)-542-6003, yashodhara.saha@hdrinc.com

Preparation Date (Day/Month/Year): 1 October 2015

HDR Project Manager/Date: Demetrios Klerides
Signature

Printed Name/Organization: Demetrios Klerides/HDR

HDR QA Manager/Date: MELaMacchia
Signature

Printed Name/Organization: Melissa E. LaMacchia/HDR

EPA Work Assignment Manager/Date: Caroline Kwan
Signature

Printed Name/Organization: Caroline Kwan/ EPA

EPA QA Manager/Date: ______
Signature

Printed Name/Title: Phil Cocuzza/Section Chief

Approval Authority: EPA Region 2

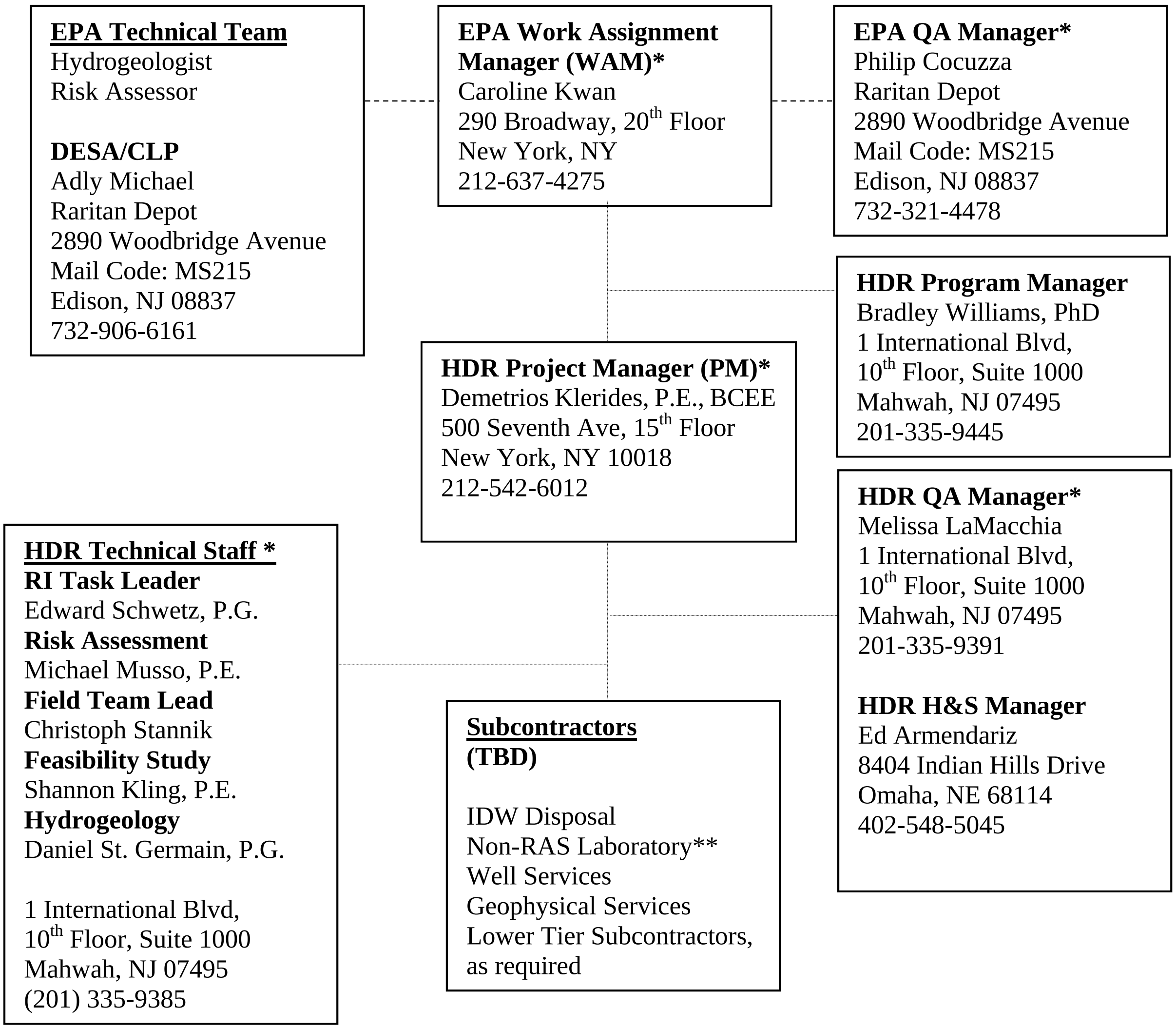
Plans and Reports from previous investigations relevant to this project:

- Phase II Remedial Investigation Report, April 1995
- Final Pre Design Report, February 2001
- Annual Remedial Action Progress Report, April 2013

Document Control Numbering System: 147 254794 - 0

QAPP Worksheets #3 & 5 Project Organization and QAPP Distribution

(UFP-QAPP Section 2.3 and 2.4)
(EPA 2106-G-05 Sections 2.2.3 and 2.2.4)



* Indicates QAPP recipients
* HDR PM will be responsible for distributing this QAPP and all subsequent copies to recipients.
** Non-RAS Data validation services will not be required for rock core samples.

QAPP Worksheets #4, 7 & 8 Personnel Qualifications and Sign-off Sheet

(UFP-QAPP Manual Section 2.3.2 through 2.3.4)
(EPA 2106-G-05 Section 2.2.1 and 2.2.7)

Name	Project Title/Role	Organizational Affiliation	Education/Experience	Specialized Training	Signature/Date*
Caroline Kwan	WAM	EPA	As required for the project	As required for the project	
DESA/CLP and USEPA Technical Team	TBD	EPA	As required for the project	As required for the project	
Demetrios Klerides, P.E.	Project Manager	HDR	BE/ME Civil Engineering, 29 years environmental consulting	OSHA Hazwoper, Medical Clearance	
Melissa LaMacchia	QA Manager	HDR	BS/MS Environmental Science, 14 years environmental consulting	OSHA Hazwoper, Medical Clearance	
Edward Schwetz, P.G.	RI Task Leader	HDR	BS Geological Engineering, MS Management, 28 years environmental consulting	OSHA Hazwoper, Medical Clearance	
Michael Musso, P.E.	Risk Assessment	HDR	BE Civil Engineering, MS Public Health, 24 years environmental consulting	OSHA Hazwoper, Medical Clearance	
Christoph Stannik	Field Team Leader	HDR	MS Physical Geography, 20 years environmental consulting	OSHA Hazwoper, Medical Clearance	
Shannon Kling, P.E.	FS Task Leader	HDR	BS Environmental Engineering, 13 years environmental consulting	OSHA Hazwoper, Medical Clearance	
Daniel St. Germain, P.G.	Senior Hydrogeologist	HDR	BS Marine Geology, 33 years environmental consulting	OSHA Hazwoper, Medical Clearance	
TBD	Field Staff	HDR	BA/BS degree in related field with at least 2 years of experience	OSHA Hazwoper, Medical Clearance	

Organization: Team Sub or Laboratory, etc.

Name	Project Title/Role	Organizational Affiliation	Education/Experience	Specialized Training	Signature/Date*
TBD					

*Signatures indicate personnel have read and agree to implement this QAPP as written.
TBD- to be determined

QAPP Worksheet #6 Communication Pathways

(UFP-QAPP Manual Section 2.4.2)
(EPA 2106-G-05 Section 2.2.4)

Communication Driver	Organization	Name	Contact Information	Procedure (timing, pathway, documentation, etc.)
Regulatory agency interface	HDR	Demetrios Klerides	212-542-6012	All materials and information about the project will be forwarded to the WAM
Field progress reports	HDR	Christoph Stannik	610-807-5115	Major project issues reported to the HDR Project Manager within 12 hours of detection; E-mail DQCRs to the HDR PM; Field issues reported to the HDR PM within 12 hours of detection
Stop work order	HDR	Demetrios Klerides	212-542-6012	Liaison to EPA WAM; major project issues reported to the EPA WAM within 24 hours of detection; work closely with members of the Project Team to understand any issues that arise and will have ultimate authority to stop work; Consult with the Project Team to correct deficiencies and ensure appropriate actions are taken before work is re-started.
QAPP changes prior to field work	HDR	Yashodhara Saha	212-542-6003	Work with the HDR PM and correct any discrepancies in the QAPP prior to field work.
QAPP changes during project execution	HDR	Yashodhara Saha	212-542-6003	Work with the HDR PM and update the QAPP as necessary during field work.

Communication Driver	**Organization**	**Name**	**Contact Information**	**Procedure (timing, pathway, documentation, etc.)**
Field corrective actions	HDR	Melissa LaMacchia	201-335-9391	Work with the HDR PM on major project issues and corrective actions.
Field corrective actions	Field Subcontractor	TBD	TBD	Field issues reported to the FTL immediately.
Sample receipt variances	EPA RSCC	Adly Michael	732-632-4766	Laboratory analysis issues reported to the EPA WAM within 24 hours of detection.
Laboratory quality control variances	EPA RSCC	Adly Michael	732-632-4766	Laboratory analysis issues reported to the EPA WAM within 24 hours of detection.
Analytical corrective actions	EPA RSCC	Adly Michael	732-632-4766	Laboratory analysis issues reported to the EPA WAM within 24 hours of detection.
Data verification issues	EPA RSCC	Adly Michael	732-632-4766	Laboratory analysis issues reported to the EPA WAM within 24 hours of detection.
Data review corrective actions	EPA RSCC	Adly Michael	732-632-4766	Laboratory analysis issuess reported to the EPA WAM within 24 hours of detection.

QAPP Worksheet #9 Project Planning Session Summary

(UFP-QAPP Manual Section 2.5.1 and Figures 9-12)
(EPA 2106-G-05 Section 2.2.5)

<u>Planning Session</u>
Date: April 23, 2015
Location: 290 Broadway, New York, NY
Purpose: Scoping meeting under Task 1.2 to cover HDR questions/comments on the Statement of Work (SOW)

Participants:

Name	Organization	Title/Role	Contact Information
John Bachmann, Jr.	EPA	Contracting Officer	212-637-3363
Keith Moncino	EPA	Project Officer	212-637-4353
Caroline Kwan	EPA	Work Assignment Manager	212-637-4275
Demetrios Klerides	HDR	Project Manager	212-542-6012
Brad Williams	HDR	Program Manager	201-335-9445

Notes/Comments: No comments or changes to the SOW.
Consensus decisions made: No comments or changes to the SOW.

Action Items:

Action	Responsible Party	Due Date
Submit draft scoping meeting minutes	HDR	April 28, 2015
Submit Draft Work Plan	HDR	June 8, 2015

QAPP Worksheet #10 Conceptual Site Model

(UFP-QAPP Manual Section 2.5.2)
(EPA 2106-G-05 Section 2.2.5)

Background Information is provided in Introduction Pages 4 through 6. Information provided in this Worksheet has been obtained from the Final PDI Report referenced in this QAPP.

The primary site CVOCs and contaminant daughter products that are representative of the Curriculum Center contaminant source area include PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride. The PDI investigation(s) at the Curriculum Center showed that the subsurface structural geological conditions have a large impact on the migration of contamination. The overburden, which ranges in thickness from less than one foot to more than 30 feet, appears to be the thickest in the vicinity of the suspected discharges on the north side of the building. This trough or depression in the bedrock surface likely acted as a “sink” for discharges, resulting in three regimes that affect the fate and transport of contaminants: (1) the thicker zones of overburden contain variable amounts of clay, which likely affected the vertical and horizontal migration of releases from the building. (2) the bedrock down to approximately 80 feet below ground surface (bgs) in this area is highly fractured, with good vertical and horizontal permeability. Liquid wastes most likely migrated readily through this zone. (3) the deeper bedrock, from 80 feet bgs to approximately 130 feet bgs, has minimal fracturing, resulting in much lower permeability. It is likely that liquid contaminants have become trapped in rock matrix in this zone, as evidenced by the extremely high levels of contamination. Based on these observations, it was concluded that significant CVOC concentrations are present in the aquifer at the Curriculum Center, and:

- Shallow groundwater contamination, from the water table to approximately 70 feet bgs, is in a highly productive zone.
- Deep groundwater contamination, from approximately 80 feet to 130 feet bgs, is extremely high, with levels of PCE representing highly saturated conditions. This aquifer zone has minimal fracture permeability and, therefore, is not considered a productive zone.

According to the April 2013 Annual Remedial Action Progress Report, data indicates that the treatment facility at the Curriculum Center is successfully removing contaminant mass and retarding the migration of the CVOC groundwater plume. However, the consistency of contaminant concentrations over the past few years in the shallow zone just downgradient of the facility suggest that some contamination from the highly contaminated deep zone maybe migrating to the shallow zone.

The source is known, but the mechanisms of transport and the interaction between the upper and lower zones are not well understood. The bottom of the Tutu aquifer is not well defined but is dependent, to a great extent, upon the characteristics of bedrock fracturing..
The focus of the FSRI is to confirm the presence of DNAPL on or in the bedrock. Information obtained during the FSRI will be used to further develop the CSM. The FSRI will focus on primary site CVOCs listed above since sufficient information is available for the contaminants at the Curriculum Center.HDR will then evaluate if it is feasible to remediate or recover DNAPL and present the findings in the focused source FS report. Data colelcted during the FSRI will be used to determine if hydraulic capture of DNAPL and contaminated groundwater with the existing Curriculum Center treatment facility is feasible or if any upgradies or modifications need to be made to the facility in order to accomplish the same. Existing operations and maintenance (O&M) performance data and mass flux will be used to estimate remedial timeframes and costs in the focused source FS report.

QAPP Worksheet #11 Project/Data Quality Objectives/ Systematic Planning Process Statements

(UFP-QAPP Manual Section 2.6.1)
(EPA 2106-G-05 Section 2.2.6)

The problem to be addressed by the project: Site history, background, and a summary of contamination at the Curriculum Center were provided in the Introduction section. Figure 2 shows the Curriculum Center.
Data needs to be gathered at the Curriculum Center during FSRI activities to delineate the nature and extent of contamination in the bedrock aquifer, and develop remedial alternatives in an FS in support of a ROD, and to prepare a Technical Impracticability (TI) waiver, if appropriate. The source is known, but the mechanisms of transport and the interaction between the upper and lower zones of the bedrock aquifer are not well understood. The contaminants of concern (COCs) at the Curriculum Center predominantly include PCE, TCE, cis 1,2-DCE, trans-1,2-DCE, and vinyl chloride. A surface geophysical evaluation will be completed using three different surface geophysical methods. Seismic techniques will be used to determine the depth and shape of the bedrock surface. This data will be used to identify locations where CVOCs could have pooled in low areas on the surface and entered bedrock. An Aestus GeoTrax electrical conductivity survey will be conducted to assess the potential location and distribution of high concentrations of CVOCs within bedrock. A Willowstick geophysical survey will be conducted to identify water bearing fractures that could be transporting CVOCs through the bedrock aquifer. A Matrix Diffusion Evaluation consisting of rock coring will be completed at two locations to document the potential presence and vertical distribution of CVOCs in bedrock pore water. Water level monitoring of 29 monitoring and recovery wells, capture zone evaluation of 12 wells to understand the ROI and hydraulic capture of the existing treatment system, surface geophysical surveys, borehole drilling/coring, 6 monitoring well installations, borehole geophysics in 9 existing wells and 6 new wells, packer testing, and groundwater sampling will be conducted during the investigation to support the preparation of an RI report and an FS.

The environmental questions being asked: The questions being asked are: What is the nature and extent of contamination in the bedrock aquifer? What are the characteristics of the waste for off-site disposal and how will the waste be disposed? What are the fate and transport processes that effect the migration of CVOCs in the bedrock aquifer? What are the current and potential future impacts on contamination on human health and the environment? What are the most appropriate remedial alternatives for the contaminated groundwater to eliminate, reduce, or control risks to human health and the environment? Is a Technical Impracticability waiver appropriate?

Alternative actions or outcomes that may result based on the answers to the key questions being asked: Existing database information and on-going site remedial practices will be evaluated, and a limited amount of field work will be performed to identify data gaps, which will aid in defining the overall CSM. Based on the results of the FSRI, recommendations will be given for additional site characterization and/or analytical parameters that should be used for future investigations, if required. The results of the FSRI and site conditions will be used to identify remedial alternatives in the FS. The results of the FSRI will determine how and where the waste is disposed.

A synopsis of secondary data or information from site reports: Information from previous investigations has revealed the presence of a continuing source of CVOCs in groundwater in the vicinity of Curriculum Center. The primary COCs identified were PCE, TCE, cis 1,2-DCE, trans-1,2-DCE, and vinyl chloride.

The possible classes of contaminants and the affected matrices: The focus of the FSRI is groundwater, but other matrices will be sampled to fill in data gaps, support the FS and identify the need for a TI waiver. The other matrices to be sampled are pore water and rock. Based on historical data available for the Curriculum Center, the contaminants of concern are CVOCs.

The rationale for inclusion of chemical and nonchemical analyses: HDR will collect samples for trace level Target Compound List (TCL) VOCs in groundwater and rock coring samples. Rock coring (matrix diffusion) samples will also be analyzed for non-chemical parameters: specific gravity, bulk density, percent moisture and total organic carbon (TOC). The rock core samples will be collected and analyzed by a subcontractor, who will be operating under a separate approved QAPP. These parameters will be analyzed to gain a current understanding of the nature and extent of contamination at the study site. Waste disposal characterization of drummed soil cuttings will be in accordance with disposal facility requirements. The waste characterization requirements will be confirmed following selection/identification of the treatment and disposal facilities. It is assumed that wastewater samples will be sent to the treatment system for disposal. This QAPP will be updated when more information is available regarding the waste characterization requirements.

Information concerning various environmental indicators: Environmental indicators have been observed during previous investigations as summarized above.

Project decision conditions ("If..., then..." statements): The primary decision statement for the FSRI sampling through the collection of samples is: If insufficient usable data (less than 95% complete) is obtained, then additional activities may be required to refine the CSM and aid in the understanding of bedrock aquifer conditions. Completeness of the data is defined as a measure of the samples collected versus the number of samples analyzed that yielded valid, or useable, results.

If remedial groundwater alternatives are considered impracticable for the bedrock aquifer, then a TI waiver will be prepared.

Who will use the data? HDR, and USEPA Region 2 will use the data.

What will the data be used for?

- Groundwater data will be used to confirm the presence or absence of groundwater contamination in the bedrock aquifer, to determine the extent of contamination horizontally and vertically, and to evaluate groundwater as an exposure medium.
- Rock coring data will be used to calculate rock pore water concentrations, diffusion, and evaluate the rock matrix as a potential continuing source of contamination.

What type of data are needed? How much data are needed?

HDR will collect groundwater and rock core samples in accordance with Table 1 of the June 2015 Draft FSRI/FS Work Plan and as summarized in this QAPP. QA/QC samples are described in Worksheet #20. The sampling program will include the following:

-Limited site surveys and reconnaissance, and well surveys

-Surface geophysical investigations consisting of seismic survey, Aestus GeoTrax survey (11 transects), and Willowstick geophysical survey (2 locations).

-Rock coring/matrix diffusion samples will be collected from two borings (upto 20 per boring; total upto 40 samples) and analyzed for CVOCs, wet and dry bulk density, % moisture, specific gravity and TOC. These results will be used to convert the laboratory results into pore water concentrations. Prior to sampling, the core will be photographed.

-Continuous water level measurements via six existing transducers and six additional transducers in selected wells for capture zone evaluation; one round of synoptic groundwater elevation measurements from 29 monitoring wells and recovery wells; and barometric and rainfall data from National Weather Service.

-Installation of one shallow bedrock monitoring well and five deep bedrock monitoring wells. Target depth for shallow well is assumed as 80 feet below ground surface (bgs). Target depth for deep bedrock wells assumed as 140 feet bgs. Actual well depths will be established based on the results from the initial hydrogeologic and geophysical assessments conducted during the investigation.

-Borehole geophysics (fluid temperature, fluid resistivity, caliper, heat pulse flowmeter, and acoustic televiewer) in nine existing wells and six new wells.
-Packer testing of three discrete intervals will be conducted at each of the six new bedrock wells for a total of 18 samples.
-One groundwater sample from 23 existing monitoring wells and six newly installed monitoring wells for a total of 29 samples will be analyzed for TCL VOCs.
-Field screening using a photoionization (PID) or flame ionization detector (FID) will be performed during well installation and during sample collection. Field screening parameters using a water quality meter (e.g., Horiba U-22 or equivalent) will be performed during groundwater sampling.
-Soil drill cuttings for waste characterization are anticipated. It is assumed that EPA/HDR will coordinate with the USVI Government operating the Curriculum Center groundwater treatment system and sampling wastewater will be sent to the Curriculum Center treatment system. This QAPP will be updated with waste characterization criteria when a decision on the disposal facility is made. HDR is exploring green options for reducing and managing the Investigative Derived Waste (IDW), including local disposal and recycling options.

How "good" do the data need to be in order to support the environmental decision? The investigation is defined as a critical step in the planning process to assess bedrock aquifer conditions, provide the data necessary to support the remedial alternatives and a TI waiver, if applicable. The data needs to be of sufficient quality to verify that results were obtained using applicable processes and protocols and are adequate in satisfying the above project DQOs as well as for risk assessment and other decision-making purposes. The parameters for assessing the usability of the data are outlined in Worksheet #37.

Where, when, and how should the data be collected/generated? Worksheet #20 presents the project schedule. Worksheet #17 presents the sampling design and rationale. Worksheet #18 presents the sampling locations and methods. Worksheet #18 lists the SOPs that govern various types of sampling. The SOPs are provided in Attachment A.

Who will collect and generate the data? HDR's field crews will conduct all sampling activities. Procurement of analytical services will follow the FASTAC process. It is unknown which labs will perform these services at the time of the issuance of the QAPP. It is assumed that all samples except rock cores will be analyzed by DESA/CLP; therefore, both relevant information for DESA (included within the QAPP worksheets) and CLP (Attachment B) are provided. It is assumed that rock core samples for CVOCs will be analyzed by a real-time on-site non-RAS subcontracted laboratory. Rock core sample analysis for parameters other than CVOCs will also be conducted by a non-RAS subcontracted laboratory.

How will the data be reported? All data from DESA/CLP will be validated by EPA for use by HDR to provide data evaluation and overall usability in its reports to EPA. Analytical data will be received in electronic Region 2 Electronic Data Deliverable (EDD) format and loaded into EQuIS. EQuIS will be used to generate summary tables for use in HDR's reports and to generate text files for upload by EPA into their own database. As necessary, GIS and other graphics software will be used to prepare figures for reports and presentations.

Who will collect and generate the data? HDR's field crews will conduct all sampling activities. It is currently assumed that rock core sample analysis for CVOCs will be conducted by an on-site non-RAS subcontracted laboratory. Rock core sample analysis for parameters other than CVOCs will be shipped to a subcontractor laboratory for analysis. All other samples will be shipped to DESA/CLP for chemical analysis.

QAPP Worksheet #12 Measurement Performance Criteria Table

(UFP-QAPP Manual Section 2.6.2)
(EPA 2106-G-05 Section 2.2.6)

Data quality indicators (DQIs), measurement performance criteria (MPC), and QC sample and/or activity are used to assess the measurement performance for both the sampling and analytical measurement systems. DQIs include the PARCC (precision, accuracy, representativeness, comparability, and completeness) parameters; a method of assessing the validity of environmental data. Precision, accuracy, and completeness can be measured quantitatively based on techniques described below and in Worksheet #37. Representativeness and comparability are qualitative measurements.

Precision is a measure of the variation among individual measurements of the same sample (i.e., the relative percent difference of the results obtained for a sample and a split/blind duplicate sample collected at the same time and in the same way as the original sample).

Accuracy is a measure of the distortion of a measurement from its true value (i.e., the percent recovery of a sample spiked with a known concentration of the analytes being tested for (matrix spike).

Representativeness is a measure of how closely the results received reflect the actual concentrations or distribution of compounds in a sample, as well as field conditions and environmental conditions. Sampling plan design, sample collection techniques, and sample handling protocols have been developed to ensure the collection of representative samples. Field and laboratory blanks will be analyzed to assess sample contamination.

Comparability expresses the confidence with which one data set can be compared to another. To ensure comparability, standard operating/sampling procedures will be followed.

Completeness is a measure of the number of samples collected versus the number of samples analyzed that yielded valid, or useable, results. Data completeness determines whether planned DQOs have been satisfied and is based upon the usability calculation; described further in Worksheet #37.

This worksheet will be updated with waste characterization requirements when more information is obtained from a suitable waste disposal facility.

The following table summarizes the EPA's Division of Environmental Science and Assessment (DESA) laboratory's MPCs for *Tutu Wells Site*. It is not known at the time the QAPP is being prepared whether DESA or CLP will analyze the samples; therefore, CLP values are provided as an attachment.

QAPP Worksheet #12 Measurement Performance Criteria Table (continued)
(UFP-QAPP Manual Section 2.6.2)
(EPA 2106-G-05 Section 2.2.6)

Matrix	**Groundwater**				
Analytical Group/Method	**Volatile OrganicCompounds**				
Concentration Level	**Trace**				
Sampling Procedure[1]	**Analytical Method/SOP**[2]	**Data Quality Indicators (DQIs)**	**Measurement Performance Criteria**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)**
SOP-FS-14, -15	DW-1	Precision	% RPD < 20 ±50% RPD	Laboratory Control Sample (LCS) Duplicate Field Duplicate	A S&A
SOP-FS-14, -15	DW-1	Accuracy	Average Recovery (80-120%)	Field Blank	A
SOP-FS-14, -15	DW-1	Accuracy	+/- 40% from the initial/continuing calibration	Internal standards	A
SOP-FS-14, -15	DW-1	Accuracy	Limits 70%-130%	Matrix spike	A
SOP-FS-14, -15	DW-1	Accuracy	Limits 80%-120%	Surrogate Compounds	A
SOP-FS-14, -15	DW-1	Accuracy	< RL	Method Blank	A
SOP-FS-14, -15	DW-1	Accuracy/Bias	No target compounds > QL	Trip Blank Field Blank	S&A
SOP-FS-14, -15	DW-1	Completeness	95% usable for VOC data	Usability calculation	S&A

[1]Reference number from QAPP Worksheet #21 (see Section 3.1.2).
[2]Reference number from QAPP Worksheet #23 (see Section 3.2).

QAPP Worksheet #13 Secondary Data Uses and Limitations

(UFP-QAPP Manual Section 2.7)
(EPA 2106-G-05 Chapter 3)

Secondary Data	Data Source (Originating Organization, Report Title, and Date)	Data Generator(s) (Originating Org., Data Types, Data Generation/ Collection Dates)	How Data Will Be Used	Limitations on Data Use
Previous Investigation Sampling Results	Geraghty & Miller Inc., Phase II Remedial Investigation Report, April 1995	Geraghty & Miller Inc., RI Data, Sample Collection Dates: 02/94-07/94	For selection of proposed sample locations and to determine/delineate the nature and extent of contamination within the study area.	No known limitations
Pre-Design Investigation	CDM Federal, Final Pre-Design Report, February 2001	CDM Federal, Groundwater Sampling, Sample Collection Dates: 08/98-08/99	For selection of proposed sample locations and to determine/delineate the nature and extent of contamination within the study area.	No known limitations
Remedial Action Progress	CDM Smith, April 2013 Annual Remedial Action Progress Report, August 2013	CDM Smith, Groundwater Sampling, Sample Collection Dates: May 2013	For selection of proposed sample locations and to determine/delineate the nature and extent of contamination within the study area.	No known limitations

QAPP Worksheets #14 & 16 Project Tasks and Schedule

(UFP-QAPP Manual Section 2.8.1)
(EPA 2106-G-05 Section 2.2.4)

A project schedule showing specific tasks and planned start and end dates has been provided as Figure 3 in this QAPP.

QAPP Worksheet #15 Project Action Limits and Laboratory-Specific Detection/Quantitation Limits

(UFP-QAPP Manual Section 2.6.2.3 and Figure 15)
(EPA 2106-G-05 Section 2.2.6)

The following table summarizes EPA's DESA laboratory Reference Limits and Evaluations for *Tutu Wells Site*. It is not known at the time the QAPP is being prepared whether DESA or CLP will analyze the samples; therefore, CLP values are provided as an attachment.

This worksheet will be updated with waste characterization requirements when more information is obtained from a suitable waste disposal facility.

