EPA Contract No.: 68HE0318D0003
Task Order No.: 68HE0421F0011

Remedial Acquisition Framework: Design and Engineering Services

Final Quality Assurance Project Plan

Burlington Industries Cheraw OU2 Site Remedial Investigation/Feasibility Study and Remedial Design/Remedial Action Oversight Cheraw, South Carolina

June 15, 2021

CDM Smith

CDM Smith

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June 15, 2021

Mr. Jeffery Crowley
Task Order Contracting Officer Representative
U.S. Environmental Protection Agency
61 Forsyth Street, SW
Atlanta, GA 30303

PROJECT:	EPA Contract No.: 68HE0318D0003 Task Order No.: 68HE0421F0011
DCN	F0011-FQAPP-2021.06.15
SUBJECT:	Final Quality Assurance Project Plan Burlington Industries Cheraw OU2 Site Remedial Investigation/Feasibility Study and Remedial Design/Remedial Action Oversight Cheraw, South Carolina

Dear Mr. Crowley,

CDM Federal Programs Corporation (CDM Smith) is pleased to submit an electronic copy of the Final Quality Assurance Project Plan for the Burlington Industries Cheraw OU2 Site RI/FS Oversight task order.

If you have any questions regarding this submittal, please contact me at your earliest convenience at (404) 720-1325.

Very truly yours,

CDM FEDERAL PROGRAMS CORPORATION

Tony Isolda
Project Manager

Enclosures

cc: R. Oxford, EPA Region 4
L. Flores, EPA Region 4
J. Weeber, CDM Smith
H. Coppage, CDM Smith
J. Romig, CDM Smith
J. Oxford, CDM Smith
Project File, CDM Smith

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EPA Region 4 Operating Procedures

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This Quality Assurance Project Plan (QAPP) is prepared in accordance with the Uniform Federal Policy (UFP)-QAPP manual (EPA 2005) and updated worksheets (2012) and is compliant with EPA's QAPP requirements document EPA QA/R-5 (EPA 2001). The project will be implemented in accordance with the quality procedures in CDM Smith's Quality Management Plan Manual (CDM Smith 2019).

All worksheets are included herein.

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References

CDM Smith. 2019. Design and Engineering Services Contract Quality Management Plan, Revision 0, May.

TRC Companies. 2021a. *Remedial Investigation/Feasibility Study Work Plan*, Burlington Industries Cheraw Superfund Site, Operable Unit 2, Cheraw, South Carolina. Prepared for Highland Industries, Inc. January.

TRC Companies. 2021b. *Remedial Investigation/Feasibility Study Quality Assurance Project Plan,* Burlington Industries Cheraw Superfund Site, Operable Unit 2, Cheraw, South Carolina. Prepared for Highland Industries, Inc. January.

TRC Companies. 2021c. *Field Sampling Plan,* Burlington Industries Cheraw Superfund Site, Operable Unit 2, Cheraw, South Carolina. Prepared for Highland Industries, Inc. January.

U.S. Environmental Protection Agency. 2012. Revision 1, *Optimized UFP-QAPP Worksheets*. March.

U.S. Environmental Protection Agency. 2005. *Uniform Federal Policy for Quality Assurance Project Plans: Evaluating, Assessing, and Documenting Environmental Data Collection and Use Programs – Part 1: UFP-QAPP Manual.* EPA-505-B-04-900A: U.S. EPA. March.

U.S. Environmental Protection Agency. 2001. *Superfund Oversight Guidance Memo.* January

U.S. Environmental Protection Agency. 2001. *EPA Requirements for Quality Assurance Project Plans* (EPA QA/R-5). EPA/240/B-01/003. March.

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Acronyms

ABS	absolute difference
ASC	analytical services coordinator
CCV	continuing calibration verification
CDM Smith	CDM Federal Programs Corporation
CLP	Contract Laboratory Program
COC	chain-of-custody
CRQL	contract required quantitation limit
CSM	conceptual site model
DC	data coordinator
DCN	document control number
DQA	data quality assessment
DQI	data quality indicator
DQO	data quality objective
DV	data validation
EDD	electronic data deliverable
EPA	United States Environmental Protection Agency
EQuIS	Environmental Quality Information Systems
FASTAC	Field and Analytical Services Teaming Advisory Committee
FCN	field change notification
FID	flame ionization detector
FS	feasibility study
FTL	field team leader
GC/MS	gas chromatograph/mass spectroscopy
HCL	hydrochloric acid
HHRA	human health risk assessment
ICP-AES	inductively coupled plasma atomic emission spectroscopy
ICP-MS	inductively coupled plasma mass spectrophotometer
ICV	initial calibration verification
ID	identification
L	liter
LCS	laboratory control sample
LSASD	Lab Services and Applied Sciences Division
MDL	method detection limit
mg/kg	milligram per kilogram
mL	milliliter
MS/ MSD	matrix spike/matrix spike duplicate
N/A	not applicable
NFG	National Functional Guidelines
oz.	ounce
PCB	polychlorinated biphenyl
P.E.	Professional Engineer
PID	photoionization detector
PM	program manager