QAPP Worksheet #15 Reference Limits and Evaluation Table
(UFP-QAPP Manual Section 2.6.2.3 and Figure 15)
(EPA 2106-G-05 Section 2.2.6)

Matrix:	Aqueous
Analytical Group:	Volatile Organic Compounds
Concentration Level:	Trace

Analyte	CAS Number	Project Action Limit[1], µg/L	Method CRQL, µg/L	Achievable Laboratory Limits MDLs, µg/L	Achievable Laboratory Limits RLs, µg/L
Dichlorodifluoromethane	75-71-8	NL	0.5	0.11	0.5
Chloromethane	74-87-3	NL	0.5	0.07	0.5
Vinyl Chloride	75-01-4	2	0.5	0.12	0.5
Bromomethane	74-83-9	NL	0.5	0.14	0.5
Chloroethane	75-00-3	NL	0.5	0.14	0.5
Trichlorofluoromethane	75-69-4	NL	0.5	0.11	0.5
1,1-Dichloroethene	75-35-4	7	0.5	0.10	0.5
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	NL	0.5	NL	0.5
Carbon Disulfide	75-15-0	NL	0.5	0.10	0.5
Acetone	67-64-1	NL	5.0	0.36	5.0
Methyl Acetate	79-20-9	NL	0.5	NL	0.5
Methylene Chloride	75-09-2	NL	0.5	0.18	0.5
trans-1,2-Dichloroethene	156-60-5	100	0.5	0.09	0.5
cis-1,2-Dichloroethene	156-59-2	70	0.5	0.06	0.5
Methyl tert-Butyl Ether	1634-04-4	NL	0.5	0.03	0.5
1,1-Dichloroethane	75-34-3	NL	0.5	0.08	0.5
2-Butanone	78-93-3	NL	5.0	0.21	5.0
Chloroform	67-66-3	NL	0.5	0.07	0.5
1,2-Dichloroethane	107-06-2	5	0.5	0.09	0.5
1,1,1-Trichloroethane	71-55-6	200	0.5	0.09	0.5

Cyclohexane	110-82-7	NL	0.5	NL	0.5
Carbon Tetrachloride	56-23-5	5	0.5	0.10	0.5
Benzene	71-43-2	5	0.5	0.07	0.5
Trichloroethene	79-01-6	5	0.5	0.08	0.5
Methylcyclohexane	108-87-2	NL	0.5	NL	0.5
1,2-Dichloropropane	78-87-5	5	0.5	0.04	0.5
Bromodichloromethane	75-27-4	NL	0.5	0.06	0.5
cis-1,3-Dichloropropene	10061-01-5	NL	0.5	0.05	0.5
trans-1,3-Dichloropropene	10061-02-6	NL	0.5	0.04	0.5
1,1,2-Trichloroethane	79-00-5	5	0.5	0.08	0.5
Dibromochloromethane	124-48-1	NL	0.5	0.03	0.5
4-Methyl-2-Pentanone	108-10-1	NL	0.5	0.10	0.5
Toluene	108-88-3	1000	0.5	0.08	0.5
1,2-Dibromoethane	106-93-4	NL	0.5	0.04	0.5
Chlorobenzene	108-90-7	100	0.5	0.06	0.5
Tetrachloroethene	127-18-4	5	0.5	0.09	0.5
2-Hexanone	591-78-6	NL	5.0	0.11	5.0
Ethylbenzene	100-41-4	700	0.5	0.06	0.5
m,p-Xylene	179601-23-1	10000	0.5	0.13	0.5
o-Xylene	95-47-6	10000	0.5	0.05	0.5
Styrene	100-42-5	100	0.5	0.03	0.5
Bromoform	75-25-2	NL	0.5	0.07	0.5
Isopropylbenzene	98-82-8	NL	0.5	0.06	0.5
1,1,2,2-Tetrachloroethane	79-34-5	NL	0.5	0.05	0.5
1,3-Dichlorobenzene	541-73-1	NL	0.5	0.05	0.5
1,4-Dichlorobenzene	106-46-7	NL	0.5	0.03	0.5
1,2-Dichlorobenzene	95-50-1	NL	0.5	0.04	0.5
1,2-Dibromo-3-Chloropropane	96-12-8	NL	0.5	0.18	0.5
1,2,4-Trichlorobenzene	120-82-1	70	0.5	0.06	0.5
1,2,3-Trichlorobenzene	87-61-6	NL	0.5	0.05	0.5
Bromochloromethane	74-97-5	NL	0.5	0.10	0.5

1. Project action limits are EPA MCLs for drinking water regulations (May 2009).
NL- not listed

QAPP Worksheet #17 Sampling Design and Rationale

(UFP-QAPP Section 3.1.1)
(EPA 2106-G-05 Section 2.3.1)

Describe and provide strategies and a rationale for choosing the sampling approach: HDR will conduct all of the field sampling for the FSRI. HDR will collect groundwater samples from 23 existing monitoring wells and 6 new monitoring wells for a total of 29 bedrock locations as shown on Figure 2. The goal of the FSRI is to characterize the bedrock aquifer conditions and define the nature and extent of contamination. This QAPP will be revised as necessary to document changes in proposed sampling strategy as data becomes available for the site.

Groundwater: Monitoring wells will be installed in the bedrock aquifer to define the extent of the groundwater plume and delineate the source or sources of contamination. Twenty-three existing wells at Curriculum Center are currently used to define the nature and extent of groundwater contamination. Six new wells will be installed as part of this scope of work. One well will be installed in the deep water bearing zone near RD-5 to define the concentration of VOCs in the deep water bearing zone at this location. Two monitoring wells will be installed at selected locations to confirm the Aestus survey. Two additional wells (one in the shallow water bearing zone and one in the deep water bearing zone) will be installed to facilitate the completion of the Willowstick geophysical survey. One bedrock core will be installed which maybe converted to a well. Groundwater samples will be collected from 26 wells to further define the nature and extent of groundwater contamination. The need to collect groundwater samples from the two Willowstick wells will be determined as the investigation proceeds. A total of 29 groundwater samples are anticipated. The hydrogeological assessment includes a well redevelopment and hydraulic testing, well condition survey, downhole geophysics, capture zone evaluation, monitoring well installation, groundwater elevation survey, packer sampling, groundwater elevation measurements, and groundwater sampling.

Rock: Due to the possibility of contaminant mass transfer between fractures and the rock matrix, rock core sampling and matrix diffusion analysis will be performed. A minimum of one boring will be drilled in the core of the mapped plume at Curriculum Center to determine if the VOCs have diffused into the matrix of the bedrock. Whole rock samples will be collected at a minimum of 2 foot intervals for whole rock analysis of VOCs. Whole rock samples will be collected and analyzed until the concentration of VOCs in the whole rock core samples is less than the PQL. This component of the sampling will be conducted by a subcontractor whose QAPP will be provided separately.

- Analytical data will be compared to State and Federal standards appropriate for the respective media and their potential use to determine whether standards are exceeded. The COCs identified for the Curriculum Center to date are CVOCs (PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride) in groundwater. Waste characterization sampling requirements will depend upon disposal facility requirements and this QAPP will be updated accordingly once those requirements are known. Wastewater IDW will likely be disposed of in the groundwater treatment system to minimize off-site disposal.

Non-analytical Data (not from laboratory analysis)

- Groundwater elevation data collected during the investigation (synoptic measurements and continuous long-term measurements using transducers) will be used to establish groundwater flow direction and fluctuations in bedrock aquifer, to support the placement of new monitoring wells, to support the investigation and modeling of area hydrogeology, and to understand the radius of influence and hydraulic capture of the existing groundwater extraction system.

- Barometric data may be collected by transducers to document the potential effect changes in barometric pressure could have on the water levels. Rainfall measurements will be obtained from the nearest precipitation station or airport to evaluate precipitation's potential effect on groundwater levels.
- Seismic geophysical data will be used to determine depth and shape of bedrock and identify locations where CVOCs could have pooled in low areas on the surface and entered bedrock.
- Aestus GeoTrax electrical conductivity survey will be used to assess the potential location and distribution of high concentrations of CVOCs within bedrock.
- Willowstick geophysical survey will be conducted to identify water bearing fractures that could be transporting CVOCs through the bedrock aquifer.
- Matrix diffusion data will be used to assess the fate and transport of CVOCs in the bedrock and to evaluate potential remedies and remedial time frames.
- Downhole geophysical data generated during the investigation will be used to identify discrete water-bearing depths in fractured bedrock, strike and dip of bedrock, and flow data. The data will be used to determine packer testing intervals for chemical and flow testing and as input for hydrogeological modeling.

Field screening results (soil core screening) from PIDs (or FIDs) will be used to determine if IDW is highly contaminated and segregate it from the other IDW in order to minimize the volume of IDW that will require management as hazardous.

<u>Analytical Data - Groundwater Sampling and Rock Coring</u>

The process that will be used to make decisions based on the data collected is provided in Worksheet #10.

All groundwater analytical data generated during the investigation will be used to define the nature and extent of CVOCs, confirm CVOC anomalies identified in the Aestus survey, and complete the Willowstick survey. The data will also be used to guide the placement of new monitoring or recovery wells, if needed in the future. Packer testing chemical data will be used to determine a vertical groundwater contamination profile within the bedrock aquifer. Groundwater data will be considered sufficient when sufficient data is available to define the nature and extent of groundwater contamination.

Analytical data for physical properties and CVOCs of bedrock cores generated during the investigation will be used to convert the laboratory results into rock pore water concentrations. Rock data will be considered sufficient when sufficient data is available to define the nature and extent of contamination in the rock matrix.

QAPP Worksheet #18 Sampling Locations and Methods/SOP Requirements Table

(UFP-QAPP Manual Section 3.1.1 and 3.1.2)
(EPA 2106-G-05 Section 2.3.1 and 2.3.2

Sampling Location/ ID Number	**Matrix**	**Number of Samples/ Depth, ft. bgs**	**Type**	**Analyte/ Analytical Group**	**Number of Samples (identify field duplicates)**	**Sampling SOP Reference[1]**	**Rationale for Sampling Location**
Refer to Figure 2 for locations. (Samples will be named as RCOU2-0001 through RCOU2-0040)	Rock Core	Upto 20 per boring, 2 borings; 40 samples	Rock pore water concentrations	VOCs, Porosity, Bulk Density, Percent Moisture, TOC, Specific Gravity	40 plus 2 field duplicates (1 per 20)	SOP #25	To evaluate potential for contaminant mass transfer between the fractures and rock matrix.
New wells will be identified as MW-OU2-1, through MW-OU2-6. (Samples will be named as MWOU2-1-01, -02, -03 for each interval)	Groundwater	Monitoring wells, 6 new bedrock wells; 3 intervals per well; 18 samples	Packers	VOCs, Field Screening	18 plus 1 field duplicate (1 per 20)	SOP# 15, 24	To collect samples from different depth intervals of the bedrock aquifer and to determine contamination contribution from specific fractures and depth intervals at the monitoring wells.
Synoptic Groundwater Elevations (Existing wells; BP-1, BP-2, BP-3, IW-1, IW-1S,	Groundwater	Water table; 6 new wells, 23 existing wells	Water level data	N/A	N/A	SOP #14	To establish groundwater flow direction in the bedrock aquifer

Sampling Location/ ID Number	Matrix	Number of Samples/ Depth, ft. bgs	Type	Analyte/ Analytical Group	Number of Samples (identify field duplicates)	Sampling SOP Reference[1]	Rationale for Sampling Location
IW-2, IW-2S, MW-13, MW-13D, MW-14, MW-15, MW-16, MW-17, MW-1D, RD-10, RD-11, RD-12, RD-13, RD-9, RW-6, RW-7, RW-8, RW-9; Newly installed wells will be identified as MW-OU2-1 through MW-OU2-6)							
New wells MW-OU2-1 through MW-OU2-6 and 6 other existing wells TBD	Groundwater	Water table; 12 transducers	Water level data	N/A	N/A	SOP #15	To establish groundwater flow direction and fluctuations in the bedrock aquifer
MW-15-mmddyy; (Existing wells; BP-1, BP-2, BP-3, IW-1, IW-1S, IW-2, IW-2S, MW-13, MW-13D, MW-14, MW-15, MW-16, MW-17,	Groundwater	Monitoring wells, 6 new bedrock wells; 23 existing wells; 29 samples	Low-flow	TCL VOCs, Water quality	29 plus 2 field duplicates (1 per 20)	SOP# 15, 24	To determine groundwater quality.

Sampling Location/ ID Number	**Matrix**	**Number of Samples/ Depth, ft. bgs**	**Type**	**Analyte/ Analytical Group**	**Number of Samples (identify field duplicates)**	**Sampling SOP Reference[1]**	**Rationale for Sampling Location**
MW-1D, RD-10, RD-11, RD-12, RD-13, RD-9, RW-6, RW-7, RW-8, RW-9; Newly installed wells will be identified as MW-OU2-1 through MW-OU2-6)							
New wells MW-OU2-1 through MW-OU2-6; existing wells MW-15, MW-1D, RD-5, VIHA-1, MW-4D, IW-1S, RW-6, IW-1, and BP-3	Groundwater	6 new wells, 9 existing wells	Downhole geophysical logging	N/A	N/A	SOP #11	To determine discrete water-bearing depths in fractured bedrock, strike and dip of bedrock, flow data.

[1]Specify the appropriate reference letter or number from the Sampling SOP References table (Worksheet #21).

QAPP Worksheet #19 & 30 Analytical SOPs Requirements Table

(UFP-QAPP Manual Section 3.1.2.2)
(EPA 2106-G-05 Section 2.3.2)

It is not known at the time the QAPP is being prepared whether DESA or CLP will analyze the samples. Therefore, DESA values are included in Worksheet #19 and CLP values are provided as Attachment A.

Laboratory Name	EPA Region 2 Laboratory (DESA)
Laboratory Address	2890 Woodbridge Avenue Edison, New Jersey 08837
Laboratory Accreditations/Certifications	NELAP
Sample Delivery Method	Delivery service (i.e., UPS, FedEx)
Back-up Laboratory	EPA Contract Laboratory Program (CLP)

Matrix[1]	**Analytical Group**	**Concentration Level**	**Analytical and Preparation Method/SOP Reference**[2]	**Sample Volume**	**Containers (number, size, and type)**	**Preservation Requirements (chemical, temperature, light protected)**	**Maximum Holding Time (preparation/ analysis)**	**Data Package Turnaround**
Aqueous	TCL Volatiles	Trace	DW-1 (*Ref: EPA 524.2)*	3 X40ml 6 X 40ml (QC)	VOA vial with Teflon-lined septum	Cool, 4ºC ; HCL to pH < 2 $Na_2S_2O_3$, if Res CL present	Preserved w/HCL: 14 days: Unpreserved: 7 days	42 days
Rock Cores[3,4]	TCL Volatiles	Trace	DW-1 (*Ref: EPA 524.2*) C-89 (*Ref: EPA 624*)	3 X40ml 6 X 40ml (QC)	VOA vial with Teflon-lined septum	Cool, 4ºC	Preserved w/Methanol: 14 Days	42 days
Rock Cores[3,4]	Porosity, Bulk Density, % moisture, TOC[4]	N/A	N/A, Subcontractor	TBD	Aluminum foil-lined PVC tray	TBD	TBD	42 days

[1]Soil and wastewater samples are anticipated as IDW during the FSRI. Wastewater samples will likely be disposed in the on-site treatment system. This worksheet will be updated with waste characterization requirements when a suitable waste disposal facility is identified.
[2]Reference number from QAPP Worksheet #23 (see Section 3.2).
[3]will be analyzed by an on-site non-RAS subcontracted laboratory or shipped to a non-RAS subcontracted laboratory.
[4]A separate QAPP will be provided by the Subcontractor for the analysis.
TBD – to be determined

QAPP Worksheet #20 Field Quality Control Sample Summary Table

(UFP-QAPP Manual Section 3.1.1 and 3.1.2)
(EPA 2106-G-05 Section 2.3.5)

Field Duplicates: Field duplicate samples are analyzed to check for sampling and analytical reproducibility. The general frequency will be one field duplicate for every 20 investigative samples collected (frequency of 5%). Field duplicates will be submitted to the laboratory as "blind" samples (i.e., the actual sampling location will be recorded in the field logbook but not on the chain-of-custody).

Equipment (rinsate) Blanks: Equipment blanks, or equipment rinsates, are analyzed to check for procedural contamination at the site that may cause sample contamination. Equipment blanks will be prepared in the field, using laboratory-grade deionized water, by allowing the water to flow over/through the sampling implement and into sample containers with the appropriate preservative. Equipment blanks will be collected from non-dedicated and non-disposable equipment. The general frequency of submittal will be a minimum of 5% or one field blank per day of sampling depending on the size of the project.

Field Blanks: A blank used to provide information about contaminants that may be introduced during sample collection, storage, and transport; also a clean sample exposed to sampling conditions, transported to the laboratory, and treated as an environmental sample. Field blanks will be collected once per day of sampling.

Trip Blanks: Trip blanks are used to assess whether cross-over of constituents between samples occurs during sample shipment and storage. One laboratory-supplied trip blank, consisting of high-grade deionized water (e.g., laboratory "purge" water) will be included along with each shipment of samples to be analyzed for VOCs.

Matrix Spikes: Matrix spikes provide information about the effect of the sample matrix on the preparation and measurement methodology.

Matrix[1]	**Analytical Group**	**Concentration Level**	**Quantities**						
			Field Samples	**Field Duplicates**	**Matrix Spikes**	**Trip Blanks**	**Field Blanks**	**Equipment Blanks**	**Total Analyses**
Groundwater	TCL VOCs	Trace	29	One per 20 samples (2)	-	1 for each cooler (10)	One per day of sampling (10)	One per day of sampling (10)	61
Rock Core	TCL VOCs	Low	Upto 40	One per 20 samples (2)	One per 20 samples (2)	1 for each cooler* (10)	One per day of sampling (10)	One per day of sampling (10)	74
Rock Core	[2]	N/A	Upto 40	One per 20 samples (2)	0	0	0	0	42

[1]- This worksheet will be updated for IDW samples to satisfy waste characterization criteria of disposal facilities, when more information is available.
[2]- Porosity, TOC, bulk density, percent moisture, and specific gravity.
*-trip blanks will be required if shipped off-site. It is currently assumed that samples will be analyzed on-site.

QAPP Worksheet #21 Project Sampling SOP References Table

(UFP-QAPP Manual Section 3.1.2)
(EPA 2106-G-05 Section 2.3.2)

Reference Number	Title, Revision Date and/or Number	Originating Organization	Equipment Type	Modified for Project Work? (Check if yes)	Comments
SOP-FS-01	Field Logbook, December 2014	HDR	PID or FID CGI dataRAM	☐	
SOP-FS-02	Mobilization and Demobilization, December 2014	HDR	N/A	☐	
SOP-FS-03	Site Location and Elevation Survey, December 2014	HDR	GPS	☐	
SOP-FS-04	Air Monitoring, December 2014	HDR	PID or FID CGI dataRAM	☐	
SOP-FS-05	Decontamination, December 2014	HDR	N/A	☐	
SOP-FS-09	Rock Coring, December 2014	HDR	Drill Rig	☒	Revised to reflect rock coring procedures and requirements as spelled out in the approved work plan.
SOP-FS-14	Groundwater Level Measurements, December 2014	HDR	Water Level Indicator	☐	
SOP-FS-15	Low Flow Groundwater Sampling, December 2014	HDR	Grundfos or eq. submersible pump Bladder Pump Horiba® U-22 meter, or eq.	☐	
SOP-FS-16	Monitoring Well Installation, Completion and Development, December 2014	HDR	Drill Rig Centrifugal Pump Surge Blocks	☒	Revised to reflect the well installation procedures for bedrock and overburden.
SOP-FS-20	Downhole Geophysics, December 2014	HDR	Video Camera Submersible Pump	☐	

Reference Number	Title, Revision Date and/or Number	Originating Organization	Equipment Type	Modified for Project Work? (Check if yes)	Comments
			Generator Pneumatic Packer Assembly Nitrogen Bottle Tubing, Valves, Adapters Transducers Water Level Indicator		
SOP-FS-24	Packer Sampling	HDR	Packers	☐	
SOP-FS-25	Investigation-Derived Waste, December 2014	HDR	55-gallon drums Pallets	☐	
SOP-SM-01	Project Setup – Scribe	HDR	Scribe sample management software	☐	
SOP-SM-02	Sample Logging and Labeling – Scribe	HDR	Scribe sample management software	☐	
SOP-SM-03	Sample Naming	HDR	None	☒	Revised to reflect site-specific sample naming
SOP-SM-04	Chain-of-Custody-Scribe	HDR	Scribe sample management software	☐	
SOP-SM-05	Sample Packing & Shipping	HDR	Coolers, packing supplies	☐	
SOP-SM-06	FASTAC Process & Reporting	HDR	None	☐	

SOPs for Aestus and Willowstick surveys have not been provided since these are proprietary products. Work plans/specifications will be provided by the vendor(s) when subcontracted and will be used for the project.

QAPP Worksheet #22 Field Equipment Calibration, Maintenance, Testing, and Inspection Table

(UFP-QAPP Manual Section 3.1.2.4)
(EPA 2106-G-05 Section 2.3.6)

All field equipment will be examined to check that it is in operating condition and calibrated prior to the start of each day in the field. This includes checking the manufacturers' operating and instruction manual(s) for each instrument to maintain conformance with recommended operation and maintenance and calibration procedures. The instruments will also be calibrated/checked at the end of each day in the field. If abnormal readings are observed throughout the day, either as a result of weather or field conditions, the instruments may be calibrated/checked in order to determine whether any "drift" in the accuracy of the meter's ability to record measurements has occurred. In the event that an internally calibrated field instrument fails to meet calibration/checkout procedures, it will be returned to the manufacturer for service. All calibration data will be recorded on field sheets or in the field notebook.

Field Equipment	Calibration Activity	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person
PID	Calibrate with fresh air or "zero air" to 0 ppm and Isobutylene calibration gas to 100 ppm	Battery pack; sensor module; PID lamp; sampling pump; and inlet connectors and filters (above to be performed by experienced personnel.	Exposure to test/calibration gas (known concentration) to verify the instrument is accurate and hasn't lost sensitivity.	Verify alarm limits, battery charge, and data logging capacity, if using; ensure sample port is clear and instrument is clean.	Daily before use; calibration check at the end of each day; and during the day if necessary due to field conditions (dust) or weather (humidity)	0 ppm fresh air; 100 ppm Isobutylene – within ±10% of gas concentration	Recalibrate; service as necessary.	HDR Field Team Leader or designee
FID	Calibrate with standard gases	Check/replace battery	Visual inspection	Verify sample port is clear and instrument is clean.	Prior to day's activities, anytime an anomaly is suspected	± 5ppm	Clean probe, replace probe, replace battery, service as necessary.	HDR Field Team Leader or designee
Water Level Indicator or Interface Probe	Compare to a calibrated steel tape	Check/replace battery	Auditory Inspection	Verify probe is clean and operational.	Prior to day's activities, anytime an anomaly is suspected	Audio tone when contacted with water	Replace battery, replace unit	HDR Field Team Leader or designee
Continous water logger/Transducer	Manufacturer calibration only	Performed by manufacturer or prior to shipping	Manufacturer calibration only	Check instrument is in working order	Once per month	Pass/Fail	Return to vendor or rental company for replacement	HDR Field Team Leader or designee

Field Equipment	Calibration Activity	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person
Pumps	Manufacturer calibration only	Performed by manufacturer or prior to shipping	Manufacturer calibration only	Check instrument is in working order	Once per month	Pass/Fail	Return to vendor or rental company for replacement	HDR Field Team Leader or designee
Horiba® U-22 or eq.	Calibrate with standard solutions	Check/replace batter, sensor modules.	Visual Inspection	Verify probe is clean and operational.	Prior to day's activities, end of day's activities, anytime and anomaly is suspected	pH ± 0.1 units DO ±3% Sp Cond ±1% Temp ±1˚C Turbidity ±2NTU	Clean probe, replace battery, replace membrane, replace probe	HDR Field Team Leader or designee

QAPP Worksheet #23 Analytical SOPs References Table

(UFP-QAPP Manual Section 3.2.1)
(EPA 2106-G-05 Section 2.3.6)

The following table summarizes EPA's DESA laboratory Reference Limits and Evaluations for *Tutu Wells Site*. It is not known at the time the QAPP is being prepared whether DESA or CLP will analyze the samples; therefore, CLP values are provided as an attachment.

This worksheet will be updated with waste characterization requirements when more information is obtained from a suitable waste disposal facility.

Reference Number[1]	Title, Revision Date, and/or Number	Definitive or Screening Data	Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work? (Y/N)
C-89	Analysis of Volatile Organic Compounds in Aqueous, Soil/Sediment and Waste Oil/Waste Organic Solvents Samples by Purge and Trap GC/MS, Rev 2.0, 3/07	Definite	TCL Volatiles (Aqueous)	GC-MS	DESA LAB	Y

[1]Subcontractor will provide a separate QAPP for the rock core analyses which will include TCL VOCs, Porosity, TOC, bulk density, percent moisture, and specific gravity.

QAPP Worksheet #24 Analytical Instrument Calibration Table

(UFP-QAPP Manual Section 3.2.2)
(EPA 2106-G-05 Section 2.3.6)

The following table summarizes EPA's DESA laboratory Reference Limits and Evaluations for *Tutu Wells Site*. It is not known at the time the QAPP is being prepared whether DESA or CLP will analyze the samples; therefore, CLP values are provided as an attachment.

This worksheet will be updated with waste characterization requirements when more information is obtained from a suitable waste disposal facility.

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference[1,2]
GC-MS	See SOP C- 90, C-89	See SOP C- 90, C-89	See SOP C- 90, C-89	See SOP C- 90, C-89	Assigned Lab personnel	SOP C- 90, C-89

[1]Specify the appropriate reference letter or number from the Analytical SOP References table (Worksheet #23).
[2]Subcontractor will provide a separate QAPP for the rock core analyses which will include TCL VOCs, Porosity, TOC, bulk density, percent moisture, and specific gravity.

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

(UFP-QAPP Manual Section 3.2.3)
(EPA 2106-G-05 Section 2.3.6)

The following table summarizes EPA's DESA laboratory Reference Limits and Evaluations for *Tutu Wells Site*. It is not known at the time the QAPP is being prepared whether DESA or CLP will analyze the samples; therefore, CLP values are provided as an attachment.

This worksheet will be updated with waste characterization requirements when more information is obtained from a suitable waste disposal facility.

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference[1]
See list of Instrument given in Worksheet #24	See LQMP, G-10, G-11, G-12, G-19	See LQMP, G-10, G-11, G-12, G-19	See LQMP, G-10, G-11, G-12, G-19	See LQMP, G-10, G-11, G-12, G-19	See LQMP, G-10, G-11, G-12, G-19	See LQMP, G-10, G-11, G-12, G-19	See LQMP, G-10, G-11, G-12, G-19	See LQMP, G-10, G-11, G-12, G-19

[1]Specify the appropriate reference letter or number from Analytical SOP References table (Worksheet #23).

QAPP Worksheet #26 & 27 Sample Handling, Custody, and Disposal

(UFP-QAPP Manual Appendix 3.3)
(EPA 2106-G-05 Section 2.3.3)

Immediately after collection, samples will be transferred to properly labeled sample containers, and properly preserved. Samples requiring refrigeration for preservation will be promptly transferred to coolers packed with wet ice and/or ice packs. Samples will be shipped on the day of sampling or within an appropriate timeframe as to not exceed the maximum allowable holding time before extraction or analysis. Proper chain-of-custody documentation will be maintained and samples will be analyzed within the specified holding times.

The following table summarizes EPA's DESA laboratory Reference Limits and Evaluations for *Tutu Wells Site*. It is not known at the time the QAPP is being prepared whether DESA or CLP will analyze the samples; therefore, CLP values are provided as an attachment.

Sample logging, labeling, naming, packing and chain-of-custody SOPs are provided in Appendix C.

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT	
Sample Collection (Labeling and COC) (Personnel/Organization):	Field Staff/HDR
Sample Packaging (Personnel/Organization):	Field Staff/HDR
Coordination of Shipment (Personnel/Organization):	Field Staff/HDR
Type of Shipment/Carrier:	UPS, Federal Express, or applicable
SAMPLE RECEIPT AND ANALYSIS (Details in SOP G-25)	
Sample Receipt (Personnel/Organization):	OSCAR/DESA
Sample Custody and Storage (Personnel/Organization):	OSCAR/DESA
Sample Preparation (Personnel/Organization):	Lab Personnel/DESA
Sample Determinative Analysis (Personnel/Organization):	Lab Personnel/DESA
SAMPLE ARCHIVING	
Field Sample Storage (No. of days from sample collection):	Samples to be shipped and arrive at laboratory within 48 hours (2 days) of sample shipment. (needs to be confirmed with the laboratory due to potential issues with shipments from the island to the mainland)
Sample Extract/Digestate Storage (No. of days from extraction/digestion):	up to 60 days

Biological Sample Storage (No. of days from sample collection):	NA N/A
SAMPLE DISPOSAL (Details in SOP G-6)	
Personnel/Organization:	DESA Lab
Number of Days from Analysis:	60 days

QAPP Worksheet #28 Analytical Quality Control and Corrective Action

(UFP-QAPP Manual Section 3.4 and Tables 4, 5, and 6)
(EPA 2106-G-05 Section 2.3.5)

The following table summarizes EPA's DESA laboratory Reference Limits and Evaluations for *Tutu Wells Site*. It is not known at the time the QAPP is being prepared whether DESA or CLP will analyze the samples; therefore, CLP values are provided as an attachment.

This worksheet will be updated with waste characterization requirements when more information is obtained from a suitable waste disposal facility.

QC Samples Table
(UFP-QAPP Manual Section 3.4 and Tables 4, 5, and 6)
(EPA 2106-G-05 Section 2.3.5)

Matrix	Aqueous
Analytical Group	VOC
Concentration Level	Trace
Sampling SOP	SOP #17, SOP #35
Analytical Method/ SOP Reference	DW-1 (Ref: EPA 524.2)
Sampler's Name	Christoph Stannik
Field Sampling Organization	HDR
Analytical Organization	EPA Region 2 Lab
No. of Sample Locations	29

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Tuning	12 hr period	Pass all PBFB tune criteria	Check Instrument Reanalyze, Retune	Lab personnel	Sensitivity	Pass all PBFB tune criteria
Initial Calibration	SOP DW-1, CLP-1	% RSD +/- 20% Not more than 10% of total analytes failure	Check Instrument, Reanalyze	Lab personnel	Accuracy/ Precision	% RSD +/- 20% Not more than 10% of total analytes failure

Continuing Calibration Check Standard (Alternate check standard)	1 per analytical batch	Max %D RRF +/- 30% Not more than 10% of total analytes failure	Reanalyze, Qualify data	Lab personnel	Accuracy	Max %D RRF +/- 30% Not more than 10% of total analytes failure
Method Blank	1 per extraction batch	< RL	Investigate source of contamination	Lab personnel	Sensitivity Contamination	< RL
Field Blank	1 per decontamination event	≤ CRQL	Verify results; reanalyze. Flag outliers. Check decontamination procedures	Lab personnel	Accuracy/Contamination	≤ CRQL
Trip Blank	1 per cooler containing VOC samples	< QL	Investigate source of contamination	Lab personnel	Accuracy/Bias	< QL
LCS/LFB	2 per extraction batch	Limits: Average Recovery 70-130% % RPD < 20	Qualify data unless high recovery and/or Not Detected)	Lab personnel	Accuracy/ Precision	Limits: Average Recovery 70-130% RPD 20%
Laboratory Matrix spikes	1 per extraction batch	Limits 70-130%	Qualify data unless high recovery and/or Not Detected)	Lab personnel	Accuracy	Limits 70-130%
Internal Standards	Each sample, standard, blank	+/- 40% from the initial/continuing calibration	Check Instrument Analyze / Qualify data	Lab personnel	Quantitation	+/- 40% from the initial/continuing calibration
Surrogates	Each sample, standard, blank	Limits 80%-120%	Reinject, Qualify data	Lab personnel	Extraction efficiency, Accuracy	Limits 80%-120%

QAPP Worksheet #29 Project Documents and Records Table

(UFP-QAPP Manual Section 3.5.1)
(EPA 2106-G-05 Section 2.2.8)

Sample Collection Documents and Records	On-site Analysis Documents and Records	Off-site Analysis Documents and Records	Data Assessment Documents and Records	Other
Field Chains-of-Custody	Field SOPs	Internal Chains-of-Custody	Sample acceptance checklist	Customer Service Survey Cards
Packing Slips and Sample Tags	Calibration Logs	Sample Preparation Log	PT Sample Results	Telephone Logs
Analytical Service Requests and Associated Correspondence	PID reading Logs	Standard Traceability Record Instrument Analysis Log	Training Records	Procurement Records
CLP Sample IDs	Depth-to-water measurement Logs	QC summary checklist with all relevant information	MDL Study Records	Equipment Maintenance Logs
DQCRs	Groundwater sampling Logs	Sample Analysis Data	Initial DOC / CDOC Records	Validated Computer Software Records
Field Logs and Notes	Downhole geophysical Logs	Instrument Calibration Data	Internal Audit Reports	
Photographs	Rock core Logs	Instrument/ Computer Printouts	Corrective Action Reports	
		Definition of Qualifiers	External Laboratory Assessment	
		Cover Letter	NELAC Accreditation	
		Approval Form		
		Case Narrative		
		Final Report		

QAPP Worksheet #31, 32 & 33 Assessments and Corrective Action

(UFP-QAPP Manual Section 4.1.1 and 4.1.2)
(EPA 2106-G-05 Section 2.4 and 2.5.5)

The QA team will conduct monthly audits of each work assignment to ensure that all plans and procedures outlined in the QMP have been and will be successfully implemented. HDR's QA/QC program requires QC reviews commensurate with the stage of the project beginning with proposal submittal, scope of work, schedule and budget development. At notice to proceed (NTP), a "zero percent" review will be conducted, proceeded by reviews staged at major project milestones/delivery points. Initial reviews will focus on business issues, client expectations, and resource related elements. Subsequent reviews escalate in detail, including design calculations and analysis (i.e., design checks), scope compliance, inter-disciplinary coordination, drawing projection standards (client and HDR standards), and subcontractor review and coordination. The HDR QA team will be selected by the QA/QC Manager. QA/QC reviewers will be "senior level" engineers, scientists, and/or specialists not involved with the specific project or work assignment. Reviews will be documented on the HDR Management Review Form (MRF) (see Attachment D).

Field activities performed by both HDR staff and subcontractors will be audited for each phase of work conducted in the field. The audit will be conducted by the Field Activities Manager and will consist of a comprehensive review of field work and health and safety practices to ensure that the procedures employed adhere to the QAPP and SSHP. In general, a field audit will be conducted once per week for each week field activities are occurring. Results of the audit will be summarized on the HDR Field Quality Control Audit (FQCA) form (see Attachment D) and forwarded to the EPA upon completion. In addition, a Daily Quality Control Report (DQCR) will be completed for each day in the field that will document all activities, visitors, conditions, corrective actions, etc. (see Attachment D).

EPA Region 2 will audit the CLP laboratories, as necessary, and will perform these audits on a program rather than project-specific basis. For analyses that are carried out by a subcontracted laboratory, onsite laboratory audits will be conducted on an as-needed basis and scheduled before laboratory work begins. Results of these audits will be summarized and forwarded to the EPA upon completion.

A member of the HDR IT team will be assigned to periodically conduct verification of computer models and software to verify correctness, reasonableness, and user competence. The audits will be conducted by entering known data sets or by double entry, cross checking, or range checking. Verification of the models and software performance will be included in the specific reports, as appropriate.

It will be the responsibility of the HDR Project Manager to develop and initiate corrective action as necessary if unacceptable conditions are discovered as a result of the QC audits. The EPA Contracting Officer will be notified if conditions are such that the overall program is affected and a Corrective Action Report will be issued (see Attachment E).

Assessments:

Assessment Type	Responsible Party & Organization	Number/Frequency	Estimated Dates	Assessment Deliverable	Deliverable Due Date
Field Quality Control Audit	Field Activites Manager, HDR	Once per Week	TBD	TBD	48 hours after audit
Internal Audit	Lab QA Officer	Monthly	TBD	TBD	30 days after the audit
PT	PT provider	Semiannually	TBD	TBD	30 days after the audit
NELAC	Florida DOH	Every two years	TBD	TBD	30 days after the audit

Assessment Response and Corrective Action:

Assessment Type	Person(s) Responsible for Responding to Assessment Findings (Title and Organizational Affiliation)	Assessment Response Documentation	Timeframe for Response	Person(s) Responsible for Responding to Assessment Findings (Title and Organizational Affiliation)	Person(s) Responsible for Identifying and Implementing Corrective Actions (CA) (Title and Organizational Affiliation)	Person(s) Responsible for Monitoring Effectiveness of CA (Title and Organizational Affiliation)
Field Quality Control Audit	Field Team Leader, HDR	Field Team Leader, HDR	TBD	Field Team Leader, HDR	Field Team Leader in consultation with the Project Manager, HDR	Project Manager in consultation with the QA Manager, HDR
Internal Audit	Lab Personnel	Lab Personnel	TBD	Lab Personnel	Lab Personnel	Lab QA Officer
PT	Lab Personnel	Lab Personnel	TBD	Lab Personnel	Lab Personnel	Lab QA Officer
NELAC	Lab QA Officer	Lab QA Officer	TBD	Lab QA Officer	Lab Personnel	Florida DOH

QAPP Worksheet #34 Data Verification and Validation Inputs

(UFP-QAPP Manual Section 5.2.1 and Table 9)
(EPA 2106-G-05 Section 2.5.1)

☐ Worksheet Not Applicable (State Reason)

Item	Description	Verification (Completeness)	Validation (conformance to specifications)
	Planning Documents/Records		
1	Approved QAPP	X	
2	Contract	X	
3	Field SOPs	X	
4	Laboratory SOPs	X	
	Field Records		
5	Field Logbooks	X	X
6	Equipment Calibration Records	X	X
7	Chain-of-Custody Forms	X	X
8	Sampling Diagrams	X	X
9	Drilling Logs	X	X
10	Geophysical Records	X	X
11	Relevant Correspondence	X	X
12	Change Orders/Deviations	X	X
13	Field Audit Reports	X	X
14	Field Corrective Action Reports	X	X
	Analytical Data Package		
15	Cover Sheet (Laboratory identifying information)	X	X
16	Case Narrative	X	X
17	Internal Laboratory Chain-of-Custody	X	X
18	Sample Receipt Records	X	X
19	Sample Chronology	X	X
20	Communication Records	X	X
21	Project-specific PT Sample Results	X	X
22	LOD/LOQ Establishment and Verification	X	X
23	Standards Traceability	X	X
24	Instrument Calibration Records	X	X

25	Definition of Laboratory Qualifiers	X	X
26	Results Reporting Forms	X	X
27	QC Sample Results	X	X
28	Corrective Action Reports	X	X
29	Raw Data	X	X
30	Electronic Data Deliverable	X	X

QAPP Worksheet #35 Data Verification Procedures

(UFP-QAPP Manual Section 5.2.2)
(EPA 2106-G-05 Section 2.5.1)

☐ Worksheet Not Applicable (State Reason)

Records Reviewed	Requirement Documents	Process Description	Responsible Person/Organization
Field logbook	QAPP, SOP-FS-01	Verify that records are present and complete for each day of field activities. Verify that all planned samples including QC samples were collected and that sample collection locations are documented. Verify that meteorological data were provided for each day of field activities. Verify that changes/exceptions are documented and were reported in accordance with requirements. Verify that any required field monitoring was performed and results are documented.	Daily – PM At conclusion of field activities – Project QA Manager
Chain-of-Custody Forms	QAPP, SOP-SM-04	Verify the completeness of the chain-of-custody records. Examine entries for consistency with the field logbook. Check that appropriate methods and sample preservation have been recorded. Verify that the required volume of sample has been collected and that sufficient sample volume is available for QC samples (e.g., MS/MSD). Verify that all required signatures and dates are present. Check for transcription errors.	Daily – Field Crew Chief At conclusion of field activities – Project Chemist
Laboratory Deliverable	QAPP, Validation SOPs	Verify that the laboratory deliverable contains all records specified in the QAPP. Check sample receipt records to ensure sample condition upon receipt was noted, and any missing/broken sample containers were noted and reported according to plan. Compare the data package with the Chain-of-custody to verify results were provided for all collected samples. Review the narrative to ensure all QC exceptions are described. Check for evidence that any required notifications were provided to project personnel as specified in the QAPP. Verify that necessary signatures and dates are present.	Before release – Laboratory QA Manager Upon receipt – Project Chemist
Audit Reports, Corrective Action Reports	QAPP, Attch D/E	Verify that all planned audits were conducted. Examine audit reports. For any deficiencies noted, verify that corrective action was implemented according to plan.	Project QA Manager

QAPP Worksheet #36 Data Validation Procedures

(UFP-QAPP Manual Section 5.2.2)
(EPA 2106-G-05 Section 2.5.1)

☐ Worksheet Not Applicable (State Reason)

Step IIa/IIb	Matrix	Analytical Group	Concentration Level	Validation Criteria	Data Validator (title and organizational affiliation)
IIa/IIb	Aqueous	VOCs	Trace	Data Validation SOP for Organic Trace Concentration VOCs under SOW SOM01.2	EPA Region 2, Data Validation Personnel

QAPP Worksheet #37 Usability Assessment

(UFP-QAPP Manual Section 5.2.3 including Table 12)
(EPA 2106-G-05 Section 2.5.2, 2.5.3, and 2.5.4)

A usability assessment considers whether data meet PQOs as they relate to the decision made and evaluates whether data are suitable for making that decision.

The PARCC (precision, accuracy, representativeness, comparability, and completeness) parameters are a method of assessing the validity and usability of environmental data. Following validation, the HDR project team will assess the data. Assessment will include incorporation of the data validation findings into a database by entering data qualifiers. Assessment will also include review of the quantitative DQOs and the preparation of a summary report. The final report will include an evaluation of the overall usability of the data. The quantitative DQOs are defined below.

Precision
If calculated from duplicate measurements:

$$RPD = \frac{(C_1 - C_2) \times 100\%}{(C_1 + C_2) / 2}$$

where,

RPD = relative percent difference
C_1 = larger of the two observed values
C_2 = smaller of the two observed values

Accuracy
For measurements where matrix spikes are used:

$$\%R = 100\% \times \left[\frac{S - U}{C_{sa}} \right]$$

where,

%R = percent recovery
S = measured concentration in spike aliquot
U = measured concentration in unspiked aliquot

C_{sa} = actual concentration of spike added

Completeness
Defined as follows for all measurements:

$$\%C = 100\% \times \left[\frac{V}{T} \right]$$

where,
%C = percent completeness
V = number of measurements judged valid
T = total number of measurements

Comparability is the degree of confidence with which results from two or more data sets, or two or more laboratories, may be compared. To achieve comparability, standard environmental methodologies will be employed in the field and in the laboratory, including:

- Using identified standard procedures/methods for both sampling and analysis phases of the project;
- Ensuring traceability of all analytical standards and/or source materials;
- Verifying all calibrations;
- Using standard reporting units and reporting formats, including the reporting of QA/QC data;
- Validating analytical results, including using data qualifiers in all cases where appropriate;
- Requiring that validation qualifiers be provided at all times (e.g., text, tables, figures, etc.) with the associated analytical result; and
- Requiring that any metadata on the data set (i.e., information for purposes of description, administration, technical functionality and requirements, use and usage, and/or preservation) be documented and provided with the data set at all times.

These steps will ensure all future users of either the data or the conclusions drawn from them will have a basis for establishing the acceptance criteria for its use and will be able to judge the comparability of these data and conclusions.

When a definitive off-site laboratory analysis is performed to verify field screening results (e.g., the soil gas survey samples), the comparability between the two sets of results must be established. This evaluation will determine the acceptability of the screening results for use in meeting PQOs and making project decisions. Acceptability will be based on a Percent Different (%D) criterion of 20 percent, calculated using the following equation:

$$\%D = \frac{Vd - Vs}{Vd} \times 100$$

where Vd is the definitive value and Vs is the screening method sample concentration value.

For the overall evaluation of comparability, at least 75 percent of the calculated %Ds must meet the 20 percent acceptance criteria.

Representativeness is the degree to which the results of the analyses accurately and precisely represent a characteristic of a population, a process condition, or an environmental condition. In this case, representativeness is the degree to which the data reflect the contaminants present and their concentration magnitudes in the sampled site areas. Sample homogeneity and sampling/subsampling variability must be considered during project planning to obtain a higher degree of representativeness. Representativeness of data will be obtained through the proper selection of sampling locations and implementation of approved sampling and analytical procedures. Results from environmental field duplicate sample analyses can be used to assess representativeness, in addition to precision.

The HDR Project Manager will be responsible for information in the usability assessment. The data usability assessment will be conducted on validated data; the results will be presented with each measurement report. After the data usability has been performed, data deemed appropriate for use will then be used with each measurement report.

The HDR chemist will determine if quality control data is within MPCs through the data assessment validation process IIb.

The usability report will include a discussion of the accuracy, precision, representativeness, completeness, and comparability of the data set and deviations from planned procedures and analysis and the impact on the project objectives. Tables will be prepared, including a summary of planned samples, collected samples and parameters analyzed, detection in field blanks and trip blanks, comparison of field duplicates, estimated and rejected data, and a comparison of planned and actual detection limits.

☐ Worksheet Not Applicable (State Reason)

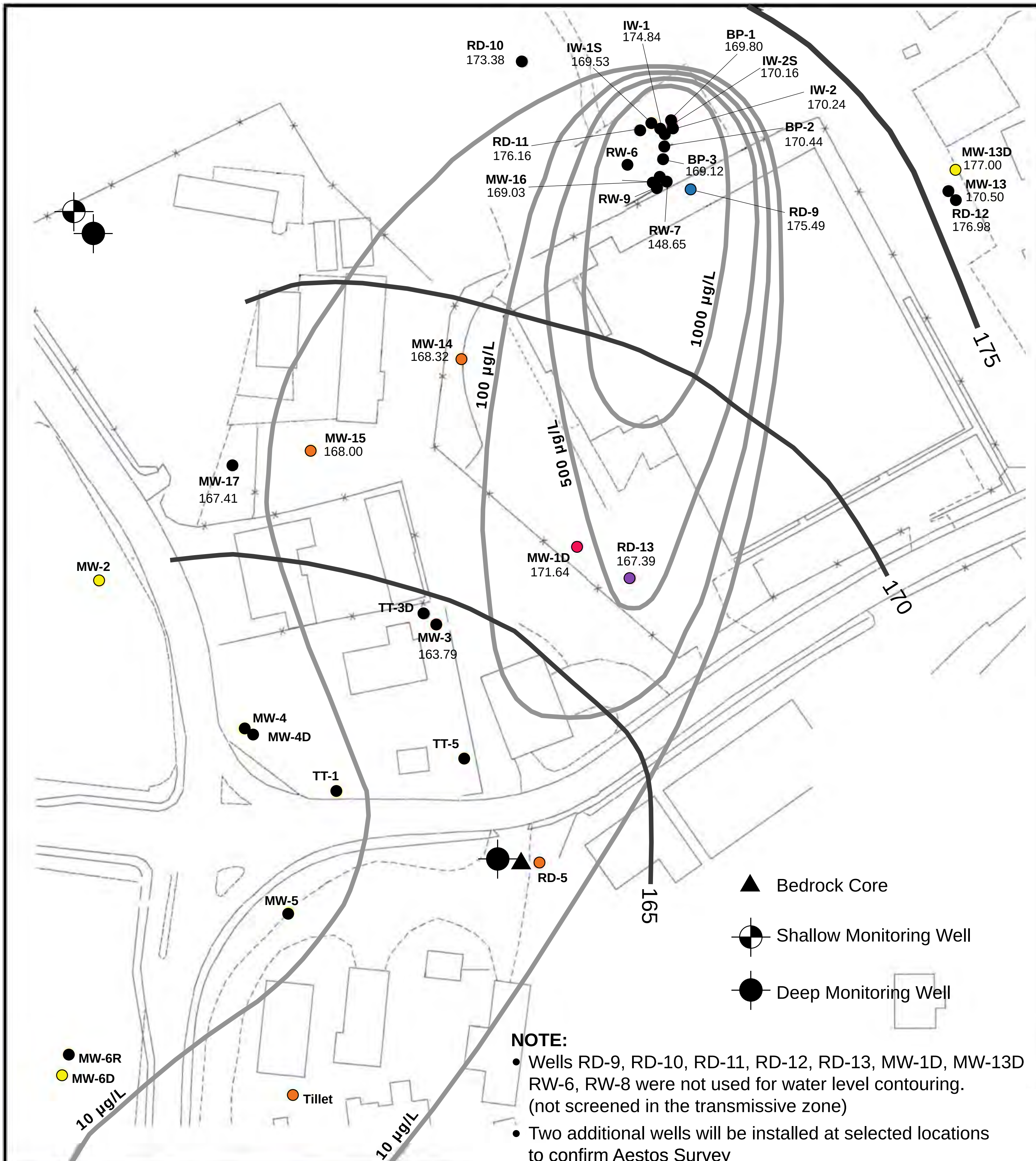
FIGURES

Figure 1
Site Location Map

Tutu Wellfield Site, St. Thomas, USVI

HDR

Aerial image source: © 2015 Google, CNES / Astrium (Licensed Google Earth Pro Image)



Groundwater Monitoring Wells
Total CVOC Concentrations (µg/L), May 2013

- 0 - 9.99
- 10 - 99.99
- 100 - 499.99
- 500 - 999.99
- 1,000 - 478,500
- Not Sampled

0 | 100 | 200 ft
APPROX. SCALE (ft)

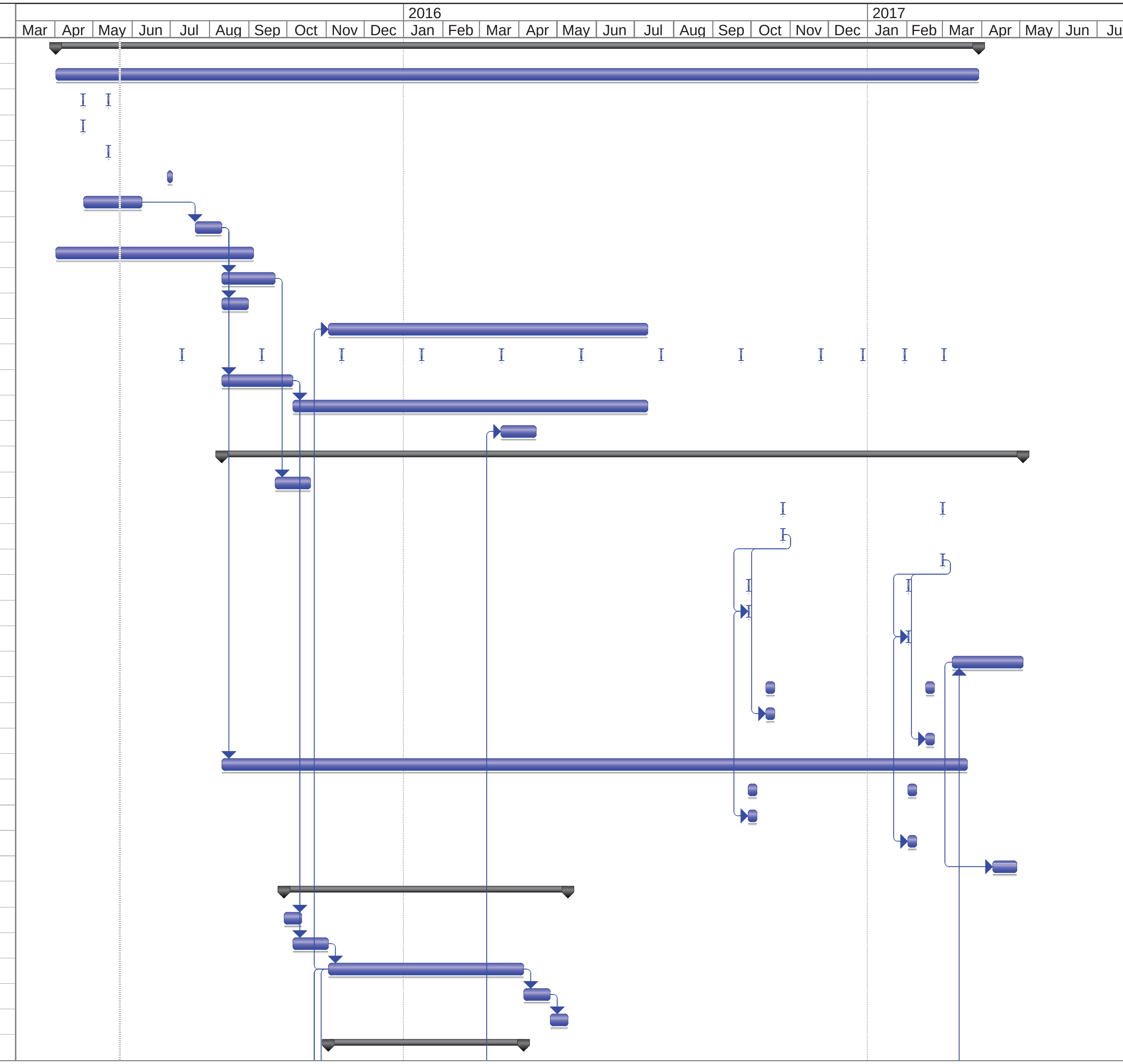
Total CVOC Iso-contours (µg/L), May 2013
Groundwater Elevation Iso-contours (Feet Above Mean Sea Level), April 20, 2013

Figure 2
Monitoring Well, Bedrock Coring, and Borehole Geophysics Locations
Curriculum Center Tutu Wellfield Site, St. Thomas, USVI

Source: CDM Smith

WA # 031-RICO-021D
Tutu Wells Site Focused RI/FS
St. Thomas, USVI
Project Schedule

ID	Indicators	Task Name	Duration	Start	Finish	Predecessors
1		**Task 1 Project Planning And Support**	**520 days**	**Thu 4/2/15**	**Wed 3/29/17**	
2		Project Administration	520 days	Thu 4/2/15	Wed 3/29/17	
3		**Scoping Meetings**	**51 days**	**Thu 4/23/15**	**Thu 7/2/15**	
4		Scoping Meetings 1	1 day	Thu 4/23/15	Thu 4/23/15	
5		Scoping Meetings 2	1 day	Wed 5/13/15	Wed 5/13/15	
6		Site Visit	4 days	Mon 6/29/15	Thu 7/2/15	
7		Draft Work Plan	32 days	Fri 4/24/15	Mon 6/8/15	
8		Final Work Plan	15 days	Tue 7/21/15	Mon 8/10/15	7FS+30 days
9		Evaluate Existing Data and Documents	112 days	Thu 4/2/15	Fri 9/4/15	
10		Quality Assurance Project Plan	30 days	Tue 8/11/15	Mon 9/21/15	8
11		Health and Safety Plan	15 days	Tue 8/11/15	Mon 8/31/15	8
12		Non-RAS Analysis	180 days	Tue 11/3/15	Mon 7/11/16	49SS
13		**Project Meetings**	**430 days**	**Fri 7/10/15**	**Thu 3/2/17**	
26		Subcontract Procurement	40 days	Tue 8/11/15	Mon 10/5/15	8
27		Perform Subcontract Management	200 days	Tue 10/6/15	Mon 7/11/16	26
28		Pathway Analysis Report (PAR)	20 days	Fri 3/18/16	Thu 4/14/16	63SS-30 days
29		**Task 2 - Community Relations**	**452 days**	**Tue 8/11/15**	**Wed 5/3/17**	
30		Community Relations Plan	20 days	Tue 9/22/15	Mon 10/19/15	10
31		**Public Meeting Support**	**91 days**	**Wed 10/26/16**	**Wed 3/1/17**	
32		RI Meeting	1 day	Wed 10/26/16	Wed 10/26/16	
33		Proposed Plan Support 2	1 day	Wed 3/1/17	Wed 3/1/17	
34		**Fact Sheet Preparation**	**91 days**	**Thu 9/29/16**	**Thu 2/2/17**	
35		Fact Sheet Preparation 1	1 day	Thu 9/29/16	Thu 9/29/16	32FS-20 days
36		Fact Sheet Preparation 2	1 day	Thu 2/2/17	Thu 2/2/17	33FS-20 days
37		Proposed Plan Support	40 days	Thu 3/9/17	Wed 5/3/17	75
38		**Public Notices**	**95 days**	**Thu 10/13/16**	**Wed 2/22/17**	
39		Public Notices 1	5 days	Thu 10/13/16	Wed 10/19/16	32FS-10 days
40		Public Notices 2	5 days	Thu 2/16/17	Wed 2/22/17	33FS-10 days
41		Information Repositories	420 days	Tue 8/11/15	Mon 3/20/17	8
42		**Site Mailing List**	**95 days**	**Thu 9/29/16**	**Wed 2/8/17**	
43		Site Mailing List 1	5 days	Thu 9/29/16	Wed 10/5/16	35SS
44		Site Mailing List 2	5 days	Thu 2/2/17	Wed 2/8/17	36SS
45		Responsiveness Summary Support	15 days	Mon 4/10/17	Fri 4/28/17	37SS+22 days
46		**Task 3 -Field Investigation**	**160 days**	**Tue 9/29/15**	**Mon 5/9/16**	
47		Site Reconnassance	10 days	Tue 9/29/15	Mon 10/12/15	26FS-5 days
48		Mobilization and Demobilization	20 days	Tue 10/6/15	Mon 11/2/15	26
49		Soil Boring, Drilling and Testing/Hydrogeological Assessment	110 days	Tue 11/3/15	Mon 4/4/16	48
50		Environmental Sampling	15 days	Tue 4/5/16	Mon 4/25/16	49
51		Investigation Derived Waste Characterization and Disposal	10 days	Tue 4/26/16	Mon 5/9/16	50
52		**Task 4 Sample Analysis**	**110 days**	**Tue 11/3/15**	**Mon 4/4/16**	

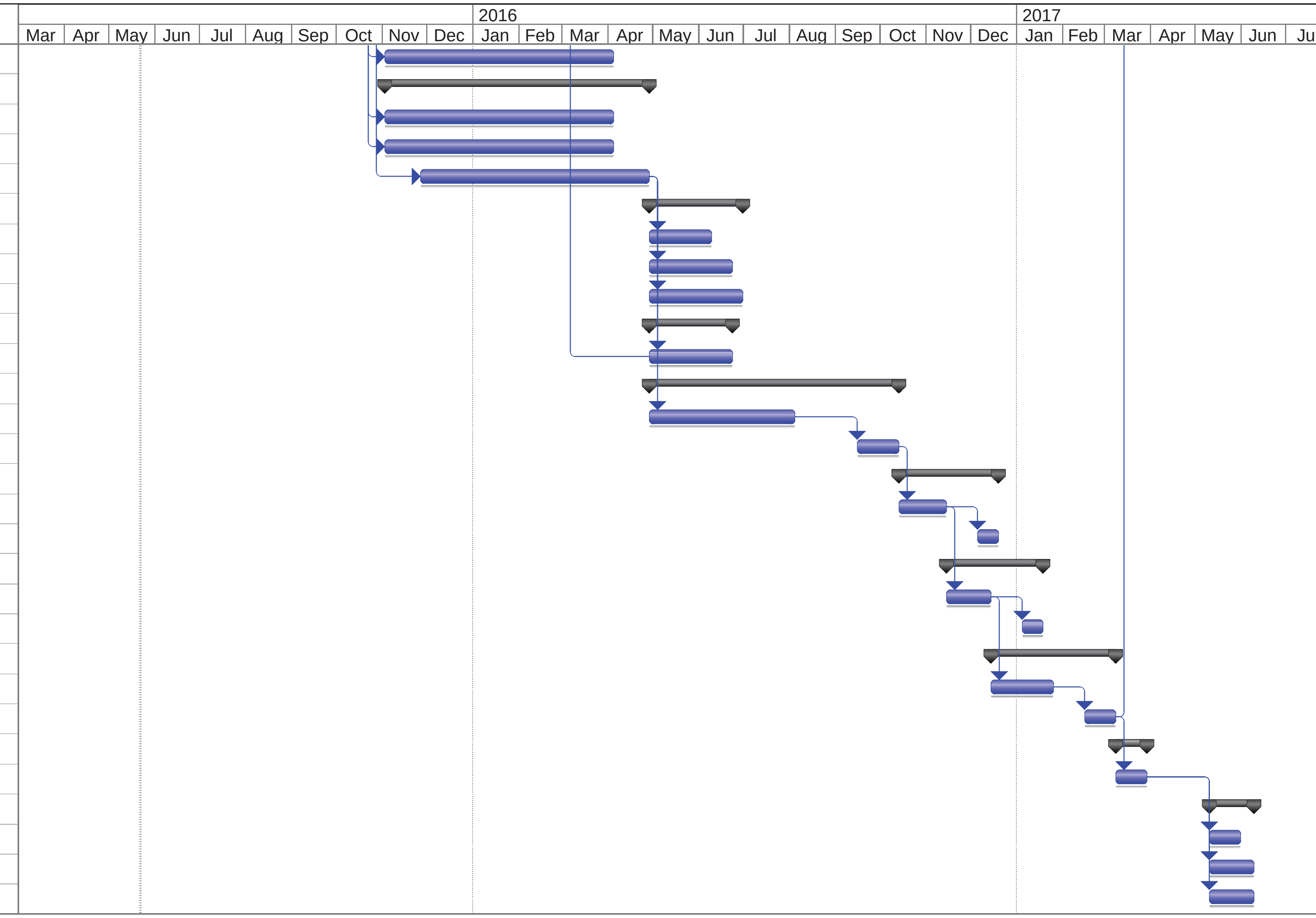


Tutu Initial Project Schedule.mpp Date: Fri 5/22/15	Task		Progress		Summary		External Tasks		Deadline
	Split		Milestone		Project Summary		External Milestone		

Figure 3

WA # 031-RICO-021D
Tutu Wells Site Focused RI/FS
St. Thomas, USVI
Project Schedule

ID		Task Name	Duration	Start	Finish	Predecessors
53		Field Screening and Sample Analysis	110 days	Tue 11/3/15	Mon 4/4/16	49SS
54		**Task 5 - Analytical Support and Data Validation**	**128 days**	**Tue 11/3/15**	**Thu 4/28/16**	
55		Collect, Prepare and Ship Samples	110 days	Tue 11/3/15	Mon 4/4/16	49SS
56		Sample Management	110 days	Tue 11/3/15	Mon 4/4/16	49SS
57		Data Validation	110 days	Fri 11/27/15	Thu 4/28/16	49SS+18 days
58		**Task 6 - Data Evaluation**	**45 days**	**Fri 4/29/16**	**Thu 6/30/16**	
59		Data Usability Evaluation	30 days	Fri 4/29/16	Thu 6/9/16	57
60		Data Reduction, Tabulation, and Evaluation	40 days	Fri 4/29/16	Thu 6/23/16	57
61		Data Evaluation Reports / SCSR	45 days	Fri 4/29/16	Thu 6/30/16	57
62		**Task 7 Assessment of Risk**	**40 days**	**Fri 4/29/16**	**Thu 6/23/16**	
63		Baseline Risk Assessment - Human Health	40 days	Fri 4/29/16	Thu 6/23/16	57
64		**Task 9 - Remedial Investigation Report**	**120 days**	**Fri 4/29/16**	**Thu 10/13/16**	
65		Draft RI Report	70 days	Fri 4/29/16	Thu 8/4/16	57
66		Final RI Report	20 days	Fri 9/16/16	Thu 10/13/16	65FS+30 days
67		**Task 10 - Remedial Alternatives Screening**	**47 days**	**Fri 10/14/16**	**Mon 12/19/16**	
68		Draft Technical Memorandum	22 days	Fri 10/14/16	Mon 11/14/16	66
69		Final Technical Memorandum	10 days	Tue 12/6/16	Mon 12/19/16	68FS+15 days
70		**Task 11 - Remedial Alternatives Evaluation**	**47 days**	**Tue 11/15/16**	**Wed 1/18/17**	
71		Draft Technical Memorandum	22 days	Tue 11/15/16	Wed 12/14/16	68
72		Final Technical Memorandum	10 days	Thu 1/5/17	Wed 1/18/17	71FS+15 days
73		**Task 12 - Feasibility Study Report**	**60 days**	**Thu 12/15/16**	**Wed 3/8/17**	
74		Draft FS Report	30 days	Thu 12/15/16	Wed 1/25/17	71
75		Final FS Report	15 days	Thu 2/16/17	Wed 3/8/17	74FS+15 days
76		**Task 13 - Post RI/FS Support**	**15 days**	**Thu 3/9/17**	**Wed 3/29/17**	
77		Draft and Final Addendum Report	15 days	Thu 3/9/17	Wed 3/29/17	75
78		**Task 16 - Work Assignment Closeout**	**22 days**	**Thu 5/11/17**	**Fri 6/9/17**	
79		Revised Work Plan Budget	15 days	Thu 5/11/17	Wed 5/31/17	77FS+30 days
80		Document Indexing	22 days	Thu 5/11/17	Fri 6/9/17	77FS+30 days
81		Document Retention/Conversion	22 days	Thu 5/11/17	Fri 6/9/17	77FS+30 days



Tutu Initial Project Schedule.mpp
Date: Fri 5/22/15

Task	Progress	Summary	External Tasks	Deadline
Split	Milestone	Project Summary	External Milestone	

Figure 3

ATTACHMENT A
QAPP WORKSHEETS

TABLE OF CONTENTS

CROSSWALK

The following table provides a "cross-walk" between the QAPP elements outlined in the Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP Manual), the necessary information, and the location of the information within the text document and corresponding QAPP Worksheet. Any QAPP elements and required information that are not applicable to the project are circled.

QAPP Element(s) and Corresponding Section(s) of UFP-QAPP Manual	Required Information	Crosswalk to QAPP Section	Crosswalk to QAPP Worksheet No.
Project Management and Objectives			
2.1 Title and Approval Page	- Title and Approval Page	Approval Page	1
2.2 Document Format and Table of Contents 2.2.1 Document Control Format 2.2.2 Document Control Numbering System 2.2.3 Table of Contents 2.2.4 QAPP Identifying Information	- Table of Contents - QAPP Identifying Information	TOC Approval Page	 2
2.3 Distribution List and Project Personnel Sign-Off Sheet 2.3.1 Distribution List 2.3.2 Project Personnel Sign-Off Sheet	- Distribution List - Project Personnel Sign-Off Sheet	Approval Page	3 4
2.4 Project Organization 2.4.1 Project Organizational Chart 2.4.2 Communication Pathways 2.4.3 Personnel Responsibilities and Qualifications 2.4.4 Special Training Requirements and Certification	- Project Organizational Chart - Communication Pathways - Personnel Responsibilities and Qualifications - Special Personnel Training Requirements	2	5 6 7 8
2.5 Project Planning/Problem Definition 2.5.1 Project Planning (Scoping) 2.5.2 Problem Definition, Site History, and Background	- Project Planning Session Documentation (including Data Needs tables) - Project Scoping Session Participants Sheet - Problem Definition, Site History, and Background - Site Maps (historical and present)	1	 9 10
2.6 Project Quality Objectives and Measurement Performance Criteria 2.6.1 Development of Project Quality Objectives Using the Systematic Planning Process 2.6.2 Measurement Performance Criteria	- Site-Specific PQOs - Measurement Performance Criteria	3	11 12

QAPP Element(s) and Corresponding Section(s) of UFP-QAPP Manual	Required Information	Crosswalk to QAPP Section	Crosswalk to QAPP Worksheet No.
2.7 Secondary Data Evaluation	- Sources of Secondary Data and Information - Secondary Data Criteria and Limitations	1 2	13
2.8 Project Overview and Schedule 2.8.1 Project Overview 2.8.2 Project Schedule	- Summary of Project Tasks - Reference Limits and Evaluation - Project Schedule/Timeline	4	14 15 16
Measurement/Data Acquisition			
3.1 Sampling Tasks 3.1.1 Sampling Process Design and Rationale 3.1.2 Sampling Procedures and Requirements 3.1.2.1 Sampling Collection Procedures 3.1.2.2 Sample Containers, Volume, and Preservation 3.1.2.3 Equipment/Sample Containers Cleaning and Decontamination Procedures 3.1.2.4 Field Equipment Calibration, Maintenance, Testing, and Inspection Procedures 3.1.2.5 Supply Inspection and Acceptance Procedures 3.1.2.6 Field Documentation Procedures	- Sampling Design and Rationale - Sample Location Map - Sampling Locations and Methods/SOP Requirements - Analytical Methods/SOP Requirements - Field Quality Control Sample Summary - Sampling SOPs - Project Sampling SOP References - Field Equipment Calibration, Maintenance, Testing, and Inspection	5	17 18 19 20 21 22
3.2 Analytical Tasks 3.2.1 Analytical SOPs 3.2.2 Analytical Instrument Calibration Procedures 3.2.3 Analytical Instrument and Equipment Maintenance, Testing, and Inspection Procedures 3.2.4 Analytical Supply Inspection and Acceptance Procedures	- Analytical SOPs - Analytical SOP References - Analytical Instrument Calibration - Analytical Instrument and Equipment Maintenance, Testing, and Inspection	6	23 24 25

QAPP Element(s) and Corresponding Section(s) of UFP-QAPP Manual	Required Information	Crosswalk to QAPP Section	Crosswalk to QAPP Worksheet No.
3.3 Sample Collection Documentation, Handling, Tracking, and Custody Procedures 3.3.1 Sample Collection Documentation 3.3.2 Sample Handling and Tracking System 3.3.3 Sample Custody	- Sample Collection Documentation Handling, Tracking, and Custody SOPs - Sample Container Identification - Sample Handling Flow Diagram - Example Chain-of-Custody Form and Seal	7	27 26
3.4 Quality Control Samples 3.4.1 Sampling Quality Control Samples 3.4.2 Analytical Quality Control Samples	- QC Samples - Screening/Confirmatory Analysis Decision Tree	5	28
3.5 Data Management Tasks 3.5.1 Project Documentation and Records 3.5.2 Data Package Deliverables 3.5.3 Data Reporting Formats 3.5.4 Data Handling and Management 3.5.5 Data Tracking and Control	- Project Documents and Records - Analytical Services - Data Management SOPs	6	29 30
Assessment/Oversight			
4.1 Assessments and Response Actions 4.1.1 Planned Assessments 4.1.2 Assessment Findings and Corrective Action Responses	- Assessments and Response Actions - Planned Project Assessments - Audit Checklists - Assessment Findings and Corrective - Action Responses	8	31 32
4.2 QA Management Reports	- QA Management Reports		33
4.3 Final Project Report	- Final Report(s)		33
Data Review			
5.1 Overview		9	NA
5.2 Data Review Steps 5.2.1 Step I: Verification 5.2.2 Step II: Validation 5.2.2.1 Step IIa Validation Activities 5.2.2.2 Step IIb Validation Activities 5.2.3 Step III: Usability Assessment 5.2.3.1 Data Limitations and Actions from Usability Assessment 5.2.3.2 Activities	- Verification (Step I) Process - Validation (Steps IIa and IIb) Process - Validation (Steps IIa and IIb) Summary - Usability Assessment	9	34 35 36 37

QAPP Worksheet #12
Measurement Performance Criteria Table

(UFP-QAPP Manual Section 2.6.2)

Complete this worksheet for each matrix, analytical group, and concentration level. Identify the data quality indicators (DQI), measurement performance criteria (MPC) and QC sample and/or activity used to assess the measurement performance for both the sampling and analytical measurement systems. Use additional worksheets if necessary. If MPC for specific DQI vary within an analytical parameter, i.e., MPC are analyte-specific, then provide analyte-specific MPC on an additional worksheet.

Matrix	Aqueous
Analytical Group	TCL Volatile Organics
Concentration Level	Trace (ug/L)

Sampling Procedure[1]	Analytical Method/SOP[2]	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
	SOM01.2	Precision (field)	Project-Specific %RPD	Field Duplicate	S & A
		Accuracy (field)	No analyte > CRQL*	Field Blank	S & A
		Precision (laboratory)	Project-Specific %RPD; List compound specific RPD	Field Duplcate; MS/MSD**	S & A; A
		Accuracy (laboratory)	List compound specific %R	***DMCs; MS/MSD**	A

[1]Reference number from QAPP Worksheet #21.
[2]Reference number from QAPP Worksheet #23.
*Reference USEPA Region 2 Trace Volatile Data Validation SOP most recent revision http://www.epa.gov/region2/qa/documents.htm
****Optional** MS/MSD – Reference CLP SOM01.2, Exhibit D, Table 6 for Criteria
***Deuterated Monitoring Compounds (DMCs) – Reference CLP SOM01.2, Exhibit D, Table 5 for Criteria

QAPP Worksheet #15
Reference Limits and Evaluation Table

Matrix: Groundwater
Analytical Group: Target Compound List Volatile Organic Compounds
Concentration Level: Trace

Analyte	CAS Number	Project Action Limits*	Project Quantitation Limit (ug/L)	Analytical Method – SOM01.2 Trace Quantitation Limits (ug/L)	Analytical Method – SOM01.2 Low Quantitation Limits (ug/L)
Vinyl Chloride	75-01-4			0.5	5
trans-1,2-Dichloroethene	156-60-5			0.5	5
cis-1,2-Dichloroethene	156-59-2			0.5	5
Trichloroethene	79-01-6			0.5	5
Tetrachloroethene	127-18-4			0.5	5

**Reference Source*

QAPP Worksheet #19
Analytical SOP Requirements Table

Matrix	No. of Samples	Analytical Group [Lab Assignment]	Concentration Level	Analytical and Preparation Method/SOP Reference	Total Sample Volume	Containers (number, size, and type)	Preservation Requirements	Maximum Holding Time (preparation/ analysis)
Aqueous		Low Concentration Volatile Organics [CLP]	Trace	SOM01.2, CLP Sampler's Guide	120 ml	(3) 40 ml amber glass vials w/Teflon lined septum	1:1 HCl to pH<2; cool to 4°C	14 days extract; 40 days analyze
Equipment Blanks		Trace Concentration Volatile Organics [CLP]	Low	SOM01.2, CLP Sampler's Guide	120 ml	(3) 40 ml VOA vials w/Teflon lined septum	1:1 HCl to pH<2; cool to 4°C	14 days extract; 40 days analyze
Trip Blanks		Trace Concentration Volatile Organics [CLP / DESA]	Low	SOM01.2, CLP Sampler's Guide	120 ml	(3) 40 ml VOA vials w/Teflon lined septum	1:1 HCl to pH<2; cool to 4°C	14 days extract; 40 days analyze

QAPP Worksheet #23
Analytical SOP References Table

Reference Number	Title, Revision Date, and/or Number	Definitive or Screening Data	Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work? (Y/N)*
SOM01.2	USEPA Contract Laboratory Program Statement of Work for Multi-Media, Multi-Concentration Organic Analysis,; October 2006	Definitive	Target Compound List Volatile Organics	GC/MS	CLP RAS Laboratory	N

* If yes, explain the modification

QAPP Worksheet #24
Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
GC/MS	See SOM01.2	Initial calibration: upon award of the contract, whenever the laboratory takes corrective action which may change or affect the initial calibration criteria (e.g., ion source cleaning or repair, column replacement, etc.), or if the continuing calibration acceptance criteria have not been met. Continuing calibration: Once every 12 hours	Initial calibration/ Continuing calibration: relative response factor (RRF) greater than or equal to minimum acceptable response factor listed in Table 5 of procedure; %RSD must be less than or equal to value listed in Table 5 of procedure.	Initial calibration: inspect system for problems (e.g., clean ion source, change the column, service the purge and trap device), correct problem, re-calibrate. Continuing calibration: inspect system, recalibrate the instrument, reanalyze samples.	EPA CLP RAS Laboratory GC/MS Technician	SOM01.2
GC/ECD	See SOM01.2	Initial calibration: upon award of the contract, whenever major instrument maintenance or modification is performed or if the calibration verification technical acceptance criteria have not been met. Calibration verification: Once every 12 hours	Initial calibration/ Calibration verification: resolution between two adjacent peaks must be greater than or equal to 60.0 percent, single components must be greater than or equal to 90.0 percent resolved, RTs within the RT window, %D must be greater than or equal to -25 percent and less than or equal to 25 percent, %RSD must be less than or equal to 20.0 percent.	Initial calibration: inspect the system (e.g., change the column, bake out the detector, clean the injection port), correct problem, re-calibrate. Calibration verification: inspect system, recalibrate the instrument, reanalyze samples.	EPA CLP RAS Laboratory GC/ECD Technician	SOM01.2

QAPP Worksheet #24
Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
YSI	Calibrate with standard solutions; as per instrument manufacturer's recommended procedures	Prior to day's activities; end of day's activities; anytime anomaly suspected	+/- 0.1 units	Clean probe, replace battery, replace membrane, replace probe	EPA SST	Manufacturer's Instructions
La Motte Turbidity Meter	Calibrate with standard solutions; as per instrument manufacturer's recommended procedures	Prior to day's activities; end of day's activities; anytime anomaly suspected		Replace battery, replace standards, replace bottle, replace lightbulb	EPA SST	Manufacturer's Instructions

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

Instrument/ Equipment	Maintenance Activity	Testing/Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference[1]
GC/MS	See SOM01.2; as per instrument manufacturer's recommendations	See SOM01.2; as per instrument manufacturer's recommendations	See SOM01.2; as per instrument manufacturer's recommendations	Acceptable re-calibration; see SOM01.2	Inspect the system, correct problem, re-calibrate and/or reanalyze samples.	EPA CLP RAS Laboratory GC/MS Technician	SOM01.2
GC/ECD	See SOM01.2; as per instrument manufacturer's recommendations	See SOM01.2; as per instrument manufacturer's recommendations	See SOM01.2; as per instrument manufacturer's recommendations	Acceptable re-calibration; see SOM01.2	Inspect the system, correct problem, re-calibrate and/or reanalyze samples.	EPA CLP RAS Laboratory GC/ECD Technician	SOM01.2
YSI Multi-parameter meter	Check/replace battery	Visual inspection	Prior to day's activities; anytime anomaly suspected	No visual defects; +/- 0.1 units	Replace battery; replace probe	EPA SST	Manufacturer's Instructions
LaMotte Turbidity Meter	Check/replace battery	Visual inspection	Prior to day's activities; anytime anomaly suspected		Replace battery; replace light bulb	EPA SST	Manufacturer's Instructions

QAPP Worksheet #26
Sample Handling System

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT
Sample Collection (Personnel/Organization): [ ] Contractor Project Manager or EPA Region 2 DESA
Sample Packaging (Personnel/Organization): [ ] Contractor Project Manager or EPA Region 2 DESA
Coordination of Shipment (Personnel/Organization): [ ] Contractor Project Manager or EPA Region 2 DESA
Type of Shipment/Carrier: Federal Express; or applicable
SAMPLE RECEIPT AND ANALYSIS
Sample Receipt (Personnel/Organization): Sample Custodian, EPA CLP RAS Laboratory//National Non-RAS Laboratory
Sample Custody and Storage (Personnel/Organization): Sample Custodian, EPA CLP RAS Laboratory//National Non-RAS Laboratory
Sample Preparation (Personnel/Organization): Sample Technicians, EPA CLP RAS Laboratory//National Non-RAS Laboratory
Sample Determinative Analysis (Personnel/Organization): Sample Technicians, EPA CLP RAS Laboratory//National Non-RAS Laboratory
SAMPLE ARCHIVING
Field Sample Storage (No. of days from sample collection): Samples to be shipped within [ ], and arrive at laboratory within 24 hours (1 day) of sample shipment
Sample Extract/Digestate Storage (No. of days from extraction/digestion): As per analytical methodology; see Worksheet #19
SAMPLE DISPOSAL
Personnel/Organization: Sample Technicians, EPA CLP RAS Laboratory/ National Non-RAS Laboratory
Number of Days from Analysis: Until analysis and QA/QC checks are completed; as per analytical methodology; see Worksheet #19.

QAPP Worksheet #27
Sample Custody Requirements

Sample Identification Procedures: Each sample will be labeled with the site identification code [ ] and a sample type letter code and number that depicts a specific location. Each sample will also be labeled with a CLP or Non-CLP assigned number. Depending on the type of sample, additional information such as depth, sampling round, date, etc. will be added. Examples are provided in the QAPP.
Field Sample Custody Procedures (sample collection, packaging, shipment, and delivery to laboratory): Each sample will be individually identified and labeled after collection, then sealed with custody seals and enclosed in a plastic cooler. The sample information will be recorded on chain-of-custody (COC) forms, and the samples shipped to the appropriate laboratory via overnight delivery service or courier. EPA SCRIBE program will be used for field documentation. Refer to the U.S. EPA OSWER 9240.0-44, EPA 540-R-07-06 *Contract Laboratory Program Guidance for Field Samplers*, dated July 2007
Laboratory Sample Custody Procedures (receipt of samples, archiving, disposal): A sample custodian at the laboratory will accept custody of the shipped samples, and check them for discrepancies, proper preservation, integrity, etc. If noted, issues will be forwarded to the laboratory manager for corrective action. The sample custodian will relinquish custody to the appropriate department for analysis. At this time, no samples will be archived at the laboratory. Disposal of the samples will occur only after analyses and QA/QC checks are completed.

QAPP Worksheet #28
QC Samples Table

(UFP-QAPP Manual Section 3.4)

Complete a separate worksheet for each sampling technique, analytical method/SOP, matrix, analytical group, and concentration level. If method/SOP QC acceptance limit exceed the measurement performance criteria, the data obtained may be unusable for making project decisions.

Matrix	Aqueous
Analytical Group	Target Compound List Trace Concentration Volatile Organics
Concentration Level	Trace (ug/L)
Sampling SOP(s)	
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	
Field Sampling Organization	
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Method Blank	1 every 12 hours	No analyte > CRQL		Suspend analysis; reanalyze blank and affected samples	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	No analyte > CRQL	
Matrix Spike (Not Required)	1 per ≤ 20 samples; if requested	Trichloroethene	71-120 %R	Flag outliers	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	Trichloroethene	71-120 %R
Matrix Spike Duplicate (Not Required)	1 per ≤ 20 samples; if requested	Trichloroethene	0-14 %RPD	Flag outliers	EPA CLP RAS Laboratory GC/MS Technician	Precision	Trichloroethene	0-14 %RPD
Deuterated Monitoring Compounds	all samples	Vinyl chloride-d_3	65-131 %R	Check calculations and instruments, reanalyze affected samples	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	Vinyl chloride-d3	65-131 %R

QAPP Worksheet #28
QC Samples Table

(UFP-QAPP Manual Section 3.4)
Complete a separate worksheet for each sampling technique, analytical method/SOP, matrix, analytical group, and concentration level. If method/SOP QC acceptance limit exceed the measurement performance criteria, the data obtained may be unusable for making project decisions.

Matrix	Aqueous
Analytical Group	Target Compound List Trace Concentration Volatile Organics [cont'd]
Concentration Level	Trace (ug/L)
Sampling SOP(s)	
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	
Field Sampling Organization	
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Internal Standards	all samples	60-140%	Check calculations and instruments, reanalyze affected samples	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	± 40 % of response area, ± 20 sec retention time shift

QAPP Worksheet #30
Analytical Services Table

Matrix	Analytical Group	Concentration Level	Analytical SOP	Data Package Turnaround Time	Laboratory/Organization (Name and Address, Contact Person and Telephone Number)	Backup Laboratory/Organization (Name and Address, Contact Person and Telephone Number)
Aqueous	Trace Concentration VOCs	Low				NA

QAPP Worksheet #31
Planned Project Assessments Table

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment (Title and Organizational Affiliation)	Person(s) Responsible for Responding to Assessment Findings (Title and Organizational Affiliation)	Person(s) Responsible for Identifying and Implementing Corrective Actions (Title and Organizational Affiliation)	Person(s) Responsible for Monitoring Effectiveness of Corrective Actions (Title and Organizational Affiliation)
Laboratory Technical Systems/ Performance Audits	[ ]	External	Regulatory Agency	Regulatory Agency	EPA CLP RAS Laboratory	EPA CLP RAS Laboratory	EPA or other Regulatory Agency
Performance Evaluation Samples	[ ]	External	Regulatory Agency	Regulatory Agency	EPA CLP RAS Laboratory	EPA CLP RAS Laboratory	EPA or other Regulatory Agency
On-Site Field Inspection	[ ]	Internal	EPA	[ ]	[ ]	[ ]	[ ]

QAPP Worksheet #32
Assessment Findings and Corrective Action Responses

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (Name, Title, Organization)	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (Name, Title, Org.)	Timeframe for Response
Project Readiness Review	Checklist or logbook entry	Contractor Project Leader, [ ]	Immediately to within 24 hours of review	Checklist or logbook entry	Contractor Project Leader [ ]	Immediately to within 24 hours of review
Field Observations/ Deviations from Work Plan	Logbook	Project Leader [ ] and EPA RPM	Immediately to within 24 hours of deviation	Logbook	Contractor Project Leader [ ] and EPA RPM	Immediately to within 24 hours of deviation
Laboratory Technical Systems/ Performance Audits	Written Report	EPA CLP Laboratory	30 days	Letter	EPA CLP Laboratory	14 days
On-Site Field Inspection	Written Report	Contractor Project Leader [ ]	7 calendar days after completion of the audit	Letter/Internal Memorandum	Contractor Project Leader and/or EPA RPM	To be identified in the cover letter of the report
Performance Evaluation Samples	Electronic Report	EPA CLP Laboratory	30 days	Letter or Written Report	EPA CLP Laboratory	14 days

QAPP Worksheet #33
QA Management Reports Table

Type of Report	**Frequency (daily, weekly, monthly, quarterly, annually, etc.)**	**Projected Delivery Date(s)**	**Person(s) Responsible for Report Preparation (Title and Organizational Affiliation)**	**Report Recipient(s) (Title and Organizational Affiliation)**
EPA CLP RAS Laboratory Data (unvalidated)	As performed	[ ]	EPA CLP RAS Laboratory	Adly Michael, RSCC, EPA Region 2 and Contractor Project Leader [ ]
EPA CLP RAS Laboratory Data (validated)	As performed	Up to 60 days after receipt of unvalidated data	EPA Region 2	Contractor Project Leader [ ]
Laboratory Technical Systems/ Performance Audits	[ ]	Unknown	EPA or other Regulatory Agency	EPA CLP RAS Laboratory
Performance Evaluation Samples	[ ]	Unknown	EPA or other Regulatory Agency	EPA CLP RAS Laboratory
On-Site Field Inspection	[ ]	7 calendar days after completion of the inspection	Contractor Project Leader [ ]	Contractor Project Leader [ ]
Field Change Request	As required per field change	Three days after identification of need for field change	Contractor Project Leader [ ]	EPA RPM
Final Report	[ ]	2 weeks after receipt of EPA approval of data package	Contractor Project Leader [ ]	EPA RPM

QAPP Worksheet #34
Verification (Step I) Process Table

Verification Input	Description	Internal/ External	Responsible for Verification (Name, Organization)
Site/field logbooks	Field notes will be prepared daily by the EPA Sample Leader and will be complete, appropriate, legible and pertinent. Upon completion of field work, logbooks will be placed in the project files.	I	Contractor Project Leader [ ]
Chains of custody	COC forms will be reviewed against the samples packed in the specific cooler prior to shipment. The reviewer will initial the form. An original COC will be sent with the samples to the laboratory, while copies are retained for (1) the Sampling Trip Report and (2) the project files.	I	Contractor Project Leader [ ]
Sampling Trip Reports	STRs will be prepared for each week of field sampling [for which samples are sent to an EPA CLP RAS laboratory.] Information in the STR will be reviewed against the COC forms, and potential discrepancies will be discussed with field personnel to verify locations, dates, etc.	I	Contractor Project Leader [ ]
Laboratory analytical data package	Data packages will be reviewed/verified internally by the laboratory performing the work for completeness and technical accuracy prior to submittal.	I	EPA CLP RAS Laboratory
Laboratory analytical data package	Data packages will be reviewed as to content and sample information upon receipt by EPA.	I	Contractor Project Leader [ ]
Final Sample Report	The project data results will be compiled in a sample report for the project. Entries will be reviewed/verified against hardcopy information.	I	Contractor Project Leader [ ]

QAPP Worksheet #35
Validation (Steps IIa and IIb) Process Table

Step IIa/IIb	Validation Input	Description	Responsible for Validation (Name, Organization)
IIa	SOPs	Ensure that the sampling methods/procedures outlined in QAPP were followed, and that any deviations were noted/approved.	Contractor Project Leader [ ]
IIb	SOPs	Determine potential impacts from noted/approved deviations, in regard to PQOs.	Contractor Project Leader [ ]
IIa	Chains of custody	Examine COC forms against QAPP and laboratory contract requirements (e.g., analytical methods, sample identification, etc.).	EPA Region 2 Data Validation Personnel with contractor support
IIa	Laboratory data package	Examine packages against QAPP and laboratory contract requirements, and against COC forms (e.g., holding times, sample handling, analytical methods, sample identification, data qualifiers, QC samples, etc.).	EPA Region 2 Data Validation Personnel with contractor support
IIb	Laboratory data package	Determine potential impacts from noted/approved deviations, in regard to PQOs. Examples include PQLs and QC sample limits (precision/accuracy).	EPA Region 2 Data Validation Personnel with contractor support, Contractor Project Leader [ ]
IIb	Field duplicates	Compare results of field duplicate (or replicate) analyses with RPD criteria	Contractor Project Leader [ ]

QAPP Worksheet #36
Validation (Steps IIa and IIb) Summary Table

Step IIa/IIb	Matrix	Analytical Group	Concentration Level	Validation Criteria	Data Validator (title and organizational affiliation)
IIa / IIb	Aqueous	VOCs	Trace	Data Validation SOP for Organic Analysis of Trace Concentration VOCs under SOW SOM01.2	EPA Region 2 Data Validation Personnel with contractor support

(UFP-QAPP Manual Section 5.2.3)
Describe the procedures/methods/activities that will be used to determine whether data are of the right type, quality, and quantity to support environmental decision-making for the project. Describe how data quality issues will be addressed and how limitations on the use of the data will be handled.

QAPP Worksheet #37
Usability Assessment

Summarize the usability assessment process and all procedures, including interim steps and any statistics, equations, and computer algorithms that will be used:
Describe the evaluative procedures used to assess overall measurement error associated with the project:
Identify the personnel responsible for performing the usability assessment:
Describe the documentation that will be generated during usability assessment and how usability assessment results will be presented so that they identify trends, relationships (correlations), and anomalies:
Discuss the impacts of any qualified data, any deviations from original plan or sampling procedures, whether the project objectives were met, etc.

ATTACHMENT B

Standard Operating Procedures

SOP #	**Title**
Field Sampling (FS) SOPs	
SOP-FS-01	Field Logbook
SOP-FS-02	Mobilization and Demobilization
SOP-FS-03	Site Location and Elevation Survey
SOP-FS-04	Air Monitoring
SOP-FS-05	Decontamination
~~**SOP-FS-06**~~	~~EnCore Sampling Procedure for VOCs~~
~~**SOP-FS-07**~~	~~Direct Push Technology Borings~~
SOP-FS-08	Hollow Stem Auger Borings
SOP-FS-09	Rock Coring
~~**SOP-FS-10**~~	~~Sediment Sampling~~
~~**SOP-FS-11**~~	~~Shallow Soil Sampling (Hand)~~
~~**SOP-FS-12**~~	~~Test Pits~~
~~**SOP-FS-13**~~	~~Monitoring Well Condition Survey~~
SOP-FS-14	Groundwater Level Measurements
SOP-FS-15	Low-flow Groundwater Sampling
SOP-FS-16	Monitoring Well Installation, Completion and Development
~~**SOP-FS-17**~~	~~Color-Tec Sampling*~~
~~**SOP-FS-18**~~	~~CSIA*~~
~~**SOP-FS-19**~~	~~Aquifer Testing~~
SOP-FS-20	Downhole Geophysics
~~**SOP-FS-21**~~	~~Biota Sampling~~
~~**SOP-FS-22**~~	~~Soil Gas/Indoor Air Sampling~~
~~**SOP-FS-23**~~	~~Surface Water Sampling~~
SOP-FS-24	Packer Sampling
SOP-FS-25	Investigation Derived Waste
~~**SOP-FS-25**~~	~~Soil Classification~~
Sample Management (SM) SOPs	
SOP-SM-01	Project Set-up-Scribe
SOP-SM-02	Sample Logging & Labeling-Scribe
SOP-SM-03	Sample Naming
SOP-SM-04	Chain of Custody-Scribe
SOP-SM-05	Sample Packing & Shipping
SOP-SM-06	FASTAC Process & Reporting

SOPs for Aestus and Willowstick surveys have not been provided since these are proprietary products. Work plans/specifications will be provided by the vendor(s) when subcontracted and will be used for the project.

1.0 Purpose & Application

This procedure describes protocols for recording information in a field logbook.

2.0 Equipment & Materials

- Field logbook, bound
- Pen (indelible ink)

3.0 Procedure

All information pertinent to an environmental field survey or sampling effort will be recorded in a bound field logbook that will be initiated at the start of the first onsite activity. The field logbook will be a bound notebook with consecutively numbered pages.

The outside cover will be labeled with the project name and specific activity. The inside cover will include:

- Site Name
- USEPA Work Assignment Number
- Site Manager's Name and Mailing Address
- Start/End Date of Logbook
- Sequential Logbook number

The following information will be recorded on each page:

- Page number
- Project/Client
- Location
- Project Number
- Date
- Recorder's initials

At a minimum, entries in the logbook will include:

- Time of arrival and departure of site personnel, visitors and equipment.
- Instrument calibration information (including make, model, and serial number)
- Weather
- Samples collected including sample location, depth, name, matrix, time, methodology, analyses, type of sample, and any other observations.
- Field measurements
- Health and safety observations/issues.
- Signature and date of recorder.

Corrections shall be made by a single-line cross-out and initialed by the recorder. Any unused portion at the bottom of a page should be crossed-out.

4.0 References

USEPA. CLP Guidance for Field Samplers, EPA 540-R-07-06, OSWEER 9240.0-44, Final, July 2007.

5.0 Attachments

USEPA. CLP Guidance for Field Samplers, EPA 540-R-07-06, OSWEER 9240.0-44, Final, July 2007.

1.0 Purpose & Application

This procedure describes mobilization and demobilization activities for planned field work. Any variation from this Standard Operating Procedure (SOP) must be approved by the Project Manager prior to implementation and a description of the variance will be documented in the field logbook.

2.0 Equipment & Materials

Equipment & materials to be mobilized to the site are identified in the SOPs for each specific activity.

3.0 Procedure

This field investigation activity consists of field personnel orientation, equipment mobilization, the determination of sampling locations, and demobilization. Each field team member will attend an on-site orientation meeting to become familiar with the history of the site, health and safety requirements, and field investigation procedures.

Equipment mobilization will entail the ordering, purchase, and if necessary, fabrication of all sampling supplies and equipment needed for the field investigation. An inventory of available HDR, Inc. supplies/equipment will be conducted prior to initiating field activities, and all additional equipment required will be secured. Proactive communications will be initiated with property owners and managers. At sites with substantial activities, a field office trailer may be set up and necessary utility hookups will be made as part of the mobilization effort.

For the Site Reconnaissance, sample locations shall be determined and marked with stakes or marking paint, as applicable, and recorded with GPS, where appropriate. Utility clearance will be conducted, as per Work Plan, at locations planned for drilling or earth moving.

Equipment and personnel will be demobilized at the completion of each portion of the field activities as necessary. Equipment demobilization may include (but will not be limited to) sampling equipment, drilling subcontractor equipment, and field office trailer and utility hookups. Demobilization will also consist of site-area clean-up, staging and inventory of investigation-derived wastes, and organization of investigation records. Site restoration may be required.

4.0 References

None.

5.0 Attachments

None

1.0 Purpose & Application

All survey work and collection of spatial data will be performed in accordance with this Standard Operating Procedure (SOP). Any variation from this SOP must be approved by the Project Manager prior to implementation and a description of the variance will be documented in the field log book.

2.0 Equipment & Materials

- Global Positioning Systems (GPS)
- Stakes
- Flagging
- Marking Paint
- Survey equipment to be provided by the subcontractor

3.0 Procedure

Sample locations will be chosen during the mobilization phase. Their location will be collected with a "mapping grade" GPS unit accurate to within one meter. These locations will be recovered prior to sample collection and marked with spray paint, survey nails, stakes, and/or survey tape depending on site conditions. After sample collection, the exact location(s) from where the sample was collected will be collected with the GPS.

Sample locations requiring a full survey will be surveyed by a subcontracted licensed surveyor.

Monitoring well coordinates (latitude and longitude) and elevations will be established for each monitoring well and will be referenced to mean sea level (msl). The horizontal control will be to the closest one foot and referenced to local State Plane Coordinate System (North American Datum (NAD) of 1983). The vertical control will be to the nearest 0.01 foot and referenced to the North American Vertical Datum of 1988 (NAVD 88). Measurements will be established for ground surface, top of riser and top of casing at each monitoring well.

Soil borings and surface soil sample locations requiring a full survey will be located vertically and horizontally, as above.

Each surveyed point will include the following information:

- Horizontal Coordinates in the state plane coordinate system listed above.
- Latitude/Longitude of each well location
- NAVD88 (U.S. feet) elevation at top of well casing, reported to 0.01'
- NAVD88 (U.S. feet) elevation at ground of casing, reported to 0.1'

Physical features including general site boundaries, site buildings, right of ways, parking areas, and topographical information when required will be located to the nearest foot and verified with aerial photos where possible. Permanent control monuments will be placed in accessible locations within the limits of the work if existing permanent monuments are not located within 1000 feet of the site. These monuments will be set no closer than 500 feet to each other.

The location, identification, coordinates, and elevation of the wells/sampling points and monuments will be plotted on a map with a scale large enough to show their locations with reference to other structures at the individual sites. A tabulated list of the wells/sampling points and monuments, including notes from the field book will be included with the project report. The tabulation will include well/boring/sampling point identification number, X and Y coordinates, and all required elevations.

Spatial information will be delivered in Microsoft excel format. Additionally, the spatial data will be delivered in an ESRI-compatible format, either shapefile or geodatabase.

4.0 References

None

5.0 Attachments

None

1.0 Purpose & Application

This procedure describes techniques that will be used when air monitoring is required. Real-time air monitoring will be conducted during all intrusive site program activities to ensure the safety of all field personnel. Air monitoring will be conducted at the borehole and in the breathing zone during drilling operations using a PID or FID. In addition, the PID (or FID) will be used to measure for Volatile Organic Compounds (VOCs) at the well head, prior to groundwater sampling and to guide soil sample collection. In instances where conditions are unknown a portable gas multi meter should also be used. When conducting activities within a landfill, a RAD meter should be used. When monitoring for dust or as part of community air monitoring, aerosol monitors should also be used. Air monitoring will be conducted by a trained HDR person. Any variation from this SOP must be approved by the Project Manager prior to implementation and a description of the variance will be documented in the field logbook.

2.0 Equipment & Materials

- MiniRae 2000 PID, 10.6 eV lamp
- PE Photovac Micro FID
- MultiRAE PLUS Gas Monitor
- DR-4000 DataRAM Real-Time Aerosol Monitor
- pDR-1000 Real-Time Aerosol Monitor

2.1 Application

PIDs and FIDs are used to detect organic vapors during drilling and sampling activities. They are broad band detectors and are not selective, as the PID may ionize or oxidize, respectively, everything with an ionization energy less than or equal to the lamp output, and the FID will combust everything that is organic in nature. The PID will be used to guide sample collection, and determine if drilling activities should be stopped for health and safety purposes (action levels are provided in Section 6b).

The multi-gas meter measures LEL, oxygen, carbon monoxide, and hydrogen sulfide. This meter should be used for confined space entry and also should be used to monitor the borehole and breathing zone during drilling activities and during tank inspections/closures to detect combustible gas leaks.

The dataRAMs measure particulates in the air and should be used for any intrusive activities that may generate dust and as part of community air monitoring plans.

2.2 Detection Method

The first application of photoionization detection was as a gas chromatography (GC) ion detector. In a PID, high-energy photons, typically in the ultraviolet (UV) range, break molecules into positively charged ions. As compounds elute from the GC's column they are bombarded by high-energy photons and are ionized when molecules absorb high energy UV light. UV light excites the molecules, resulting in temporary loss of electrons in the molecules and the formation of positively charged ions. The gas becomes electrically charged and the ions produce an electric current, which is the signal output of the detector. The greater the concentration of the component, the more ions are produced, and the greater the current.

The current is amplified and displayed on an ammeter. It is widely held that the ions recombine after passing the detector to reform their original molecules, however only a small portion of the airborne analytes are ionized to begin with so the practical impact of this (if it occurs) is probably negligible.

The operation of the FID is based on the detection of ions formed during combustion of organic compounds in a hydrogen flame. The generation of these ions is proportional to the concentration of organic species in the sample gas stream. Hydrocarbons generally have molar response factors that are equal to number of carbon atoms in their molecule, while oxygenates and other species that contain heteroatoms tend to have a lower response factor.

Multi-gas meter uses a catalytic style sensor to measure combustible gases in the LEL range and a thermal conductivity sensor to measure combustible gases in the percent volume range.

DataRAM is a nephelometric monitor with a light scattering sensing configuration that measures the fine particle fraction of airborne dust, smoke, fumes, and mists

2.3 Limitations

The signal produced by a PID may be quenched when measuring in high humidity environments, or when a compound such as methane is present at high concentrations. This attenuation is due to the ability of water, methane, and other compounds with high ionization potential (IP) values to absorb the photons emitted by the UV lamp without leading to the production of ion current. This reduces the number of energetic photons available to ionize target analytes. Compounds with an IP greater than 10.6 eV will either provide a limited response or no response. Compounds such as 1,1,1-trichloroethane (IP=11.25 eV) provides a limited response and if needed, would require an upgrade to an 11.7 eV lamp (see attachment for a list of IPs and instrument responses). The proper collection of VOCs is also affected by high winds. All electronic instruments should be protected during inclement weather or around water.

The FID will combust all organic compounds including methane, which may give a false reading especially when monitoring landfills (a methane filter should be used). Similarly, the FID will only give an overall sense of the relative concentration of organics present. Carbon dioxide and carbon monoxide are not detectable by an FID.

The multi-gas meter will only read with 100% accuracy the gas that was used for calibration.

DataRAMs measure particulates; too much moisture in the air can have an adverse impact on the levels that are measured. DataRAMs are sensitive to select range of particle sizes; the appropriate meter needs to be chosen to meet the needs of the project or plan.

3.0 Procedure

The manuals for each unit being used for a specific-project shall be attached to this SOP and will provide an overview of the operation, calibration, and maintenance for air monitoring equipment.

3.1 Testing and Calibration Procedures

1. Ensure that the unit has been fully charged.
2. Turn unit on.
3. At the start of each day's activities, and as appropriate during the day, and at the end of the day's activities, check the calibration by performing a calibration response verification check.
4. Complete a fresh air (0 ppm) check and a standard gas (provided by the rental company) check. The reading must be within ±10% of gas concentration. If not, perform a full calibration as described in the manuals.

3.2 Field Measurement Procedures

1. Turn on the unit.
2. Allow the unit to go through the standard menu of automatic "checks", if applicable.
3. Follow the procedures in 3.1 (Testing and Calibration Procedures).
4. Record all information in the field log book and log sheet.
   a. Record ambient readings in the log book.
   b. Record core and other readings in the log book.

5. Position the probe assembly close to the area to be monitored (boring or well). Do not immerse the probe tip in liquid.
6. During drilling and monitoring well installation activities, confined space entry, tank inspection/closure activities, etc. air monitoring readings will be measured at the borehole (or investigation point) and in the breathing zone. Air sampling for particulates should be measured within the area of investigation and upwind/downwind. Readings will also be measured during sample collection (e.g., to guide appropriate soil sample intervals to be collected, see Headspace Screening Method, and prior to opening monitoring wells).

3.3 Headspace Screening Method

The following steps will be taken to field-screen VOCs in soil samples:

1. Immediately upon opening the split-spoon or acetate liner and after collecting the VOC sample, collect a representative portion of soil sample and place in a clean, unpreserved wide mouth glass jar. The sample will be placed in a new, clean plastic sandwich bag inside the jar to minimize the number of new jars required. When using this method, readings will be taken from inside empty bags to ensure no external contamination has been introduced.

2. If the volume of sample recovered is insufficient for all analytical requirements, then the material used for the headspace reading will be used for non-volatile sampling (i.e., geotechnical sampling). Any leftover soil will be added to the drums for each respective boring and disposed in accordance with the SOP for Investigation-Derived Waste.

3. The mouth of the jar will be sealed with one continuous sheet of aluminum foil (shiny side out). The foil shall cover the mouth of the jar tightly and the jar lid will be used to secure the foil.

4. Vigorously agitate the sample jar for at least fifteen seconds and then allow a minimum of ten minutes for the sample to adequately volatilize.

5. During cold weather, the samples will be warmed to room temperature prior to taking the headspace measurement.

6. Re-shake the jar and then removed the jar lid. Quickly insert the vapor sampling probe through the aluminum foil and record the maximum meter response (within the first two to five seconds). Erratic responses will be

evaluated in terms of high organic vapor concentrations or conditions of elevated headspace moisture.

7. Record headspace reading data and ambient background readings on the boring log and in the field book as appropriate.

3.4 Variables Affecting Outdoor Air Monitoring

See Limitations. For areas of high methane, a methane filter can be applied. For high winds, a windblock (body or vehicle) should be used to reduce the effect of the wind. High humidity will be reduced using the supplied vapor filter. These should be replaced monthly unless the filter becomes clogged, or weekly in highly humid conditions.

4.0 References

None

5.0 Attachments (to be added as needed on a project-specific basis to reflect the actual meter being used in the field; obtain the manual from the rental company or online)

Photoionization Characteristics of Selected Compounds

MiniRae 2000 Manual

PE Photovac Micro FID Manual

MultiRAE PLUS Gas Monitor Manual

DR-4000 DataRAM Real-Time Aerosol Monitor Manual

pDR-1000 Real-Time Aerosol Monitor Manual

1.0 Purpose & Application

This procedure describes techniques which will produce acceptable decontamination of equipment used in field investigation and sampling activities. Any variation from this SOP must be approved by the Project Manager prior to implementation and a description of the variance will be documented in the field logbook.

2.0 Equipment & Materials

- Wooden frame lined with plastic sheeting
- Decontamination water (both potable and distilled/deionized)
- Alconox detergent or equivalent non-phosphate detergent
- High-pressure water wash
- Wire brushes
- Test tube brush
- 5-gallon bucket
- Deep basins with at least 10-gallon capacity
- 55-gallon drums
- Aluminum foil
- Pump

3.0 Procedure

3.1 Cleaning of Drilling Equipment

1. All drilling equipment mobilized to the site for field sampling activities will be inspected by the HDR Team Leader prior to use. The equipment will be clean and free of leaks. This equipment will be cleaned prior to and subsequent to sampling. Equipment leaving the site will also be cleaned. Cleaning will be completed by the subcontracted driller at the decontamination pad. As the decontamination pad is filled, the decontamination water will be pumped out for disposal.
2. Any portion of the drill rig that is over the borehole (kelly bar or mast, drilling platform, hoist or chain pulldowns, spindles, cathead, etc.) will be steam cleaned (soap and high pressure hot water) between boreholes. Augers and rods will also be cleaned to remove potential contaminants and staged on clean plastic sheeting prior to use. All visible excess material from augers,

rods, drill bits, the back of the drilling rig, and other parts of the rig which contact augers or rods will be removed using wire brushes or other tools. The augers, rods, drill bits, will be pressure washed with water obtained from an approved source (water main or spigot).

3. Drill equipment cleaning activities will be conducted on a decontamination pad, which will be constructed on-site by the drilling subcontractor for the field investigation in the site staging area. The decontamination pad will consist of a wooden frame, lined with plastic sheeting and sloped or configured to drain to one corner, where a sump will be constructed. Decontamination water will be pumped and disposed.

3.2 Decontamination of Non-disposable Sampling Equipment

Decontamination of non-disposable sampling equipment used to collect samples for chemical analyses (i.e., spoons/trowels, bowls, carbon-steel split-spoon samplers, etc.) will be conducted prior to each sampling use as described below. Larger items may be decontaminated at the decontamination pad. Smaller items may be decontaminated over 5-gallon buckets. Wastewater will be disposed.

1. Alconox detergent and potable water will be used to scrub the equipment.
2. Equipment will be first rinsed with potable water and then rinsed with distilled/deionized water.
3. Equipment will be air dried on plastic sheeting.
4. After drying, exposed ends of equipment will be wrapped or covered with aluminum foil for transport and handling.

3.3 Decontamination of Field Instrumentation

Field instrumentation (such as interface probes, water quality meters, etc.) will be decontaminated between sample locations by rinsing with deionized water. If visible contamination still exists on the equipment after the rinse, an Alconox detergent scrub will be added and the probe thoroughly rinsed again.

Decontamination of probes and meters will take place in a 5-gallon bucket. The decontamination water will be handled and disposed.

3.4 Decontamination of Groundwater Sampling Equipment

Non-disposable groundwater sampling equipment, including the pump, support cable and electrical wires in contact with the sample will be thoroughly decontaminated as described below:

1. As a pre-rinse, the pump will be operated in a deep basin containing 8 to 10 gallons of potable water. Other equipment will be flushed with potable water.
2. The pump will be washed by operating it in a deep basin containing phosphate detergent solution, such as Alconox, and other equipment will be flushed with a fresh detergent solution. Detergent will be used sparingly, as needed.
3. Afterwards, the pump will be rinsed by operating it in a deep basin of potable water and other equipment will be flushed with potable water.
4. The pump will then be disassembled and washed in a deep basin containing non-phosphate detergent solution. All pump parts will be scrubbed with a test tube brush.
5. Pump parts will be first rinsed with potable water and then rinsed with distilled/deionized water.
6. For a bladder pump, the disposable bladder will be replaced with a new one for each well and the pump reassembled.
7. The decontamination water will be disposed of properly.

3.5 Materials from Decontamination Activities

All wastewater and PPE generated from decontamination activities will be handled and disposed of properly as required.

4.0 References

None.

5.0 Attachments

None

1.0 Purpose & Application

This procedure describes techniques for installation of bedrock borings. Any variation from this SOP must be approved by the Project Manager prior to implementation and a description of the variance will be documented in the field logbook.

2.0 Equipment & Materials

- Air Rotary drill rig fitted for dual percussion or an ODEX-type casing advancement drilling
- Rock coring enabled drill rig
- 30-yard roll-off dumpster

3.0 Procedure

3.1 Air Rotary Drilling

1. Mobilize drill equipment to the borehole location.
2. Set up IDW management. Driller should install diverter at deck of drill rig to divert cuttings from the borehole to a containment vessel (typically 30-yard dumpster) via hose.
3. Drill 9.875-inch borehole through overburden to the bedrock surface. Dual pneumatic percussion rotary or an ODEX-type casing system will be used to minimize the potential for borehole collapse.
4. Install temporary steel casing in borehole.
5. Continue drilling with 6-inch air hammer ten feet into competent bedrock.
6. Install permanent 6-inch casing 10 feet into competent bedrock and grout in place from bottom of the borehole to land surface. Wait 24 hours for grout to harden before continuing to drill in bedrock.
7. Continue drilling with 6-inch air hammer to desired depth, and/or rock coring equipment (Section 3.2).
8. If using air rotary, collect drill cuttings every 10 feet, or project-specific intervals, and note material present, color, odors, etc.
9. Note any fractures (especially water bearing fractures) and changes in blown yield.

10. Estimate blown yield during the drilling.

11. Monitor breathing zone and borehole for air contaminants.

3.2 Rock Coring and Matrix Diffusion Sampling

1. Advance boring to bedrock. Conduct bedrock coring using a HQ-size core barrel, which produces a 5-foot long by 2.5 inch diameter core. Use a triple-tube core barrel to minimize disturbance to the core.

2. Instruct the drilling subcontractor personnel to place the recovered rock core in aluminum foil-lined poly-vinyl chloride (PVC) trays out of direct sunlight and windy conditions to minimize volatilization of organic contaminants, so that the cores can be logged and sampled for chlorinated volatile organic compounds (CVOCs). Minimize the time between recovery of the rock cores and sampling as much as possible to reduce potential for minimize volatilization of CVOCs.

3. Inspect the recovered core for rock core sample locations based on lithology, presence of fractures, bedding plane partings, and evidence for groundwater and/or DNAPL fluid flow. Record all observations in the core log.

4. Photograph each core before proceeding with sampling.

5. Determine sampling locations based on fracture distributions and lithology. Samples will be collected both from the fractures and the intervening unfractured rock matrix.

6. Samples collected for VOC analysis will be processed on site (trimmed to remove the outer portion of the sample impacted by coring, crushed, and transferred into pre-preserved [methanol-filled] extraction vials). Samples will be crushed using an Enerpac™ or comparable system capable of generating approximately 6,000 pounds per square inch (psi) of pressure. The CVOC samples will be analyzed on-Site by the subcontractor.

7. Rock crushing and sampling activities will be conducted by a specialty subcontractor and follow procedures outlined in *Protocol for Collecting and Analyzing Rock Core Samples for Volatile Organic Chemical Concentrations and Physical Property Measurements (Parker et al, 2005)*.

8. Following the collection of the CVOC samples, samples for physical characterization and total organic carbon (TOC) will be collected.

9. After completion of the sampling, the remainder of the core will be transferred into wooden core boxes . Ensure that boxes are labeled with borehole

location, and start and end depths of each run with blocks separating the runs. Artificial breaks for fitting purposes are typically marked on the core.

10. Photograph each core box with the core run identification clearly indicated.

11. Record the following observations of the coring process and the recovered rock core in the field logbook:

    - The coring run length;
    - The total recovery (the recovered core length divided by the total run length expressed in percentage);
    - A description of the rock, including lithology and texture, color, hardness, weathering, structural discontinuities, and local geologic names;
    - Information on fracture frequency, fracture fit, fracture spacing, fracture orientation, and odors/discoloration; and
    - The Rock Quality Designation (RQD) value (the sum of all unbroken sections of core greater than or equal to 4 inches in length divided by the total run length, expressed in percentage).
    - The coring rate will be measured and recorded in the field logbook. Rate will be measured in feet per minute or feet per hour, whichever is applicable.
    - Loss or gain of drilling fluid will be monitored and recorded in the field logbook.
    - Change in color, odor, or character of drilling fluid will be documented in the field logbook.

3.3 Borehole Protection

Surface runoff or other fluids will not be allowed to enter any boring or well during or after drilling/construction. Likewise, fluids generated during drilling (e.g. purged groundwater) will be contained in the work area during installation of borings and not allowed to runoff onto surrounding areas. The drill rig and associated equipment will be maintained in good working order and will not be allowed to leak fluids in the work area.

3.4 Materials from Field Activities

All drill cuttings and related wastes will be handled in accordance with site-specific procedures.

3.5 Borehole Abandonment

Upon completion of the boring if a permanent groundwater monitoring well is not installed and completed, the borehole will be grouted with cement-bentonite grout.

Note: no grease will be used. Decontamination of the drilling equipment will be performed in accordance with the SOP for Decontamination.

All disturbance (such as ruts from equipment, tracks etc.) as a result of the investigation work will be backfilled and repaired to pre-investigation conditions.

4.0 References

None

5.0 Attachments

None

1.0 Purpose & Application

The purpose of this Standard Operating Procedure (SOP) is to describe the protocol for measuring water level and well-depths in conventional monitoring wells. In this SOP, the term "well" is used to designate both wells and piezometers. Any variation from this SOP must be approved by the Project Manager prior to implementation and a description of the variance will be documented in the field logbook

2.0 Equipment & Materials

- Water-level/Interface Indicator with cable measured at 0.01 foot increments
- Plastic sheeting
- Folding ruler or pocket steel tape
- Field logbook
- Photoionization detector (PID)
- Squirt bottle with DI water and paper towel
- 5 gallon bucket

3.0 Procedure

The steps will be followed to complete groundwater level measurements in wells.

3.1 Preliminary Steps

1. The batteries of the water level/interface indicator will be checked each time the instrument is used and the indicator will be maintained, inspected, and tested in accordance with the manual.

2. All measurements and observations will be maintained in the field logbook.

3. Locate the well and verify its position on the site map. Record whether positive identification was obtained, including the well number and any identifying marks or codes contained on the well casing or protective casing. Remove the well cap and check for organic vapors using a PID.
4. Locate and record the specified benchmark or survey point for the well, which may be a mark at the top of the casing or surveyors pin embedded in the protective structure. Determine from the well records and record in the field logbook the elevation of this point. Measure and record the vertical distance from the bench mark to the top of the well casing, to the nearest 0.01 feet. Measure and record the metal casing stick-up (the distance between the top of the casing and nominal ground (level).

5. Record any observations and remarks regarding the completion characteristics and well condition, such as evidence of cracked casing or surface seals, security of the well (locked cap), and evidence of tampering.
6. Keep all equipment and supplies protected from contamination and on top of plastic sheeting, where applicable. Keep the water level indicator probe in its protective case when not in use.

3.2 Operation

1. Remove the water level indicator probe from the case, turn on the sounder, and test check the battery and sensitivity scale by pushing the red button. Adjust the sensitivity scale until you can hear the buzzer.
2. Slowly lower the probe and cable into the well, allowing the cable reel to unwind. Continue lowering until the meter buzzes. Very slowly, raise and lower the probe until the point is reached where the meter just begins to buzz. Marking the spot by grasping the cable with the thumb and forefingers at the top of the casing, withdraw the cable and record the depth.
3. If LNAPL is present, the interface probe will intermittently beep at the top of the product.
4. Record this depth in the field logbook.
5. Continue to lower the probe until the solid buzz is heard, which is the water level/ LNAPL interface. Record this depth in the field logbook and/or sampling data sheet.
6. To measure the well depth, lower the probe until slack is noted in the cable. Very slowly raise and lower the cable until the exact bottom of the well is "felt." Measure and record the depth.
7. Withdraw the cable and probe, and decontaminate in accordance with the SOP for Decontamination.
8. Decontamination water will be managed in accordance with Investigation-Derived Waste SOP.

3.3 Data Recording and Manipulation

The following computations will be recorded in the field logbook:

- casing elevation = bench mark elevation + casing stick-up
- top of product elevation = casing elevation - depth to product
- thickness of product = depth to water – depth to product
- water level elevation = casing elevation - depth to water well

- bottom elevation = casing elevation - depth to bottom

4.0 References

None

5.0 Attachments

None

Bannister Federal Complex Remedial Investigation Water Levels Measurements

Well ID No.	Date(mm/dd/yyyy)	Time (24-hr)	Top of Inner Casing Elev. (feet)	Depth to Top of Product from BTIC (feet)	Depth to Water from BTIC (feet)	Prod-uct Thick-ness If any (feet)	Water Level Elev. (feet)	Top of Product Elev. (feet)	Depth to Bottom of Well (feet bgs)	Well Bottom Elev.	Well Head PID Readings (ppm)	Comments, Product Description

1.0 Purpose & Application

The purpose of the low stress purging and sampling procedure is to collect groundwater samples from monitoring wells that are representative of groundwater conditions in the geological formation. This is accomplished by minimizing stress on the geological formation, minimizing disturbance of sediment that has collected in the well, and by setting the intake velocity of the sampling pump to a flow rate that limits drawdown inside the well casing. Any variation from this SOP must be approved by the Project Manager prior to implementation and a description of the variance will be documented in the field logbook.

For newly installed wells, after development, the wells will be allowed to stabilize for a minimum of two weeks prior to sampling.

2.0 Equipment & Materials

- Well construction data, location map, field data from last sampling event (if applicable)
- Clean polyethylene sheeting
- Photo Ionization Detector (PID)
- Clean, decontaminated adjustable rate, positive displacement groundwater sampling pump (e.g., bladder pumps constructed of stainless steel).
- Clean, decontaminated bladder pump
- Clean, factory wrapped polyethylene tubing
- Clean, decontaminated Water level measuring device/interface probe, minimum 0.01 foot accuracy, (electronic preferred for tracking water level drawdown during all pumping operations)
- Flow measurement supplies (e.g., graduated cylinder and stop watch or in-line flow meter)
- Power source (generator, etc.)Note: If a generator or vehicle is used, these should be down wind with the exhaust facing away from the equipment.
- Clean, decontaminated Horiba U-22 or U-52, for measuring indicator parameters
- Decontamination supplies
- Logbook
- Sample bottles
- Sample tags or labels, chain of custody

3.0 Procedure

3.1 Pre-Sampling Activities

The following steps will be performed prior to sampling:

1. Start at the well known or believed to have the least contaminated groundwater and proceed systematically to the well with the most contaminated groundwater. Measure VOCs at the rim of the unopened well with a PID instrument and record the reading in the field logbook. Check the well, the lock, and the locking cap for damage or evidence of tampering. Record observations. If the PID reading is > 5 ppm in the breathing zone, vacate the area for 30 minutes. Check the readings until < 1 ppm in the breathing zone.
2. Lay out a sheet of polyethylene for placement of monitoring and sampling equipment.
3. Remove well cap.
4. If the well casing does not have a reference point (usually a V-out or indelible mark in the well casing), make one. Note that the reference point will be surveyed in accordance with the Site Location and Elevation Survey SOP, for correction of groundwater elevations to the 1988 North American Vertical Datum (NAVD88).
5. Measure and record the depth to water (to 0.01 ft.) in all wells to be sampled prior to purging. Follow the procedures provided in the Groundwater Level Measurements SOP. Care will be taken to minimize disturbance in the water column and dislodging of any particulate matter attached to the sides or settled at the bottom of the well.
6. Prior to purging, determine the presence of Non-Aqueous Phase Liquids (NAPLs) at the top and bottom of the water column. Follow the procedures provided in the Groundwater Level Measurements SOP. When turbidity is a concern and DNAPLs are suspected, the depth of the well will not be measured prior to purging and sampling. Well volumes, where needed, will be calculated based on as-built depths and the bottom of the actual depth will be measured upon completion of sampling activities.

3.2 Sampling Procedures

Special care will be taken not to contaminate samples. This includes storing samples in a secure location to preclude conditions which could alter the properties of the sample. Samples will be custody sealed for shipment to the laboratory. Collected samples will remain in iced, coolers (to 4°C) and in the custody of the sampler or sample custodian until the samples are relinquished to another party.

A clean pair of new, non-powdered, disposable gloves will be worn each time a different location is sampled. Gloves will be donned immediately prior to sampling.

The gloves will not be allowed to come into contact with the media being sampled and will be changed any time during sample collection when their cleanliness is compromised.

The following steps will be performed during sampling:

1. Install Pump: Attach and secure the tubing to the low-flow stainless steel submersible bladder pump. Set the pump at approximately the middle of the screen and/or the best depth based on the stratigraphy of the well. The pump intake will be kept at least two (2) feet above the bottom of the well to prevent disturbance and re-suspension of any sediment present in the bottom of the well. Record the depth to which the pump is lowered and the rationale used in selecting this depth.
2. Measure Water Level: Before starting the pump, measure the water level again with the pump in the well. Leave the water level measuring device in the well.
3. Purge Well: Purge the well at a low flow rate (from 0.2 to 0.5 liters per minute). During purging, monitor the field indicator parameters (temperature, pH, turbidity, specific conductivity, eH, and DO) approximately every 3 to 5 minutes. A flow-through cell will be used to monitor the field parameters. Begin measuring field parameters after the flow-through cell has been “flushed” with groundwater twice (See Section 3.3). Ideally, a steady flow rate will be maintained that results in a stabilized water level (drawdown of 0.3 ft. or less). Pumping rates will, if needed, be reduced to the minimum capabilities of the pump (0.1 to 0.2 liters per minute) to ensure stabilization of the water level. As noted above, care will be taken to maintain pump suction and to avoid entrainment of air in the tubing. Record each adjustment made to the pumping rate and the water level measured immediately after each adjustment.
4. Monitor Indicator Parameters: During purging of the well, monitor and record the field indicator parameters in the field logbook approximately every five minutes. The well is considered stabilized and ready for sample collection when the indicator parameters have stabilized for three consecutive readings, as follows:

   ± 1°C for temperature

   ± 0.1 for pH

   ± 0.01 mS/cm or ± 3 percent (whichever is less) for specific conductance

   ± 0.3 mg/l or ± 10 percent (whichever is less) for dissolved oxygen

   ± 10 percent for turbidity

   ± 10 mV or ± 10 percent (whichever is less) for Eh
5. Dissolved oxygen and turbidity usually require the longest time to achieve stabilization. Ideally an attempt will be made to purge until

turbidity drops below 10 NTU, but this is not a requirement. Removal of a specific volume of water is also not required, provided all water quality parameters are stable as noted above. The pump will not be removed from the well between purging and sampling.

6. Wells will not be purged dry, which can cause aeration as groundwater cascades back into the well. Water table wells with slow recharge that result in significant drawdown (greater than 0.33 feet) while purging at the lowest possible rate, will be pumped at a rate between 0.1 to 0.2 liters per minute for a minimum of one hour, unless drawdown exceeds 2 feet. If a drawdown greater than 2 feet occurs in a water table well, purging will be stopped to allow the well to recover before sampling.
7. Pertinent sampling measurements including intake depth, extraction rate, final pump dial settings, and drawdown information from the sampling event for each well will be recorded in the field book. During subsequent sampling events, these measurements will be duplicated to the extent practicable.
8. During purging and sampling, the tubing will remain filled with water so as to minimize possible changes in water chemistry upon contact with the atmosphere. A ¼ inch or 3/8 inch diameter tubing will be utilized, where practicable, to help insure that the sample tubing remains water filled. If the tubing is not completely filled to the sampling point, one of the following procedures will be used: (1) add clamp, connector or valve to constrict sampling end of tubing; (2) insert small diameter Teflon tubing into water filled portion of pump tubing allowing the end to protrude beyond the end of the pump tubing, collect sample from small diameter tubing; (3) collect VOC samples first, then increase the flow rate slightly until the water completely fills the tubing, collect non-VOC samples and record new drawdown, flow rate and new indicator field parameter values.
9. Collect Samples: Once the field parameters have stabilized, samples will be immediately collected directly from the end of the tubing. The pumping rate will remain the same or lower than the purging rate to minimize aeration, bubble formation, or turbulent filling of sample containers. Volatiles and analyses that degrade by aeration will be collected first. In the event that a well has poor recovery, priority for sample collection should be determined based on the project requirements. VOC samples will be collected first and directly into sample containers. All sample containers will be filled with minimal turbulence by allowing the groundwater to flow from the tubing gently down the inside of the container. Each bottle will be capped once it is filled.
10. The filling procedures will be:
    - <u>TCL VOCs</u> - Fill each container with sample to just overflowing. The vial will be filled so that there is a reverse or convex meniscus at the top of the vial and such that no bubbles or headspace are present in the vial

after it is capped. After the cap is securely tightened, the vial will be inverted and tapped on the palm of one hand to see if any undetected bubbles are dislodged. If a bubble or bubbles are present, the vial will be topped off using a minimal amount of sample to re-establish the meniscus. Care will be taken to not flush any preservative out of the vial during topping off. If, after topping off and capping the vial, bubbles are still present, a new vial will be obtained and the sample re-collected.

- Other Parameters - Fill each container directly from the sample tubing.

11. Pack samples according to the Sample Packing SOP.
12. Carefully remove the pump assembly from the well. The Teflon-lined polyethylene tubing will be dedicated to each well. The tubing will be left in the well casing for use on subsequent sampling events. When subsequent sampling events are not expected, the tubing will be discarded as municipal waste.
13. After sampling is complete, measure and record well depth.
14. Close and lock the well.
15. Purge water will be handled on a project-specific basis.

3.3 Field Parameter Measurement

The following steps will be used to evaluate water quality during monitoring well and surface water sampling:

1) Calibrate the water quality meter as per manufacturer's instructions prior to the sampling each day. If the meter does not calibrate properly, contact the rental company for a replacement.

2) For low stress purging of the monitoring wells:

- Position the water quality meter probe in the flow-through cell. Attach the flow-through cell to the tubing. Attach a separate piece of tubing between the "out" port and the 5 gallon bucket or other purge water collection vessel.
- After the cell has been "flushed" at least twice, begin monitoring the field parameters, and continue approximately every 3 to 5 minutes during purging. All water quality measurements will be recorded in the appropriate field logbook or on a well purge data sheet.
- When the indicator parameters have, the well is considered stabilized and ready for sample collection. Remove the flow-through cell from the tubing.

3) Decontaminate the probe of the water quality meter between locations in accordance with the SOP for Decontamination.

4) Record water quality measurements in the appropriate field logbook/data sheets, noting well identification or surface water location, sample date and time, and observations.

3.4 Decontamination

Decontamination will be performed in accordance with the SOP for Decontamination.

4.0 References

None

5.0 Attachments

None

1.0 Purpose & Application

This document provides technical guidance for the design and installation of permanent cased overburden groundwater monitoring wells. This SOP also provides a list of the materials that will be used in the design and construction of these monitoring wells.

2.0 Equipment & Materials

- Hollow Stem Auger Drill rig
- Air Rotary Drill rig
- Well screens (typically 2-inch diameter Schedule 40 polyvinyl chloride (PVC) (0.010-inch slot) with flush threaded bottom caps)
- Well risers (2-inch diameter Schedule 40 PVC pipe)
- Strap wrench
- All sections of PVC screen/riser will be threaded, flush-joint design
- Spring type stainless steel well centralizers
- Portland Type I or Type II neat cement
- Certified bentonite (solvent free, sodium-bentonite pellets)
- Pre-sampled and approved water
- Certified clean silica sand for screen filter pack (10 x 20)
- Lockable expanding compression caps (water tight)
- Water Level Indicator Probe
- Weighted tape
- Well Construction Diagram
- Mechanical mixer
- Non-corrosive steel or aluminum casing
- Vented caps
- Locking caps
- Brass locks (keyed alike)
- 2-inch diameter or larger concrete-filled steel posts (bollards)
- Blaze orange paint
- Manhole covers
- Submersible Pump (i.e., Whale pump)
- 12 V battery
- Polyethylene tubing
- Surge block
- 55-gallon drums

- Horiba U-22, or equivalent
- Water level indicator
- Field logbook

3.0 Procedure

All monitoring wells will be installed, completed, and developed according to requirements discussed in the following sections.

3.1 Utility Clearances and Permits

Utility clearances and permits will be obtained in accordance with the Mobilization and Demobilization SOP.

3.2 Borehole Drilling

1. Overburden Borehole: drilling for the installation of monitoring wells will be completed in accordance with Hollow Stem Auger Drilling SOP. The borehole will be completed using a 4.25-inch inside diameter hollow stem augers which will provide sufficient diameter to permit at least two inches of annular space between the boring wall and the sides of the riser and screen.

2. Bedrock Borehole: drilling for the installation of monitoring wells will be completed in accordance with Bedrock Drilling SOP. A borehole will be drilled through the overburden and to the bedrock surface. A temporary steel casing will then be installed. The borehole will be completed using a 6-inch air hammer or other method specified in the Bedrock Drilling SOP. The borehole will then be advanced ten feet into bedrock and a permanent 6-inch steel casing will be installed and grouted into place. After curing, the borehole will be drilled to the target depth as specified in the Bedrock Drilling SOP.

3.3 Monitoring Well Materials Specifications and Design

Standard monitoring well materials (10-slot screen and 10 x 20 silica sand filter pack) will be used unless otherwise required for the project. All screens, casing, and fittings will be delivered to the site in factory sealed protective wrapping. In the event that the protective wrapping has been compromised, the well materials will be decontaminated at the site and wrapped in plastic sheeting until installed.

3.3.1 Well Riser

Well riser will consist of Schedule 40 PVC. PVC pipe will be new, threaded, flush joint, and conform to the requirements of ASTM F 480. Threaded flush-joint couplings with chemically inert O-rings, to form watertight unions, will join casing sections. A single spring type stainless steel centralizer will be attached to the riser pipe approximately mid-point of the borehole. Adhesives or solvents will not be used to join the casing sections. Teflon tape on threaded joints, if used, will be noted on the well construction log. No lead shot or lead wool will be employed in producing seals at any point in the well.

3.3.2 Well Screen

Well screens will consist of flush-threaded, 2-inch diameter (nominal size), Schedule 40 PVC with factory machined 0.010 inch size screen slotting (10-slot). All screens will have a flush threaded bottom cap. The screen material will be non-contaminating, non-clogging design. All screen sections will be threaded, flush joint design. Unless otherwise required by the project, the screen length will be ten feet, installed five feet into the water table, which will allow for normal, seasonal fluctuations in the water table elevation so that monitoring will be possible throughout an average year. For wells completed to bedrock, the bottom ten feet of each well will be screened. Sediment traps (sumps, tailpipe) will not be used below the screened portion in monitoring wells unless specifically called for by the project requirements. Field-slotted screen will not be used.

3.3.3 Filter Pack

The annular space around the well screen will be backfilled with clean, washed, well-rounded silica sand sized to perform as a filter between the formation material and the well screen. Certified clean silica sand (10 x 20) compatible with 10-slot well screen and the aquifer materials will be used in the filter pack around the well screen. The grain size of the filter pack that is used will be included on the well construction log. The filter pack material will be tremied into place to avoid bridging and ensure a continuous filter pack throughout the screened interval of the well. The filter pack will extend approximately 1 foot below, and 3 to 5 feet above the well screen. Relative depths and thicknesses will be recorded in the field logbook.

3.3.4 Bentonite Seal

A 3 to 5 foot thick bentonite seal will be placed in the annular space above the well screen and filter pack sand. The seal will be composed of commercially manufactured, solvent-free, sodium-bentonite pellets. Bentonite pellets will not exceed one-half inch diameter. Where the bentonite seal is positioned above the water table, the bentonite will be installed in 1-foot lifts with each hydrated a minimum of 30 minutes between lifts before proceeding. Clean, potable water will be added to hydrate the bentonite. After the placement of the final lift, the bentonite seal will be allowed to hydrate a minimum of an additional two hours or until HDR's field geologist is confident the seal will function as designed before grouting begins. The bentonite seal will be placed immediately after installing the filter pack. Relative depths and thicknesses will be recorded in the field logbook.

3.3.5 Annular Seal - Grout

Cement grout will be placed above the bentonite seal to the ground surface. The cement grout will consist of a mixture of Portland cement (ASTM C 150) and water in the proportion of not more than 7 gallons of approved water per bag of cement (94 pounds). Additionally, 3 to 5 percent by weight of sodium bentonite powder will be added.

Grout will be placed by pumping through a side discharging tremie pipe with the lower end of the tremie pipe located within 3 feet of the top of the bentonite seal. Pumping will continue until undiluted grout flows from the boring at the ground surface. The annular seal will be placed within 48 hours, but no sooner than two hours after the final lift of the bentonite seal installation. Prior to surface completion, the grout annular seal will be filled to design elevation.

3.4 Monitoring Well Completion

Each monitoring well installed will be completed in accordance with the following procedure:

1. A fitting cap will be installed to prevent material from entering the well.

2. Stick-up Well Completion – the well riser will be surrounded by a larger diameter protective non-corrosive steel or aluminum casing rising 2 to 3 feet above ground level and set an equal distance below the ground surface into the cement grout backfill. The casing will be installed in a manner that does not hinder access to the monitoring well for purposes of cap removal, sample collection or water level measurements. The north side of the casing will be notched as a reference point for horizontal and vertical control and for groundwater measurements. The outside protective casing will be painted blaze orange.

4. The protective casing will be provided with a locking cap and lock. The cap will be designed to prevent water from entering the protective casing. All locks will be brass and keyed alike.

5. A concrete (cement, aggregate and water) pad, 2 feet by 2 feet by 4 inches thick (minimum), sloped away from the well will be constructed around the well casing with the top outer edge at the final ground level elevation.

6. A weep hole of 1/8 inch diameter will be drilled into the outer protective casing within three inches above the pad to permit drainage of fluids that may accumulate.

7. Flush-Mount Well Completion – a flush mounted manhole protective casing will be installed over the PVC well casing. The north side of the casing will be notched as a reference point for horizontal and vertical control and for groundwater measurements. The collar of the manhole will be filled with

sand as a weep for accumulated rainwater. The manhole will be set in a concrete pad as described in step 5 above and the pad will be sloped from the center to direct drainage away from the well.

3.5 Monitoring Well Development

Each monitoring well will be developed within one week but not less than 48 hours after completion in accordance with the following procedure:

1. Development will a) assure that groundwater enters the well screen freely, thus yielding a representative groundwater sample and an accurate water level measurement b) remove 3 to 5 times the well volume and volume introduced or lost during drilling and well installation, c) remove very fine-grained sediment in the filter pack and nearby formation so that groundwater samples are not highly turbid and so that silting of the well does not occur.

2. Development will consist of alternating cycles of mechanical surging and pumping or bailing until little or no sediment enters the well.

3. Well development will continue for a minimum of 2 hours. Sediment that enters the well during this time will be removed. At the end of this time, the well will be continuously pumped using an electric submersible pump (i.e., Whale pump).

4. Temperature, pH, specific conductivity, and turbidity will be monitored during pumping (one reading per well volume). Pumping will continue until these parameters have stabilized (10 percent change for the other parameters between four consecutive readings) and the water is clear and free of fines. If the parameters do not stabilize after 4 hours of continuous pumping, then the Project Manager should be contacted for further instruction based on the project requirements.

5. If the addition of water is required to facilitate surging and pumping/bailing, only formation water from the well shall be used. If this is not practical due to tightness of the formation then only bailing will be done.

6. In all cases, the utmost care will be taken to not collapse well screens during development activities and at least 3 times the water introduced or lost during drilling shall be removed from each well.

7. The entire well cap and interior of the well casing above the water table will be washed using water from the well. This will be conducted during development, not after development is complete. Washing will not be performed if free phase contamination is present.

8. Well Development records shall be recorded in the field logbook and include the following information:

a. Name of project and site, well ID number and date

b. Date, time, and elevation of static water level and bottom of the well before development

c. Method used for development including equipment size, type and make of bailer or pump used

d. Time spent developing the well by each method, to include pumping rate used

e. Volume and physical character of the water removed, to include changed during development in clarity, color, particulates and odor

f. Volume of source water added to the well

g. Volume and physical character of sediment removed form the well

h. Clarity of water before, during and after development

i. Total depth of well and static water level measurement immediately after and no later than the following day after development

j. Field parameter measurements recorded before, during and after development

9. Development water will be containerized in 55 gallon drums and handled in accordance with the IDW SOP.

4.0 References

"Standard Specification for Portland Cement," ASTM C 150

"Handbook of Suggested Practices for the Design and Installation of Ground Water Monitoring Wells", EPA 600/4-89/034, 1989

"Monitoring Well Design, Installation, and Documentation at Hazardous, Toxic, and Radioactive Waste Sites", USACE EM1110-1-4000 (Nov. 98)

"Standard Specification for Thermoplastic Well Casing Pipe and Couplings Made in standard Dimension Ratios", ASTM F 480

5.0 Attachments

None

1.0 Purpose & Application

The purpose of this Standard Operating Procedure (SOP) is to describe procedures to record and analyze measurements of physical properties in wells or boreholes. Any variation from this SOP must be approved by the Project Manager prior to implementation and a description of the variance will be documented in the field logbook.

2.0 Equipment & Materials

The following equipment and materials will be used for downhole geophysics:

- Static water level meter
- Multi-parameter logging tool
- Gamma ray apparatus
- Camera apparatus
- Wireline cable
- Field logbook

3.0 Procedure

1. Secure system drawworks so that it will not move during the logging process.

2. Measure the static water level in the borehole and sound the bottom of the borehole, referencing each measured depth to the surface reference point (i.e., top of overburden casing).

3. Attach system wireline cable to the multi-parameter (or spec tool to be used) and insert it into the borehole.

4. Align the collar, or point of connection between the wireline cable and the multi-parameter logging tool, with the surface reference point (i.e., top of overburden casing) prior to the logging of each borehole. The depth reference will be set to 0 on the computer of the logging system with the anticipation of accurate elevation of the surface reference point to be acquired and appended to the data at a later date (i.e., after surveying).

5. Set the logging direction on the drawworks to DOWN and begin to slowly acquire borehole geophysical data from the surface to depth in the borehole with the tool apparatus. Pay close attention to the cable speed while logging downhole. Once cable appears to go slack stop the drawworks and end data collection.

6. Change logging direction on drawworks to UP and raise the tool until it hangs freely in the borehole. Reinitiate data collection and log the borehole from depth to the surface, decontaminating the wireline cable at the well head as it is withdrawn from the borehole.

7. Once collar has passed the surface reference point, stop the drawworks and end data collection.

8. Disconnect tool from cablehead, and decontaminate.

9. Attach gamma-ray probe to the cable and insert into the borehole.

10. Repeat Steps 3 through 8 for the gamma-ray apparatus.

11. Attach the video camera to the cable and insert into the borehole.

12. Repeat Steps 3 through 8 for the camera apparatus.

13. Record logging operations and other pertinent information for each borehole in the field logbook.

3.1 Decontamination

Decontamination will be performed in accordance with the Decontamination SOP.

3.2 Materials from Field Activities

All materials generated during field activities that are segregated as potentially contaminated will be handled in accordance with the Investigation-Derived Waste SOP.

4.0 References

None

5.0 Attachments

None

1.0 Procedure

1. Prior to placing the packer test equipment in the borehole, the static water level and total depth will be measured. All the equipment will be decontaminated as per **Decontamination [Field Instrumentation]** and **Decontamination [Low Flow Groundwater Sampling Equipment]** SOPs #6B and 7.

2. The packer assembly and the submersible pump will be lowered into the borehole straddling the upper-most zone to be tested. As the packer rods are being lowered, the length of each packer rod will be measured so that the packer depths may be accurately determined.

3. The packers will be inflated using the nitrogen pressure bottle.

4. Once the packers and related equipment are in place, the well interval will be purged. Each isolated fracture interval will be pumped at the maximum sustainable rate for a minimum of 15 minutes or until at least five borehole volumes (over the length of the test interval) plus the volume contained in the rod have been pumped. During purging, the total volume of extracted water will be recorded. If specified in the Work Plan, monitor potentiometric levels in other zones, e.g., above and below the packer interval, and in nearby wells.

5. After purging, collect water samples from the pump discharge.

6. Deflate the packers, lower and reposition the assembly in the next sampling interval. Repeat steps 3, 4 and 5 until all selected intervals are sampled.

2.0 Materials and Equipment

- A submersible pump (e.g., Grundfos Redi-Flo2 or other approved by EPA) to be located either between the two packers or inside the rod on the top of the packers;
- Auxiliary sampling pump equipment, including electric power generator, converter and tubing of composition specified in the Work Plan;
- One set of appropriately-sized pneumatic straddle packer apparatus separated by an adjustable, 5- to 20-foot length of galvanized perforated pipe (of a diameter adapted to that of the pump);
- A nitrogen bottle and a 300-psi pressure regulator to inflate the packers;
- Auxiliary equipment, such as tubing, valves, adaptors and rods (with diameter adapted to that of the pump); and
- Transducers.

1.0 Purpose & Application

This document provides the basis, policy guidance and standard procedures for management of Investigation Derived Waste (IDW). Any variation from this SOP must be approved by the Project Manager prior to implementation and a description of the variance will be documented in the field logbook.

HDR's approach to IDW Management includes:

- Leaving a site in no worse condition than existed prior to the investigation.
- Removing wastes that pose an immediate threat to human health or the environment
- Leaving on-site, wastes that do not require off-site disposal or extended aboveground containerization
- Careful planning and coordination for IDW management
- Minimizing the quantity of generated wastes

All IDW, both hazardous and non-hazardous, should be kept to a minimum to conserve resources. Many of the non-hazardous personal protective equipment (PPE) and disposable equipment (DE) IDW may be disposed of in municipal dumpsters if care is taken to properly bag these items and to keep them segregated from hazardous waste. Contaminated PPE and DE can often be cleaned to render them non-hazardous by cleaning with water or aqueous based cleaner. Other waste minimization techniques will be used, such as:

- Limiting traffic between "clean" and "contaminated areas"
- Use of drilling methods and sampling techniques that generate a minimal amount of waste
- Segregating hazardous waste from non-hazardous waste to prevent cross-contamination

2.0 Equipment & Materials

Water tight containers for transporting and disposing of IDW will include:

- New 55 gallon drums
- Plastic garbage bags
- Skid steer with drum grappler

3.0 Procedure

IDW includes: drill cuttings, purge water from development and sampling of monitoring wells; soil from collection of samples; PPE, solutions used to decontaminate non-disposable protective clothing and sampling equipment; and disposable equipment used during field investigation activities.

3.1 Materials from Field Activities

All materials generated during field activities that are segregated as potentially contaminated will be placed in water-tight containers.

3.1.1 Drill Cuttings

In general, unless gross contamination is observed, drill cuttings may be used as backfill at the sample site. In some instances, project or contract requirements may call for all material that have come into contact with contaminated or potentially contaminated material during sampling to be disposed as IDW. In this instance, all drill cuttings created during the installation of monitoring wells and soil borings will be collected in water-tight, new 55 gallon drums that are approved by DOT and EPA to transport waste and transported to the designated staging area.

3.1.2 Surface Water & Sediments

Excess surface water and sediment material collected for sampling, will be released at the sample source.

3.1.3 Liquids

Liquids generated during field activities (purge and decontamination water) in general may be released the ground surface, upgradient of the site, unless there is evidence of gross contamination (i.e., NAPL). In some instances, project or contract requirements may call for these materials to be disposed as IDW, regardless of the conditions at the sample site. Liquids will be placed in water-tight new 55-gallon drums that are approved by DOT and EPA to transport waste.

3.2 PPE & Decontamination Material

Disposable sampling equipment (tubing, bladders, etc.) and disposable PPE will be placed in plastic garbage bags and managed as municipal solid waste.

3.3 Drum Labeling

The following information will be placed on all drum labels and an inventory will be kept in the field logbook:

- Type of material (i.e., purge water, development water)
- Site number and location
- Boring number (and depths for soils)
- Contact information (i.e., HDR name, point of contact name, telephone number)
- Date when the waste was first accumulated

Labeling will be of a permanent nature, unaffected by exposure to outdoor elements for an extended period of time. Labels will be placed on the side of the drum and positioned to be easily viewed when drums are staged.

IDW-Test Pending: Self adhesive, weather resistant, white background label material will be used. The size will be at least 6 x 6 inches. The words “IDW-Test Pending”, sample code date filled, and Project Manager’s name and telephone number will be written on the label. The label will be revised to reflect test results.

3.4 Storage

IDW will be transferred to the site staging area at the end of each day and drums will be secured on wooden pallets. The pallets will be arranged to allow access between them for container inspection. The staging area will be secured within temporary fencing and gate with lock.

IDW will be disposed of as soon as feasibly possible but will not be allowed to be on-site longer than 90 days. Until disposal, containers will be inventoried, stored as securely as possible, and inspected regularly, as a general good practice.

3.4.1 Drum Management

- Staging are for drums will be lined with a plastic liner

- Drums will be stored within the staging area upon completion of the sample location and at the end of each day
- Drums will be transported from the sample location to the staging area by the drilling subcontractor utilizing a skid steer with drum grappler
- Individual drums will be labeled per Section 3.3
- Add IDW information to the field logbook
- Drums will be stored within a fenced storage area
- When drums are delivered or IDW is picked up by a waste hauling subcontractor, the activity will be noted in the field logbook

3.5 Waste profile

IDW will be characterized for the analytes and frequency required by the disposal facility.

Results from laboratory analysis of soil and groundwater samples collected during the field investigation will be utilized further to segregate contaminated and uncontaminated drummed materials. Drummed materials identified as clean will be disposed of as uncontaminated materials.

3.6 Disposal

All waste generated during the field activities will be stored, transported, and disposed of according to applicable state, federal and local regulations. A licensed hauler will transport municipal solid waste material.

HDR will coordinate a hauler to transport waste. Shipped waste will be disposed of in accordance with all RCRA/DOT/USEPA requirements. All waste manifests or bills of lading will be prepared by HDR in coordination with the disposal facility and will be signed by the generator/owner unless contractual requirements allow HDR to sign "as agent for".

4.0 References

40 CFR 261-264

49 CFR 172

USEPA, Management of Investigation-Derived Waste During Site Investigations, EPA/540/G-91/009, May 1991

USEPA, Guide to Management of Investigation-Derived Wastes, EPA Publication 9345.3-03FS, January 1992

USEPA, Test Methods for Evaluating Solid Waste, EPA Publication SW-846, Latest Version

5.0 Attachments

None

1.0 Purpose & Application

This procedure describes techniques that will be used to setup a project using the sample management software, Scribe. Any variation from this SOP must be approved by the Project Manager prior to implementation and a description of the variance will be documented in the field logbook.

2.0 Equipment & Materials

- Scribe
- Computer/Tablet

2.1 Application

This SOP applies to all projects which utilize Scribe as a sample management tool.

Scribe is a software tool developed by USEPA's Environmental Response Team (ERT) to assist in the process of managing environmental data. It is available for download at www.ertsupport.org/scribe_home.htm

2.2 Limitations

Scribe must be installed on either a computer or tablet device

3.0 Procedure

3.1 Project Setup

1. Click on 'File'.
2. Select 'New Project'. A New Project Wizard window is displayed.
3. Select 'Next' in the wizard.
4. Enter Site Name, Site # and EPA Region.
5. Select 'Next' and 'Finish" to finish creating the project.
6. Click on tabs listed under 'Planning' and fill out information as available on a project-specific basis.
   a. Events – Add events. (i.e., GW Sampling R1, Wet Weather SW Sampling, etc)
   b. Property Info – Add info for properties at which sampling will occur.
   c. Sampling Locations – Add sample locations.

d. Analyses – Remove unnecessary analyses and add any required analyses not presently listed.

e. Sampler – Add or remove samplers

f. Instrument list – Add instruments.

g. Lab List – Add or remove laboratories.

4.0 References

Scribe Quickstart Guide, Scribe User Manual for CLP Sampling

5.0 Attachments

Scribe Quickstart Guide

Scribe User Manual for CLP Sampling

1.0 Purpose & Application

This procedure describes techniques that will be used to log and label samples using sample management software, Scribe. Any variation from this SOP must be approved by the Project Manager prior to implementation and a description of the variance will be documented in the field logbook.

2.0 Equipment & Materials

- Scribe
- Computer/Tablet
- Printer

2.1 Application

This SOP applies to all projects which utilize Scribe as a sample management tool.

Scribe is a software tool developed by USEPA's Environmental Response Team (ERT) to assist in the process of managing environmental data. It is available for download at www.ertsupport.org/scribe_home.htm

2.2 Limitations

Scribe must be installed on either a computer or tablet device. A printer must also be available for labeling

3.0 Procedure

3.1 Sample Logging

1. Ensure correct project is open in Scribe. See project name at the top of the Scribe menu (left side of screen).
2. Select applicable sample matrix under the 'Sampling' tab in the Scribe menu.
    a. Air Sampling
    b. Wipe Sampling
    c. Biota
    d. Soil/Sediment
    e. Soil Gas Sampling
    f. Water Sampling

3. Click on 'Add a Sample' button at bottom of screen and populate information in the sample information screen pop-up. The pop-up will have up to four tabs, depending on matrix. Sample Details and Analysis are tabs common to all matrices.
    a. Sample Details –
        i. Required Fields: EventID, Sample #, and Location
        ii. EventID – Enter appropriate event as specified in Planning-Events tab.
        iii. Sample # - Give sample unique sample # per SOP SM-3.
        iv. Location – Identify location from which sample was collected.
        v. Sub Location – Provide a sub location, if applicable.
        vi. Date Collected – Provide date on which sample was collected.
        vii. Time Collected – Provide time at which sample was collected.
        viii. Sampler – Select from pull-down menu or type in sampler.
        ix. Matrix – Select sample matrix from pull-down menu or type in matrix.
        x. Source - Select sample source from pull-down menu or type in source.
        xi. Collection - Select sample collection from pull-down menu or type in collection.
        xii. Sample Type - Select sample type from pull-down menu.
        xiii. Concentration - Select concentration, if known, from pull-down menu.
        xiv. Depth From – Enter top depth of sample interval.
        xv. Depth To – Enter bottom depth of sample interval.
        xvi. Depth Units - Select depth unit from pull-down menu or type in depth unit.
        xvii. Odor - Select odor from pull-down menu or type in odor.
        xviii. Color - Select color from pull-down menu or type in color.
        xix. Remarks – Enter any remarks.
    b. Analysis
        i. Required Fields: TAG
        ii. Analysis/TAT – Select analysis/TAT from pull down menu or type in analysis/TAT.

iii. CLP Sample # - For EPA projects under CLP program it will auto-populate if analysis type is coded properly.

iv. TAG – Tag number will auto-populate.

v. Container – Select container type from pull-down menu or type in container type

vi. No – Enter number of containers per sample.

vii. Collection – Select collection method from pull-down menu or type in collection method. It will auto-populate if collection is entered in sample details tab.

viii. Storage – Select storage method from pull-down menu or type in storage method.

ix. Lab QC – Yes indicates the laboratory should perform MS/MSD analysis on the sample. No indicates just normal sample analysis should be performed.

x. Description – Enter description.

xi. Preliminary – Yes indicates preliminary data is need. No indicates preliminary data is not needed.

xii. Other tabs are provided depending matrix. These tabs are not required, but have other useful information that can be added at the discretion of the PM.

4. Click ‘Save’ button at bottom of screen.
5. Click ‘Close’ button at bottom of screen.

3.2 Sample Labeling

1. Select applicable sample matrix under the ‘Sampling’ tab in the Scribe menu.
2. Use ‘Filter’ button at the top of the screen to select the samples for which labels are needed.
3. Select ‘Print Labels’ button at bottom of the screen.
4. If label setup has not been completed, select ‘Label Setup’. If label setup has been completed select ‘Preview’ and proceed to step no. 5.
    a. Standard label is Avery 5162. Select ‘5162’ and click ‘Next’.
    b. Drag parameters from list on the left to the label layout on the right.
        i. Required label fields:
            1. Sample #
            2. Date/Time

3. Analyses
4. Preservation
5. CLP Sample # (if under CLP program)

c. Click 'Next'.
d. Click 'Finish'.

5. Check preview and make sure information is correct.
6. Print labels using the printer icon at the top of the screen.

4.0 References

Scribe Quickstart Guide, Scribe User Manual for CLP Sampling

5.0 Attachments

Scribe Quickstart Guide
Scribe User Manual for CLP Sampling

1.0 Purpose & Application

This procedure describes techniques that will be used to determine sample names. Any variation from this SOP must be approved by the Project Manager prior to implementation and a description of the variance will be documented in the field logbook.

2.0 Equipment & Materials

- None.

2.1 Application

This SOP applies to all samples collected.

2.2 Limitations

None.

3.0 Procedure

3.1 Sample Naming

1. Name location from which sample was collected using a four character acronym and a four digit number. (i.e., CFSB0001, FAMW0109)
   a. The first two characters represent the site location or a sub-location within the site. For example:
      i. Site Name = Tutu Wellfield Site (TT)
      ii. Sub-location = Curriculum Center (CC)
   b. The second two characters represent the type of sample location
      i. MW – Monitoring Well
      ii. RC – Rock Core location
   c. Examples
      i. Site monitoring well no. 1 = MW-OU2-1.
      ii. Rock core sample 1= RCOU2-0001
2. Insert a dash and the two character matrix code.
   a. Groundwater – GW
   b. Rock Core – RC

3. Insert alphanumeric depth code using 1 of 2 formats.
    a. Format 1 (shallower applications)
        i. AA = 0
        ii. AB = 1.0
        iii. AC = 1.5 …
    b. Format 2 (deeper applications)
        i. A = 0
        ii. B = 1
        iii. C = 2…
4. Insert a dash and the following digit based on sample type.
    a. -0 = Field sample
    b. -1 = Field duplicate sample
    c. -2 = Equipment blank sample
    d. -3 = Field blank sample
    e. -4 = Trip blank sample
5. Begin a key to identify sample location names and which alphanumeric depth format is used.

4.0 References

None.

5.0 Attachments

None.

1.0 Purpose & Application

This procedure describes techniques that will be used to make a chain-of-custody form using sample management software, Scribe, and to maintain proper custody practices. Any variation from this SOP must be approved by the Project Manager prior to implementation and a description of the variance will be documented in the field logbook.

2.0 Equipment & Materials

- Scribe
- Computer/Tablet
- Printer

2.1 Application

This SOP applies to all projects which utilize Scribe as a sample management tool.

Scribe is a software tool developed by USEPA's Environmental Response Team (ERT) to assist in the process of managing environmental data. It is available for download at www.ertsupport.org/scribe_home.htm

2.2 Limitations

Scribe must be installed on either a computer or tablet device. A printer must also be available for labeling

3.0 Procedure

3.1 Chain-of-Custody

1. Custody is defined as being:
   a. In actual possession;
   b. In view after being in physical possession;
   c. In a locked laboratory; and
   d. In a secure, restricted area.
2. The field sampler is personally responsible for the care and custody of the sample until transferred.
3. The field sampler will note in the bound field logbook with permanent ink the meteorological data, equipment used for sample collection, calculations, QA/QC information and any observations.

4. Chain-of-Custody forms will be completed by the field sampler using Scribe as follows.
    a. Select ‘Chain of Custody’ under the ‘Sample Management’ tab.
    b. Click ‘Add a Chain of Custody’ at the bottom of the screen.
    c. Fill out COC Details.
    d. Click ‘Assign Samples to COC’.
    e. Select samples for inclusion on COC based on sample # and analysis. Use control and/or shift keys to select multiple rows.
    f. Click ‘Assign to COC#’ button at bottom of screen.
    g. Click ‘Print Chain of Custody’ button at bottom of screen.
    h. Select ‘Report Setup’.
    i. Under ‘COC Report Type’ select ‘Lab Copy’.
    j. Print and close COC.
    k. Click ‘Print Chain of Custody’ button at bottom of screen.
    l. Select ‘Report Setup’
    m. Under ‘COC Report Type’ select Region Copy’.
    n. Print and close COC.
5. Sign/date COC upon relinquishing custody.

4.0 References

Scribe Quickstart Guide, Scribe User Manual for CLP Sampling

5.0 Attachments

Scribe Quickstart Guide

Scribe User Manual for CLP Sampling

1.0 Purpose & Application

This procedure describes techniques that will be used to pack and ship samples. Any variation from this SOP must be approved by the Project Manager prior to implementation and a description of the variance will be documented in the field logbook.

2.0 Equipment & Materials

- Packing tape
- Plastic bags
- Custody seals
- Bubble wrap
- Coolers
- Ice
- Marker

2.1 Application

This SOP applies to all projects which ship environmental samples for laboratory analysis under EPA or CLP programs.

2.2 Limitations

None.

3.0 Procedure

3.1 Sample Packing

1. Sample labels will be generated per SOP-SM-02.
2. Affix a label to each sample container.
3. Place clear packing tape over label.
4. Place signed/dated custody seal over lid of each container.
5. If glass, wrap each container in bubble wrap.
6. Place each container in separate leak-proof plastic bag.

3.2 Sample Shipping

1. Procure insulated cooler.
2. Tape any drain shut.
3. Label cooler ‘Environmental Samples’.
4. Place ice in leak-proof plastic bag.
5. Place bagged ice in another leak-proof plastic bag (i.e., double bag ice).
6. Place layer of ice on bottom of insulated cooler.
7. Place packaged sample containers in insulated cooler. Take care to place them properly to prevent breaking. Sample containers should be placed upright.
8. Place additional double-bagged ice in cooler.
9. Put relinquished COC in leak-proof plastic bag along with return shipping label and tape to the bottom of the cooler lid.
10. Place temperature blank in cooler.
11. Close cooler lid.
12. Tape cooler shut.
13. Place signed/dated custody seal over cooler/lid seam.
14. Place clear tape over custody seal for further protection.
15. Drop-off for overnight shipment.
16. Maintain shipping labels/receipts and COC copies for project file.

4.0 References

None.

5.0 Attachments

None.

1.0 Purpose & Application

This procedure describes techniques that will be used to procure analytical services under Field and Analytical Services Teaming Advisory Committee (FASTAC) protocol. Any variation from this SOP must be approved by the Project Manager prior to implementation and a description of the variance will be documented in the field logbook.

2.0 Equipment & Materials

2.1 Application

This SOP applies to all EPA projects requiring samples for laboratory analysis.

2.2 Limitations

None.

3.0 Procedure

3.1 Analytical Service Request (ASR)

1. Determine analytical sampling needs.
2. Fill out ASR spreadsheet
    a. Project Information Tab
    b. Requested Analyses Tab
    c. Instructions Tab
3. Send ASR to the Regional Sample Control Coordinator (RSCC) Adly Michael.
    a. ASR with only standard analysis (TCL/TAL) should be submitted at least two weeks prior to sampling start date.
    b. ASR with any modifications to the standard analysis procedures (e.g., lower reporting limits, additional analytes, etc.) should be placed at least four weeks prior to sampling start date.
    c. ASRs with non-RAS requests should be submitted at least four weeks prior to sampling start date.

3.2 Tiered Decision Tree Process

1. EPA Region 2 DESA Laboratory

2. National Analytical Services Contract Laboratory Program (CLP)
3. Region Specific Analytical Services (SAS) Contract Laboratories
4. Contractor

3.3 Reporting

1. Upon completion of sampling, a trip report shall be submitted to the RSCC that summarizes the number and kind of samples that were analyzed by CLP (see attached trip report template).
2. For any analyses that were analyzed by a subcontracted laboratory, an ANSETs form shall be completed (see attached form).

4.0 References

None.

5.0 Attachments

Analytical Service Request Form

Trip Report

ANSETS Form

ATTACHMENT C

Sampling Logs

Test Boring Log

	Boring No.:
	Sheet **of**
Project Name:	**Project No.:**
Client:	**Date:** Start
Driller:	Finish
Drilling Method:.	**Total Depth:**
Boring Location:	**Depth To Water:**
Coordinates:	**Surf. Elevation:**
Logged By:	**Hole Diameter:**
Monitoring Instrument(s):	

Depth (ft)	Blows On Sampler 0"-6"	6"-12"	12"-18"	18"-24"	Recovery (in)	Instrument Reading	Sample Retained		Classification Of Material f - fine m - medium c - coarse and - 35-50% some - 20-35% little - 10-20% trace - 0-10%	Remarks

MONITORING WELL COMPLETION LOG

Project Number:

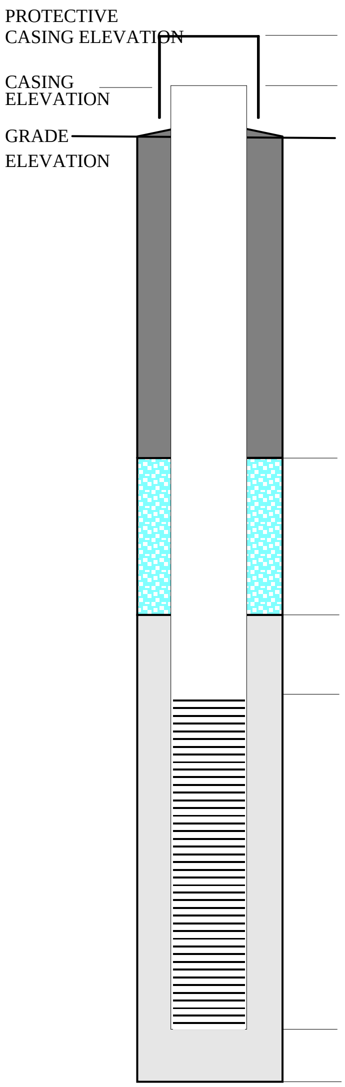
Project Name:

Well ID:

Client:

DATE DRILLED: | DATE DEVELOPED: | WELL CONSTRUCTION COMPLETED:

DEVELOPING METHOD:



NOT TO SCALE

INSPECTOR:

DRILLING CONTRACTOR:

TYPE OF WELL:

STATIC WATER LEVEL: DATE:

MEASURING POINT: TOTAL DEPTH OF WELL: TOTAL DEPTH OF BORING:

DRILLING METHOD

TYPE:

DIAMETER: CASING:

SAMPLING METHOD

TYPE:

DIAMETER: WEIGHT:

FALL: INTERVAL:

RISER PIPE LEFT IN PLACE

MATERIAL:

DIAMETER: LENGTH: JOINT TYPE:

SCREEN

MATERIAL:

INTERVAL: DIAMETER:

STRATIGRAPHIC UNITS SCREENED: SLOT SIZE:

FILTER PACK

GRADE:

SAND: GRAVEL: NATURAL:

AMOUNT: INTERVAL:

SEAL(s)

Portland Cement INTERVAL: AMOUNT:

Bentonite Slurry INTERVAL: AMOUNT:

Bentonite Pellets INTERVAL: AMOUNT:

Other: INTERVAL: AMOUNT:

NOTES:

LOCKING CASING: ☐ YES ☐ NO KEY NO:

HDR

HDR Well Development Log

Well #:
Date Started: **Start SWL:** **Developed By:**
Date Finished: **Finish SWL:** **Method:**

Meters
pH: **Conductivity:**
Temp: **Turb.:**

Time	pH	Temp	Conductivity	Turb.	Est. Purged Vol.	Comments

Note:
Temperature is measured in Celsius
Turbidity is measured in NTU
Volume is measured in gallons

HDR

Well Sampling Log

Well ID No.:

Well Casing Type:
Well Depth:**
Screened Interval:
Well Elevation:**
Ground Elevation:
Well Condition:
Weather Conditions:

Start SWL:
Water Column Ht.:
Well Casing Volume (gallons):
SWL During Sampling:
Sample Time:
Sample Method:
Sample Analyses:

Project:
Date:
Crew:
Purge Method:
Meters Used:
PID Head Space (ppm):

Time	Est. Gal. Purged	Purge Rate (gpm)	Temp. (C^o)	Cond.	ORP (mV)	D.O. (mg/L)	pH	TDS	Salinity (ppth)	Turbidity (NTU)	Depth to Water*	Comments

Comments:

Notes: Volume is measured in Gallons
* - Measurement taken from top of well casing

ATTACHMENT D

QA-QC Forms

QA/QC COMPLIANCE REVIEW FORM

Client:	USEPA Region 2	Review Date:	
Project:		Project Manager:	
Contract No:	EP-W-09-009	Reviewers:	
Attendees:			

QA/QC Review: ☐ Project Guide ☐ Filing ☐ Communications ☐ Quality Control ☐ Tech Proc ☐ Other:

Project Guide

Compliance Criteria:	Checked	Complies	Action:
1. Distribution & Updates			
2. Project Background & Description			
3. Project Team			
4. Communication Protocol			
5. Scope & Task Assignments			
6. Contractual Obligations			
7. Deliverables			
8. Schedule			
9. Budget			
10. Administration (Documentation, filing, etc)			
11. Quality Control Plan			
12. Health & Safety Plan			
13. Contract Requirements			
14. Technical Requirements			
15. Document Review Requirements			
16. Procedures to Be Followed			

Project Communications

Compliance Criteria:	Checked	Complies	Action:
1. Project Guide Requirements			
2. Transmittals			
3. Meeting Notes			
4. Telephone Records			
5. Letters			
6. Memorandum			
7. Client Contact Reports			
8. Progress Reports			
9. Faxes			
10. E-Mail			

Project Filing

Compliance Criteria:	Checked	Complies	Action:
1. Project Guide Requirements			
2. Master Files			
3. Technical Working Files			
4. Close-out & Archives			
5. Confidential Files			
6. Multiple Office Procedures			
7. File Checkout Procedures			
8. Project Development Files			
9. Contract Files			
10. Project Administration Files			
11. Communication/Correspondence Files			
12. Project Data/Reference Files			
13. Project Activity Files			

Quality Control Reviews			
Compliance Criteria:	Checked	Complies	Action:
1. Quality Control Plan			
2. QC Reviewer/Checker Qualifications			
3. Budget			
4. Schedule			
5. QC Documentation			
6. QC Responses & Approval			
7. Design Drawings			
8. Specifications			
9. Project Calculations			
10. Computer Programs			
11. Procurement Documents			

Technical Procedure: (identify procedure)			
Compliance Criteria:	Checked	Complies	Action:

Other Procedure: (identify procedure)			
Compliance Criteria:	Checked	Complies	Action:

DAILY QUALITY CONTROL REPORT

General			
PROJECT:	LOCATION:		
WEATHER CONDITIONS:	WRITTEN BY:		DATE:

Personnel Onsite	HDR	SUBCONTRACTORS	VISITORS

Materials, Etc.

MATERIALS, SUPPLIES, EQUIPMENT ONSITE AND BEING USED (note acceptability):

Completed Work and Details

WORK COMPLETED (including description of samples collected):

QC

QC ACTIVITIES COMPLETED (including calibration):

H&S

HEALTH & SAFETY INFORMATION:

Prob./Corr. Actions

PROBLEMS ENCOUNTERED/CORRECTIVE ACTIONS TAKEN:

Other

SPECIAL NOTES/INSTRUCTIONS:

Next Day

EXPECTED ACTIVITIES FOR TOMORROW:

FIELD QUALITY CONTROL AUDIT

Report No. **Date:** **Contract No.: USEPA Region 2, EP-W-09-009**

Project Name:

Weather: **Precipitation:** **Temp.: Min.** **Max.**

1. Personnel On-Site and Area of Responsibility:

NAME	: ORGANIZATION	: DESCRIPTION WORK

2. Work Performed Today: (Indicate location and description of work performed by prime and/or subcontractors).

3. Project Documents on-site: UFP QAPP, SSHP, EPA Procedures Manual, Other: (list)

4. Health and Safety Activities: Pre-Work Briefing Form Present (check box) ☐

Personnel Protective Equipment (PPE) List:

Comments:

____

5. **Field Equipment and Calibration Logs:**

EQUIPMENT	CALIBRATION LOGS
:	

6. **Low-Flow Well Sampling ::** Low-Flow Field Measurement Log Present (check box): ☐

Observation Log:

Well ID	Time	Observations

7. **Sample Collection**

Verify Conformance with QAPP: (check box) Compliant ☐ Non-Compliant ☐

Sample volume, container, preservation, labeling

Comments:____

____

____

____

_

8. **Field Quality Control Samples Collected: (check where appropriate)**

Well ID	Quantity	Field Duplicate	MS/MSD	Trip Blank	Rinsate	Comments

9. **Custody Procedures:** Review Chain of Custody, sample packaging, appropriate signatures, document retention (verify conformance with QAPP)

Comments:____

10. **Decontamination Procedures** (list activities)

11. **Corrective Actions:** (list corrective actions taken)

12. **Field Logbook and Sample Field Sheets** (verify conformance with QAPP and observation log above)

13. **Remarks:** (Instructions received or given. Conflict(s) in QAPP or HASP)

I certify this report is complete and correct, and all materials and equipment used and work performed during this reporting period are in compliance with the UFP QAPP and HASP, to the best of my knowledge, except as may be noted above.

HDR Field Auditor **Date**

MANAGEMENT REVIEW FORM

Client:	USEPA Region 2	Review Date:	
Project:		Project Manager:	
Contract No.:	EP-W-09-009	Reviewers:	
Attendees:			

Type of Review ☐ 0% ☐ 30% ☐ 70% ☐ 90% ☐ Milestone:

QA/QC Compliance: ☐ Project Guide ☐ Filing ☐ Communications ☐ Quality Control ☐ Tech Proc ☐ Other:

Project Overview: (type of project, client profile, negotiations, basis of cost estimate, current project status, yellow flag indicators)

Contract Review: (payment provisions, change order protocol, non-standard terms & conditions)

Contract Value: ____________ **Contract Expiration:** ____________

Type of Contract: ☐ Lump Sum ☐ Cost+ ☐ Per Diem ☐ % Construction ☐ Labor Rate Schedule ☐ Incentive Payment

Multiplier ________ Maximum ________ Not to Exceed ________ Fixed Profit ________ ☐ Retainage

Scope & Deliverables: (Project Guide, work plan, task breakdown, assignment of responsibilities, completion status)

Out of Scope Items/Additional Services: (pending change orders, change order documentation, additional work performed)

Schedule: (baseline, milestones, deliverables schedule, critical path, progress to date, updates, delays, contract requirements)

Staff Projections/Project Team: (org chart, WorkPlan projections, worksharing, workload & availability, experience/qualifications, support staff, communications/meetings, staff development)

Subcontractors: (type, tasks & deliverables, subcontract agreement, insurance certificates, performance)

Quality Control: (documents reviewed, schedule, reviewers, budget, documentation, design standards)

MANAGEMENT REVIEW FORM

Project Name: ______________________________ **Project No:** ______________

Contract Financial Status: (PIP/CIF, cost sheet, billing summary, invoice, earned fee, equity, A/R)

Budget & Fee As of:		**Earnings Summary** As of:		**A/R** As of:	
Gross Fee		HDR Earned Fee		Current	
Subs		Subs Earned Fee		30 days	
Net Fee		Earned Fee		60 days	
Budget		Billed to Date		90 days	
Profit		Equity		120 days	
Profit %				>120 days	
		Profit to Date			
Budget Contingency		Profit %		Retainage	
Add'l Fee Not Booked		Equity Adjustments			

Project Cost Summary As of:

	Actual Cost	Estimate to Complete	Estimate at Completion	Budget	Variance
HDR					
Subs					
Contract					

As of:	% Spent	Estimate at Completion % Complete	Earned Value % Complete
HDR			
Subs			
Contract			

Earned Value As of:	
Earned Value	
Cost Variance	
Schedule Variance	

Financial Management Comments:

Project Management: (filing, documentation, communications protocol & records, status reports, marketing update)

Health & Safety: (plan, requirements, issues, communication, training)

Client Satisfaction: (relations, communications, contact, feedback, expectations, client report card, follow-on work)

Outstanding Issues/Comments: (HDR risks & liabilities, project completion risks)

Action Items: (action, responsibility, schedule)

HDR

QUALITY CONTROL REVIEW REPORT

- ♦ Job Name: ____________________
- ♦ Contract Number: EP-W-09-009
- ♦ Project Mgr: ____________________
- ♦ Contract Mgr. Bradley Williams
- ♦ QC Reviewer: ____________________
- ♦ Date Transmitted: ____________________
- ♦ Review Deadline: ____________________
- ♦ Allocated Hours: ____________________
- ♦ Actual Review Date: ____________________
- ♦ Actual Hours: ____________________
- ♦ Document Reviewed: ____________________

♦ Project Type/Phase: Draft Evaluation Model

♦ Study:

- ☐ Concept/Development
- ☐ Draft
- ☐ Final

♦ Design:

- ☐ Schematic
- ☐ Design Development
- ☐ Plans & Specs

♦ Construction

- ☐ _____ % Complete
- ☐ Final Completion

Personnel Involved in Review:

- ☐ Architectural ____________
- ☐ Structural ____________
- ☐ Mechanical/Maint. ____________
- ☐ Electrical ____________
- ☐ Civil ____________
- ☐ Process/Operations ____________
- ☐ Landfill Design ____________
- ☐ RR Feasibility ____________
- ☐ Permit Applications ____________
- ☐ Environmental ____________
- ☐ Cost Estimation ____________
- ☐ Contracts ____________
- ☐ Other ____________

Signatures:

____________________ Reviewer

____________________ Project Manager

INSTRUCTIONS:

1. Project Manager fills out items indicated by (♦) and transmits to assigned QC Reviewer with copy to DM.
2. After review, QC Reviewer returns copies to Project Manager (PM), Department Manager (DM) (Cover sheet only).
3. PM responsible for responses to be returned to QC Reviewer with copy of cover letter to DM.

cc: PM, DM

FDR

COMMENT:

RESPONSE:

ATTACHMENT E

Corrective Action Report

CORRECTIVE ACTION REPORT

PROJECT:	**Date:**
LOCATION:	**WRITTEN BY:**

Description of Activities:

Description of Nonconformance:

Apparent Cause:

Actions Taken to Correct Condition:

Action Taken to Prevent Recurrence:

Signature and Date:

ATTACHMENT F

Trip Report

SAMPLING TRIP REPORT

Site Name:
CERCLIS ID Number:
Sampling Dates:
CLP Case Number:
Site Location:
Sample Descriptions:

Laboratories Receiving Samples (Table 1):

Case Number	Sample Type	Name and Address of Laboratory

Sample Dispatch Data (Table 2):

FedEx Airbill No.	Number of Coolers	Number and Type of Samples	Time and Date of Shipping

Sampling Personnel (Table 3):

Name	Organization	Site Duties
		Remedial Project Manager
		Sampling Operations/Team Leader
		Health & Safety/Sampler

Sample Numbers and Collection Points (Table 4):

Laboratory	Analyses	Sample Type	Sample #	Sample Collection Point(SCP)

ATTACHMENT G

Analytical Services Forms and Chains of Custody

SOP HW-32
Revision 6
December 2006

Region 2 Policy for Implementing the National Strategy for Procuring Analytical Services for all OSWER Programs (Superfund, RCRA, and Brownfields)

Standard Operating Procedure

Prepared by: ____________________ Date: 12/7/2006
Jennifer Feranda, CLP Project Officer
Hazardous Waste Support Section

Peer Reviewed by: ____________________ Date: 12/7/2006
Adly Michael, RSCC
Hazardous Waste Support Section

Concurred by: ____________________ Date: 12/7/06
Linda Mauel, Section Chief
Hazardous Waste Support Section

Approved by: ____________________ Date: 12/11/06
Robert Runyon, Chief
Hazardous Waste Support Branch

Annual Review

Reviewed by: ____________________ Date: __________
Name

Reviewed by: ____________________ Date: __________
Name

Overview

Superfund's Field and Analytical Services Teaming Advisory Committee (FASTAC) analytical services strategy requires Agency personnel to utilize a tiered decision tree for procuring Superfund analytical services for all non-time critical data collection projects. Region 2 has and continues to utilize that sequential decision tree for procuring Superfund analytical services. The decision tree is as follows:

Tier 1: EPA Region 2 DESA laboratory (including ESAT support)
Tier 2: National Analytical Services Contract Laboratories (CLP RAS and Non-RAS)
Tier 3: Region Specific Analytical Services (SAS) Contract Laboratories
Tier 4: Contractor, IAGs and Field Contractor Subcontract laboratories

Region 2 has taken many steps to assure that the FASTAC process is being followed and that Regional and National laboratory resources are being utilized to the fullest extent by the Superfund program. Some of these steps include:

1. Centralization of all Superfund analytical services procurement activities through the Regional Sample Control Coordinator (RSCC).

2. Coordination between the RSCC and the Regional DESA laboratory.

3. Outreach/training on the FASTAC process and procuring analytical services to the Superfund Program Office on a regular basis.

4. Participation in annual (or more frequent as needed) meetings with Superfund field contractors and their EPA Project Officers to outline the FASTAC process and associated requirements.

5. Operation of a Regional non-RAS tracking database, in addition to the National **An**alytical **Se**rvices **Tr**acking System (ANSETS) database, to track what non-RAS analytical services are being provided by the Regional DESA laboratory and what is being subcontracted out. The Regional database and ANSETS are compared on a monthly basis to assure that the FASTAC sequential decision tree for procuring analytical services is being followed.

The following is the step by step process by which the RSCC receives and processes RAS and non-RAS analytical requests.

Definitions:

Routine Analytical Services (RAS): Standard Target Compound List (TCL) (VOA/Semi-VOA/Pesticide/PCB Aroclors) and Target Analyte List (TAL) (metals and cyanide)

Non-Routine Analytical Services (Non-RAS): All analytical services not considered as RAS as follows:

1. Non-RAS analytical services able to be performed using the CLP RAS contracts flex clause
2. Non-RAS National CLP methods (Dioxin, PCB Congener, Air, etc.)
3. All other Non-RAS

Analytical Service Requestor: The EPA site Project Manager (OSC, RPM, etc.) or their designated representative (i.e., field contractor, State, Army Corp of Engineers, etc.).

Process:

RSCC Contact Information

Jennifer Feranda: RSCC and CLP Project Officer, Non-RAS Contracts TOPO e-mail: feranda.jennifer@epa.gov ; phone# (732) 321-6687
Adly Michael: Primary RSCC, Database Coordinator, e-mail: Michael.adly@epa.gov; phone# (732) 906-6161
Robert Toth: RSCC, e-mail: toth.robert@epa.gov; phone# (732) 906-6171

The procurement of analytical services often starts with EPA PMs and/or their representatives contacting the RSCC to determine appropriate steps for procuring their analytical services and what documentation is required to submit these requests. The following steps delineate the process beginning with the RSCC's receipt of the formal request for analytical services:

1. **All analytical requests should be submitted to the RSCC at the earliest possible date**. Requests for all Superfund analytical services, both RAS and Non-RAS, are submitted to the RSCC up to one week prior to the sampling event. It is strongly recommended that all requests for non-Routine services be submitted at least four (4) weeks prior to the actual sampling event.* All requests should be submitted to RSCC by noon Tuesday. Any requests submitted after noon on Tuesday may not be considered until the following week.

2. DESA supplies analytical service requestors with electronic versions of the following analytical request forms: "U.S. EPA Region 2 CLP Analytical Services Request Form" (Attachment 1) and "U.S. EPA Region 2 Laboratory Analysis Request Form" (Attachment 2). All requests and subsequent correspondence relating to the request for booking are required to be transmitted electronically via e-mail. All requests should be

E-mailed to the RSCC, Adly Michael, with a cc: to Jennifer Feranda, and Robert Toth per the contact information provided above. This assures timely consideration of the analytical services request and serves as a Record of Communication (ROC) and the basis for hard copy documentation , as well as traceability for all requests being made.

3. Upon RSCC receipt of a request, a case folder is generated for that project. Hard copies of requests, ROC(s), additional e-mail and documentation relating to that case are placed in the file as they are received.

4. Upon receipt, analytical services requests are reviewed for completeness, accurate content, and confirmation of an approved (or approval pending) QAPP for the project. **No analytical services will be scheduled without an approved QAPP.**

5. Once requests have been reviewed for accuracy, completeness and QAPP status, they are submitted via e-mail to the DESA Lab. The DESA Lab holds booking meetings on Tuesday afternoons or Wednesday mornings to determine what projects (or portions thereof) they can accommodate.

6. No later then noon of Wednesday following the submittal of the request, the DESA Lab responds to the RSCC as to what analytical services they will provide. **All communications are done via e-mail in order to provide timely communication and a basis for a documented record.**

7. When the RSCC receives the information from the DESA Lab as to what services they will provide, several things occur:

- **a.** For RAS requests that will not be conducted by the DESA laboratory, the information is entered into the **Su**perfund **P**roject **R**equest **S**ystem (SUPRS) to be processed through the CLP. SUPRS is a national web based database that provides regional information to the Sample Management Office (SMO) to enable them to procure the appropriate CLP laboratory for the services requested.

- **b.** For non-RAS samples the CLP Organic and Inorganic Program Managers (PM) (located in HQ-Analytical Services Branch [ASB]) are consulted to see if special analyses can be performed through the CLP RAS contract(s) using the contracts "Flexibility Clause". If they can be analyzed through the CLP, RAS contract flex clause modifications are written by the PMs and requests are entered into SUPRS.

- c. Requests for Non-RAS national contracts (Dioxin, PCB Congener and Air analysis) are provided to the DESA Non-RAS program Task Order Project Officer (TOPO) for processing. The TOPO will write a specific Task Order Request for each individual project and submit it to ASB and the HQ Office of

  Acquisition Management (OAM) Contracting Officer (CO) for review and to be offered for bid to contract labs under the National Non-RAS Blanket Purchase Agreements (BPAs). Once the lab(s) come back with a bid price, a lab is selected by the OAM CO and a procurement is prepared by the Region to transfer funds in to the national Non-RAS contracts. Laboratory information and special instructions are forwarded, via-email, to the EPA PM and their sampling representative at the time the procurement is to be prepared. Analytical services can be initiated upon OAM's receipt of the procurement.

d. For non-RAS requests that can be accommodated by DESA and/or the CLP flex clause, the analytical service requestor will be notified of such and will be provided contact and delivery, as well as any special, instructions.

e. For non-RAS requests that can not be accommodated through the DESA Lab, the CLP flex clause or the national Non-RAS program, the analytical services requestor is notified via e-mail that alternative means for analytical services will have to be obtained i.e., subcontract .

8. For work to be performed by the CLP for RAS and flexibility clause Non-RAS, SMO provides the RSCC, via e-mail, a Case number and laboratory assignments.

9. Once laboratory and case information are received from SMO (for CLP RAS and flex clause non-RAS), RSCC transmits this information, via e-mail to analytical services requestor. This information is transmitted via e-mail.

10. Two databases are maintained by the RSCC:

a. **Database #1:** This database tracks all RAS, flexibility clause non-RAS, and national contract non-RAS which are analyzed through the DESA Laboratory and the CLP (this database tracks all information from the time the samples are booked through sampling, analysis, data validation, and archiving). RAS analyses performed by the DESA lab are entered into this database, but only to the point of sample scheduling by the DESA lab. All work done after the scheduling is tracked by the DESA lab. (Attachment 3)

b. **Database #2:** This database tracks all other non-RAS analyses whether handled by the DESA laboratory or subcontracted out. It tracks non-RAS Superfund analytical work not tracked in Database #1(flex clause non-RAS and Non-RAS done through national contracts). The information in this database includes specifics about the project, the required analysis, number of samples, how those samples are analyzed (DESA vs. sub-contract lab), etc. (Attachment 4)

By COB Friday of each week, all new projects and relevant information are entered into each database as appropriate. The databases are updated with new information as needed.

11. At the end of each month, ANSETS (non-RAS tracking) information is provided to the RSCC by the analytical service requestors (Attachment 5). The information is entered into the Regional Database # 2 and the national ANSETS database. Monthly ANSETS reports are sent to the RSCC, by SMO, for their review. Concurrently, these reports are compared to the Regional Database #2 to try and determine whether the Superfund program and their representatives are following the FASTAC process as outlined by EPA HQ and Region 2.

12. If, after lab assignments are made, there is a change in the sampling event (i.e., change in date; cancellation; change in the number of samples being collected, etc.) the RSCC must be notified immediately upon the knowledge of any changes to the project, via e-mail. If there is a change in the sampling date or the number of samples being collected, a new laboratory request form (for the DESA laboratory or the CLP, as appropriate) must be submitted to the RSCC. (Reference Attachment 6).

* In FY' 03/04 DESA staff initiated a concerted effort to have RPMs involve DESA staff in scoping meetings for their projects. Early involvement in project planning enables the DESA lab to better accommodate the needs for the individual projects.

Names and Organizations Involved in the Procurement Process

RSCC: Adly Michael and Jennifer Feranda
EPA Region 2, Division of Environmental Science and Assessment (DESA)
Hazardous Waste Support Branch (HWSB), Hazardous Waste Support Section (HWSS)
DESA-HWSB-HWSS

- Regional Sample "Broker" all analytical services; oversight National CLP and National Non-RAS contracts.

DESA Lab Analytical Coordinator: John Birri,
EPA Region 2, DESA Laboratory Branch (LAB), DESA-LAB

- Coordination/Contact for all samples analyzed by the DESA Laboratory

Contractors and EPA Project Officers (PO):

Contractor: CDM Federal RACS
EPA PO: Fernando Rosado
CDM : Jeniffer Oxford

Contractor: Tetra Tech Environmental RACS
EPA PO: Keith Moncino
Tetra Tech: Lynn Arabia

Contractor: Weston RST
EPA PO: Helen Eng
Weston: Smita Sumbaly

Contractor: Weston SAT
EPA PO: Helen Eng
SAT: Yunru Yang

Contractor: **TechLaw, ROCs**
EPA PO: Richard Graciano
ROC: John Fellinger

IAG: U.S. Army Corp of Engineers
EPA PO: Shaheer Alvi
USACE: Andrea Pouliet

ATTACHMENT 1

U.S. EPA REGION II

CLP ROUTINE ANALYTICAL SERVICES REQUEST FORM

Assigned CLP Case #: **Canceled:**

Site Name: **City/State:** **Site Spill ID:**

CERCLIS ID: **Operable Unit:** **Purpose Code:**

Sampling Contact: **Phone#:** **Organization:**

EPA Project Manager: **QAPP Approved by EPA:** Y/N **Date of QAPP Approval:**

E-Mail Lab Assignments: Y/N **E-Mail for Lab Info:** **E-Mail for Data:**

Proposed Sampling Date(s): **Proposed Ship Date(s):** **Saturday Delivery:** Y/N

Oversight/Split Sampling (PRP/Fed. Facility): Y/N **Labs Used by PRP,FF:**

Contaminant(s) of Concern (If known):

Number of Samples	Conc. Level L/M	Matrix (soil, aqueous, etc.)	Analysis	Turn Around Time 7, 14, or 21 days	SOW# and/or Method (i.e. OLM0x.x ,Modified 5035)	LabAssignment

Comments:

Sampling Project Manager: ____________________ **Signature/Date:** ____________________

RSCC: ____________________ **Signature/Date:** ____________________

ATTACHMENT 2

US EPA REGION 2 LABORATORY
non-RAS ANALYSIS REQUEST FORM

SURVEY NAME: ________ DATE OF INITIAL REQUEST ________ REVISED REQUEST DATE ________

REQUESTOR: ________ PHONE NUMBER ________ E-MAIL: ________

AFFILIATION: ________ Purpose Code: ____ Site Spill ID: ____ Operable Unit: ____

Address for Final Report: Check to E-mail Final Report: ☐

# SAMPLES	ANALYTE	MATRIX	# SAMPLES	ANALYTE	MATRIX	# SAMPLES	ANALYTE	MATRIX	# SAMPLES	ANALYTE	MATRIX
	SANITARY			*NITRITE			*E. COLI			VOA, 524.2 (DW levels)	
	ACIDITY			OIL & GREASE			*ENTERO-COCCUS, MF			HALOACETIC ACIDS	
	ALKALINITY, TOTAL			*ORTHOPHOS-PHATE			*ENTERO-COCCUS, MPN			ORGANOTINS	
	AMMONIA			PHENOLICS			*F-COLIFORM, MF			PCB CONGENERS (identify list)	
	ASPHALTENES			PHOSPHORUS			*F-COLIFORM, MPN			PCBs, TCL	
	*BOD, 5 DAY			SOLIDS, % 105degC			HETERO. PLATE COUNT (HPC)			PCBs, TSCA	
	*CBOD, 5 DAY			SPECIFIC CONDUCT.			*T-COLIFORM, COLILERT			PESTICIDES, TCL	
	CHLORIDE			SULFATE			*T-COLIFORM, MF			*PESTICIDES, WEST NILE	
	COD			SULFIDE			*T-COLIFORM, MPN			PESTICIDES, other (identify)	
	*COLOR			SULFIDE, UNIONIZED			*METALS*			*BIOLOGY*	
	CORROSIVITY			SULFUR			METAL:			#EFFLUENT TOXICITY - ACUTE	
	CYANIDE			TDS			ARSENIC			#EFFLUENT TOXICITY - CHRONIC	
	CYANIDE AMENABLE TO CHLORINATION			TKN			LEAD			#SED. TOXICITY - FRESH WATER	
	CYANIDE, WEAK ACID DISSOC (FREE)			TOC			METALS - SLUDGE			#SED. TOXICITY - MARINE WATER	
	DENSITY			TPH			HARDNESS			*GRAIN SIZE:*	
	*DO (Diss. Oxygen)			TSS			METALS FINISHING			1. Check Grain Size Method:	
	FLUORIDE			*TURBIDITY			METALS TAL (DW levels)		☐	Pipet Method (Plumb 1981) OR	
	*HEX. CHROMIUM			VISCOSITY			METALS, TAL		☐	Hydrometer Method (ASTM 422D-63)	
	IGNITABILITY			*MICRO*			METALS - TCLP			2. Check Sand/Sieve Reporting Units:	
	*MBAS [surfactants]			ASBESTOS			*ORGANICS*		☐	% Total Sand OR	
	*NITRATE			*CLOSTRIDIUM PERFRINGENS			NVOA, TCL		☐	% Sand Fractions (Very Coarse Sand, Coarse Sand, Medium Sand, Fine Sand, Very Fine Sand)	
	NITRATE + NITRITE			*CRYPTO/GIARDIA			NVOA - TCLP			3. Check Fine or Mud Fraction Reporting Units:	
							PAHs		☐	% Total Fines (Silt + Clay combined) OR	
							TRIHALO-METHANES (THMs)		☐	% Total Silt and % Total Clay	
							VOA, TCL				
							VOA, TCLP				

☐ REQUEST ACCEPTED

☐ REQUEST NOT ACCEPTED

ABOVE STATUS APPROVED BY: JOHN BIRRI

DATE APPROVED: ________

NOTE: NO WEEKEND DELIVERIES ACCEPTED

SAMPLING DATES: from ________ to ________

SAMPLING TIMES FOR SHORT HOLDING TIME [asterisked]TESTS (check one):

☐ 0000 - 0600 ☐ 0600 - 1200 ☐ 1200 - 1800 ☐ 1800 - 2400 HRS

ARRIVAL DATES: from ________ to ________

ARRIVAL TIMES (check one): ☐ 8-11am ☐ 11am-4pm ☐ After 4pm

METHOD OF SHIPMENT: ________

SPECIAL REQUESTS: (e.g. - turnaround time, additional analytes, etc.)

REPORTING REQUIREMENTS (attach separate sheet, if more room is needed):

MATRIX KEY: A = AQUEOUS; D = DISSOLVED; S = SOLID; SL = SLUDGE; N = NON-AQUEOUS LIQUID/ OIL; O = OTHER (Describe)
- Specify organism, endpoints and test duration

VERSION DATE: 1/03/2005

ATTACHMENT 3

Database I / DATA TRACKING SUMMARY REPORT*

Site Name / Location		Case No./ Sampler	Request Rec'd Date	DESA Accept	CLP Accept	Requestor Notified Date	Case Booked Date	LAB	Analysis	Proj'd No. of Sample	TAT	Sampling Start Date	Sampling End Date	Data Due to HWSS	Act'l No. of Sample	Data Rec'd from Lab
Mohonk Road Industrial		33937														
High Falls	NY	USACE														
			2/22/2005	No, Odd Analyte(s)	Yes	3/4/2005	3/4/2005	LIBRTY	LC-VOA+1,4-di	5	14	3/10/2005	3/10/2005	3/25/2005		
Juana Diaz Wells		33938														
Juana Diaz	PR	PREQB														
			2/24/2005	No, Capacity	Yes	3/4/2005	3/10/2005	DATAC	LC-VOA	25	21	3/7/2005	3/11/2005	4/4/2005	17	
			2/24/2005	YES		3/2/2005	3/10/2005	DESA	LC-BNA	18	21	3/7/2005	3/11/2005		0	
			2/24/2005	YES		3/2/2005	3/10/2005	DESA	LC-Pest/PCBs	18	21	3/7/2005	3/11/2005		0	
			2/24/2005	YES		3/2/2005	3/10/2005	DESA	TAL-Metals+Hg	18	21	3/7/2005	3/11/2005		0	
			2/24/2005	YES		3/2/2005	3/10/2005	DESA	CN	18	21	3/7/2005	3/11/2005		0	
Lightman Drum Compan		33939														
Winslow Twp.	NJ	CDM														
			[illegible]/1/2005	No, Ca[illegible]ity	Yes	3/4/2005	3/[illegible]2005	[illegible]A4	TC[illegible]VOA	[illegible]5	21	3/[illegible]2005	3/18/2005	4/4/2005		
			[illegible]2005	YES		[illegible]/1/2005	3/1/[illegible]05	[illegible]ESA	TA[illegible]Metals+Hg	[illegible]3	21	3/[illegible]2005	3/18/2005		0	
Fried Industries	-	33940														
East Brunswick	NJ	TTFW														
			2/25/2005	YES		3/1/2005	3/1/2005	DESA	TAL-Metals+Hg	7	21	3/7/2005	3/11/2005		0	
			2/25/2005	No, Odd Analyte(s)	Yes	3/4/2005	3/4/2005	LIBRTY	LC-VOA+1,4-di	10	21	3/7/2005	3/11/2005	4/4/2005		

EXAMPLE

* Summary Report of RAS, modified RAS analyses, and national non-RAS contracts information.

Thursday, March 17, 2005 Page 1

ATTACHMENT 4

Database II / DATA TRACKING SUMMARY REPORT*

Site Name	Request Received Date	DESA Accept	Requestor Notified Date	Laboratory Name	Sampling Begin	Sampling End	Projected Samples	Collected Samples	Matrix	Analysis	TAT	Method
Consolidated Iron and Metals												
	6/1/2004	No, Capacity	6/3/2004	GPL Laboratories	6/7/2004	6/30/2004	5	3	Water	Volatiles	1	
	6/1/2004	No, Capacity	6/3/2004	GPL Laboratories	6/7/2004	6/30/2004	10	9	Water	TPH	21	SW-846 8015B
	6/1/2004	No, Capacity	6/3/2004	GPL Laboratories	6/7/2004	6/30/2004	3	2	Soil	TPH	21	SW-846 8015B
							18	14				
Lawrence Aviation Industries												
	4/2/2004	No, Capacity	4/6/2004	STL-Laboratories	4/12/2004	4/23/2004	12	11	Water	Titanium	21	SW-846 6010B
	4/2/2004	No, Capacity	4/6/2004	STL-Laboratories	4/12/2004	4/23/2004	140	136	Soil	pH	21	SW-846 9045C
	4/2/2004	No, Capacity	4/6/2004	STL-Laboratories	4/12/2004	4/23/2004	140	136	Soil	TOC	21	Lloyd Kahn
	4/2/2004	No, Capacity	4/6/2004	STL-Laboratories	4/12/2004	4/23/2004	140	136	Soil	Grain size	21	ASTM-D421-85
	4/2/2004	No, Capacity	4/6/2004	STL-Laboratories	4/12/2004	4/23/2004	130	122	Soil	Titanium	21	SW-846 6010B
							562	541				
							580	555				

* Summary Report of non-RAS analyses (other than non-RAS under National Contracts) either by EPA lab or subcontracted out.

ATTACHMENT 5

Analytical Services Tracking System (ANSETS) Reporting in Region 2

The following details EPA Region 2's procedures/process for reporting under ANSETS.

1. All sampling organizations (EPA, state, US Army Corp, and contractors) in Region 2 that procure analytical services under Tier 4 of the FASTAC process (sub-contract, IAG, etc.) must submit a form (Exhibit 1)detailing these analytical services (i.e., site information, matrix, analysis, number of samples, laboratory, etc) to the Regional Sample Control Coordinator (RSCC) on a monthly basis.

2. All of the data provided by the sampling organizations are entered into the Regional Database #2 and a Regional copy of the ANSETS database.

3. The information from the Regional ANSETS database is then exported (on a monthly basis) to the Sample Management Office (SMO) for incorporation into the National ANSETs Database.

4. Once SMO collects all of the information, they prepare a report of all the information collected from the Region and send the RSCC a report detailing information on each site in which information that was submitted for that month as well as a running total of the different types of analyses reported for the Fiscal Year. This report is sent to the CLP Project Officer (PO)/RSCC monthly.

5. The CLP PO/RSCC reviews the report, compares it with the regional database (Database #2) and disseminates the information as necessary to the DESA Lab, HWSS and HWSB management. The CLP PO/RSCC also may contact EPA Project managers or their designated representatives when questions arise as to why sub-contracts were used vs. the EPA DESA lab or the CLP.

Contacts for ANSETS Reporting

Jennifer Feranda: EPA Region 2 CLP PO/RSCC; DESA-HWSB-HWSS
- Overall coordination; review of reports and dissemination of information

Adly Michael: EPA Region 2 RSCC
- Regional ANSETs Database management and data entry
- Maintains files on all ANSETS documentation submitted to RSCC

Sampling Organization Contacts (Responsible for submitting ANSETS information)

Dianne Salkie: US EPA Region 2 DESA-HWSB-SCST
Jenniffer Oxford: CDM Federal Programs
Lynn Arabia: Tetra Tech Environmental Corp.
Smita Sumbaly: Weston Removal Support Team (RST)
Yunru Yang: Weston Site Assessment Team (SAT)

Frank Sorce: NJ Department of Environmental Protection (NJDEP)
Lisa Greco-Segazi: Malcolm Pirnie Inc. (MPI)
David Evans: U.S. Army Corp of Engineers, Kansas City District

United States Environmental Protection Agency

EXHIBIT 1

Attachment 2 - ANSETS Data Requirement (List of Required Data)

Date: ____________________

Sampling Start Date:
Sampling End Date:

Project Numbers			
Project Number:	Regional Account Number:	DAS Number:	Assoc. CLP Case No:
Site Information			
Site Name:		City:	State:
CERCLIS ID:	Operable Unit:	Action:	Funding Lead:
Responsible EPA Project Individual:		Sampling Organization:	

Analytical Services Information	
If field analytical services are used during this project write "field analysis" in the Laboratory Name Column. If fixed laboratory is used write the name of the laboratory in the Laboratory Name Column. Please specify in this box all field analytical techniques used.	COST:

Laboratory Name (include location if multiple lab locations)	No. Samples	Matrix	Analysis	Requested Turnaround (Days)

Completed by:	Organization:	Date:

ATTACHMENT 6

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II

DATE: October 13, 2004

SUBJECT: Procedures for Notification of Changes in Sampling/Analytical Schedules

FROM: Robert Runyon, Chief
Hazardous Waste Support Section (2DESA-HWSB)

TO: Vince Pitruzzello, Chief
Program Support Branch (2ERRD-PSB)

The purpose of this memo is to provide you with an update on requirements for procuring any Superfund analytical services through EPA Region 2's Division of Environmental Science and Assessment (DESA) laboratory and the National Contract Laboratory Program (CLP).

Over the past several months there has been a significant increase in the number of sampling events that have; 1) been postponed; 2) been cancelled; 3) been extended beyond the sampling period previously designated; or 4) changed the number of samples submitted to laboratories for analysis from the number scheduled (increased or decreased, often significantly). While it is understood that sampling and field work can sometimes be unpredictable with delays and/or changes in sample numbers, sampling events requiring changes are occurring more frequently among Region 2 field contractors. In addition, RPMs and/or samplers are not notifying the Regional Sample Control Coordinator (RSCC) and/or DESA lab of any such changes in a timely manner. Often, the RSCC or DESA laboratory are notified after the samples were expected to arrive at the lab(s), and/or DESA staff are required to initiate contact with sampling contractors to determine the status of scheduled samples that have not been received.

Delays in notification of changes in scheduled sampling projects result in costly workload inefficiencies. DESA sample coordinating staff spend unnecessary time tracking down the status of specific projects when samples don't arrive on schedule, and the scheduled analytical resources requested are unavailable for use on other projects while committed to scheduled projects.

The following procedures are being implemented to make most cost effective use of analytical resources, and to ensure that proper communication on sampling issues is being maintained between EPA Project Managers, their contractors, and DESA staff:

1) It is the Site Project Manager's (RPM, OSC, SAM, etc.) and their contractor's responsibility to notify the RSCC of any changes to sampling schedules or numbers of samples being submitted. Notifications should be made immediately upon the knowledge of any changes to the sampling project schedule or sampling numbers. Failure to appropriately notify the RSCC could result in samples not being analyzed or an extension in the time to complete analysis. This holds true for both the DESA laboratory and the CLP.

2) All notification of changes in sampling schedules or the number of samples being submitted for analysis (either to the DESA laboratory or the CLP) **must** go through the RSCC, currently Jennifer Feranda.

3) For any changes in sampling dates or the number of samples being submitted, a new Booking request form must be completed and submitted to the RSCC. The appropriate form must be

used dependent on which lab(s) are scheduled to receive the samples (i.e., the DESA laboratory or the CLP).

4) Once all scheduling issues have been resolved, communication on other sampling and technical issues can be directed to the appropriate contacts: John Birri (732) 906-6886 for the DESA laboratory and Adly Michael (732) 906-6161 for the CLP.

Should you have any questions or require further information, please contact me at (732) 321-6645 or Jennifer Feranda of my staff at (732) 321-6687.

Attachments

cc: Deb Szaro
Linda Mauel
Jennifer Feranda
John Bourbon
John Birri
Adly Michael

United States Environmental Protection Agency

ANSETS Data Requirement

Date: ____________________ Sampling Start Date: ____
Sampling End Date: ____

Project Numbers			
Project Number:	Regional Account Number:	DAS Number:	Assoc. CLP Case No:
Site Information			
Site Name:		City:	State:
CERCLIS ID:	Operable Unit:	Action:	Funding Lead:
Responsible EPA Project Individual:		Sampling Organization:	

Analytical Services Information	
If field analytical services are used during this project write "field analysis" in the Laboratory Name Column. If fixed laboratory is used write the name of the laboratory in the Laboratory Name Column. Please specify in this box all field analytical techniques used.	COST:

Laboratory Name (include location if multiple lab locations)	No. Samples	Matrix	Analysis	Requested Turnaround (Days)
	7			
Completed by:		Organization:		Date:

US EPA Region 2
Analysis Request Form

CLP Case/Project #:		**Date Received by RSCC:**		**Date Cancelled:**	

Site Name:
City/Town:
State:

CERCLIS ID:
Op Unit: **Site Spill ID:**
Action Code:

Sampling Dates:
Start:
Finish:

Arrival Time:
- ☐ 0800-1200Hrs
- ☒ 1200-1600Hrs
- ☐ After 1600 Hrs

EPA Project Manager:
First Name:
Last Name:

Analytical Services Requestor:
First Name:
Last Name:
Phone #:
Organization:

Proposed Shipping Dates:
Start:
Finish:

Saturday Delivery? ☐ Yes

EPA Approved QAPP?: ☐ Yes
Date of QAPP Approval:

Oversight/Split Sampling?: ☐ Yes
(e.g. PRP/Fed Facility)

Labs Used:
(PRP/FF)

E-mail for Lab Assignments:

E-mail for Data:

Address for Hard Copy:

Contaminants of Concern (if known):

Known Hazardous Waste Constituents:

Special Requests & Reporting Requirements (attach if more space required):

Please Provide CLP Sample Numbers
Please send hard copy and EDD for uploading into EQuIS

**** Shaded area for RSCC use only ****

U.S. EPA Region 2
Analysis Request Form

Site Name:						
# of Samples	**Conc. Level (see key)**	**Matrix (see key)**	**Analyses**	**Turnaround Time (for validated data)****	**SOW # / Method**	**Lab Assignment**

**** See instruction sheet for explanation of Turnaround Time for validated data.**

Accepted by:		Date Accepted:	

**** Shaded area for RSCC use only ****

Instructions for the Completion of
the
"U.S. EPA Region 2 Analytical Services Request Form"

The following are instructions for the completion of the "U.S. EPA Region 2 Analytical Services Request Form". These instructions should be referred to assure the request form contains accurate information and is complete. Proper completion of the request form will cut down on the time needed to process requests for analytical services. Lab assignments will not be made until form is accurately completed by Analytical Services Requestor and accepted as complete by the Regional Sample Control Coordinator (RSCC).

General Instructions

1. In order to use this form's drop down lists and checkboxes you will need to *ENABLE MACROS*. When you open the file one of three things should happen:

a. If you are not asked anything when you open the file and the macros are fully functional, that means your security level is set to **Low**. This is dangerous for your computer and it is highly advised that you set your macro security level to **Medium** by following the instructions below.

b. If you are given a security warning with the options of disabling or enabling, please click **Enable Macros**.

c. If you are given any other error message you need to set your security level to a lower setting. To do this:

- **i.** On the **Tools** menu, select **Options**.
- **ii.** Click the **Security** tab.
- **iii.** Under *Macro Security*, click **Macro Security**.
- **iv.** Click the **Security Level** tab, then select **Medium**.
- **v.** Close the file and reopen it.
- **vi.** You should be given a security warning with the option of disabling or enabling, please click **Enable Macros**. The form should now be fully functional.

2. Do not fill out any grayed areas. For RSCC use only.

3. For the fields that contain "drop down lists"; information can be manually entered if the required parameter is not provided

4. All requests must be electronically submitted, via e-mail, to: Adly Michael (Michael.adly@epa.gov), Jennifer Feranda (Feranda.jennifer@epa.gov) and Robert Toth (toth.robert@epa.gov).

5. The e-mail (transmitting the request) subject line should read: **"Analytical Services Request: (*Site Name*); (*Project Start Date*)"**

6. Requests for routine analytical services (RAS) in standard matrices (i.e. water, soil, and sediment), should be submitted to RSCC no later then noon Tuesday, the week prior to the sampling start date.

7. Requests for non-routine analytical services and non-standard matrices (i.e., waste, oil, concrete, fish tissue, etc) should be submitted to the RSCC at least two weeks prior to the sampling start date. Note that if analyses can not be accommodated by the EPA Regional lab or the CLP, requests should be provided with enough leeway for alternative analytical services to be procured).

8. Once laboratory assignments have been made, the RSCC will forward the lab assignments, shipping addresses and any other relevant information to the designee (see # 24 below) usually by Thursday or Friday prior to the sampling start date. In cases were alternative analytical services are required, the requestor will be notified within a sufficient time frame to procure those services from an outside source.

Project Information

9. Site Name: Name of site in which sampling will be conducted.

10. City/Town: City or town where site is located.

11. State: Drop Down List - State that site is located in

12. CERCLIS ID: A site identifier starting with the abbreviation for the state in which it is located and followed by several digits i.e., NYD000222999 (NJxxxxxxxxxx, PRxxxxxxxxxx or VIxxxxxxxxxx). If this is not known, please check with EPA Project Manager (PM) i.e., Remedial Project Manager (RPM), On Scene Coordinator (OSC), Site Assessment Manager (SAM), etc. If a CERCLIS ID has not yet been established for the site, please indicate so on the form.

13. Operable Unit: Drop Down List - Specific site operable unit (OU) for project (ie. 01, 02, etc). If uncertain as to OU, check with EPA PM. If no OU has been assigned, please indicate by using "00"

14. Site Spill ID: A two digit site identifier (i.e., K2). These two digits are preceeded by "02". If this is not known, please check with EPA PM, THIS MUST BE PROVIDED.

15. Action Code: Drop Down List - Please refer to table below for definitions of action codes provided in drop down list.

ACTION CODE	*DEFINITION*
Remedial QB	Site Assessment
Remedial CO	Combined RI/FS
Remedial RA	Remedial Action
Remedial BD	PRP Lead RI/FS
Remedial BF	PRP Lead Remedial Action
Remedial ME	PRP Long Term Response
Remedial RD	Remedial Design
Remedial FE	Post Construction Activities
Remedial BE	PRP Lead Remedial Design
Removal RS	Removal Assessment
Removal RV	Removal, Fund Lead
Removal BB	PRP Lead Removal
Federal Facility OX	Federal Facility Oversight
Federal Facility QB	Site Assessment
BRAC PX	Site Specific BRAC

16. Sampling Dates: "Start": Date sampling is expected to begin. (i.e., 04/04/08)
"Finish": Date sampling is expected to end (i.e., 04/06/08)

17. Proposed Shipping Dates: "Start": First date samples are expected to be shipped to the lab(s).
"Finish": Last date samples are expected to be shipped to the lab(s).

18. Arrival Time: Check Boxes - Time Frame that samples are expected to arrive at laboratory

19. Saturday Delivery: Check Box - Check "yes" if samples are expected to be delivered to the lab(s) on a Saturday.

20. EPA Project Manager: "First Name": First name of EPA Project Manager.
"Last Name": Last name of EPA Project Manager

21. Analytical Service Requestor: "First Name"**:** First name of person submitting the analytical request form from the field contractor, EPA, state, etc.
"Last Name": Last name of the person submitting the analytical request form from field contractor, EPA, State, etc.

Note: Each sampling organization should have a dedicated person who submits the analytical requests to the EPA RSCC and serves as point of contact for answering questions and resolving issues.

22. Phone #: Phone number of Sampling Coordinator. Format used should be 1234567899

23. Organization: Sampling organization conducting the sampling event (i.e., EPA, name of site contractor, State etc.)

24. EPA Approved QAPP: Check Box - Check "yes" if the project has an approved Quality Assurance Project Plan (QAPP).

Note: SAMPLES WILL NOT BE ANALYZED WITHOUT AN EPA APPROVED QAPP.

25. Date of QAPP Approval: Provide the date in which the QAPP was approved by the EPA Project Manager.

26. Oversight/Split Sampling: Check Box - Check "yes" if samples being collected are oversight or split samples for a PRP/Federal Facility project.

27. Labs Used: If the box for "Oversight/Split Sampling" is checked yes, provide the name of lab(s) being used by the PRP, Federal Facility, etc.

28. Email for Lab Assignments: E-mail address(es) that the lab assignments should be sent to.

29. Email for Data: E-mail address(es) (other than EPA Project Manager) to which validated data and data assessments should be sent. Please note all CLP data will be sent in electronic formats.

30. Address for Hard Copy: For analyses being performed by the EPA DESA Laboratory, address in which the hard copy of the data should be sent.

31. Contaminants of Concern: List any know contaminants of interest/concern for the specific site.

32. Known Hazardous Waste Constituents: List any know hazardous wastes/contaminants at the site that the lab should know about for Health and Safety or Disposal purposes (i.e. radionuclides, PCBs, asbestos, etc.)

33. Special Requests & Reporting Requirements: Provide any information regarding special project requirements that the lab(s) need to know to meet project specific requirements. These can include, but are not limited to: lower or higher CRQLs, additional compounds outside the standard TCL/TAL lists; high concentration samples; sample volume concerns; canister needs (for TO-15 air samples), etc. Attach additional pages if more space is required other than what is provide on the request form.

Requested Analysis

34. Site Name: Provide site name on the top of the analytical request table

35. # of Samples: Provide the number of samples per matrix per analysis. Include relevant QC samples (trip blanks, field duplicates, rinsate blanks, etc.)

36. Concentration Level: Drop Down List – Designate the anticipated concentration for the samples to be analyzed.

37. Matrix: Drop Down List – Provide the matrix (i.e., soil, aqueous, oil, air, etc.) for the samples being collected.

38. Analysis: Drop Down List - Provide the required analyses from the drop down list (i.e., VOA, Pesticide, PCBs, etc.). If the required analysis can not be found in the drop down list, the field can be manually populated.

39. Turnaround Time: **Turnaround time should be the total turnaround time needed for the receipt of validated data by the EPA PM and/or their designee** (i.e. if validated data is needed by the project team in 35 days, 35 days should be indicated on the request form) .

40. SOW#/Method: Provide the project required analytical method needed (i.e. SOM01.2, ILM05.4, SW-846 8260, etc.)

41. Laboratory Assignment: The laboratory assigned to analyze each group of samples. **NOTE: If samples are to be sub-contracted out for analysis, name of sub-contract lab should be provide in this space when request is submitted to RSCC.****

**** ANSETS data sheets with detailed information regarding sub-contracted analytical services are required to be submitted to the RSCC (Adly Michael and Jennifer Feranda) by the fifth (5th) of each month.**