PPE	personal protective equipment
PQO	project quality objective
QA	quality assurance
QAM	quality assurance manager
QAS	quality assurance specialist
QAPP	quality assurance project plan
QC	quality control
QCS	quality control sample
QL	quantitation limit
RCRA	Resource Conservation and Recovery Act
RF	response factor
RI/FS	remedial investigation/feasibility study
RL	reporting limit
RSCC	Regional Sample Control Center
RSD	relative standard deviation
SDG	sample delivery group
Site	Burlington Industries Cheraw OU2
SOP	standard operating procedure
SOW	Statement of Work
SHSO	site health and safety officer
SVOC	semi-volatile organic compound
TAL	Target Analyte List
TBD	to be determined
TCL	target compound list
UFP	Uniform Federal Policy
VOC	volatile organic compound
WS	worksheet
µg/kg	microgram per kilogram
µg/L	microgram per liter

1.0 Introduction

CDM Federal Programs Corporation (CDM Smith) received Task Order 68HE0421F0011 under Contract 68HE0318D0003 with U. S. Environmental Protection Agency (EPA) Region 4 to conduct oversight of Remedial Investigation (RI)/Feasibility Study (FS) activities for the Burlington Industries Cheraw Operable Unit (OU) 2 Site ("the Site") located in Cheraw, South Carolina.

This quality assurance project plan (QAPP) addresses the RI/FS field oversight and analytical activities that will be performed by CDM Smith. The RI/FS is being conducted by the Potential Responsible Party (PRP), Highland Industries Inc. (Highland Industries). TRC Environmental Corporation is the environmental consultant performing the work on behalf of the Highland Industries. The RI/FS program includes field reconnaissance and sampling and analysis of sediment, surface water, groundwater, and soil. The data collected will supplement previous data to prepare a conceptual site model (CSM) and define/refine remedial action alternatives for each site medium.

This QAPP has been prepared in accordance with the Uniform Federal Policy (UFP)-QAPP manual (EPA 2005) and optimized worksheets (EPA 2012) and is compliant with EPA's QAPP requirements document EPA QA/R-5 (EPA 2001). This QAPP and the Design and Engineering Services Contract Quality Management Plan (CDM Smith 2019) are the governing documents for oversight of the RI field investigation. CDM will use the various plans prepared by the PRPs contractors to verify proper execution of the RI/FS.

1.1 Site Description and Background

The Burlington Industries Cheraw Site consists of the former Burlington Industries, Inc. Superfund facility property, 3.2 miles of surface water drainage from the facility to the Great Pee Dee River, and several adjacent parcels along the surface water pathway where contamination is located. The manufacturing facility was formerly known as the James Fabrics Plant, which produced woven fiberglass commercial and industrial fabrics. Part of the former Burlington Industries, Inc. facility is currently owned by Highland Industries, Inc. (a division of Takata Corporation). Adjacent properties to the surface water drainage corridor include 37 occupied private residences and public lands. Contained within the public land tracts is Huckleberry Park, a 2.7-acre public park with playground equipment used by children.

In February 2016, during the South Carolina Department of Health and Environmental Control (SCDHEC) investigation of a residential property, polychlorinated biphenyls (PCBs) were found in surface soil. This residential property, along with other area parcels, were formerly owned by Burlington Industries. One currently undeveloped property was used by Burlington for drying wastewater solids. PCBs are toxic and persistent contaminants that pose a significant threat to human health and the environment. Subsequent sampling events found PCBs in surface and subsurface soil of adjacent residential lots, the former Burlington Industries facility property, sediment along the surface water corridor, and public and private properties downstream.

Based on the high concentrations of PCBs at the site, SCDHEC requested that EPA conduct a Removal Site Evaluation. The EPA completed a Removal Site Evaluation in December 2016 and concluded portions of the Site posed a threat to public health and the environment that met the criteria for removal actions. In October 2017, Highland Industries entered into an administrative settlement agreement on consent to perform various investigations and removal actions in the area, which was identified as the Burlington Site. The removal action was completed in August 2019. The Site includes two operable units (OUs) specified in the Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility Study (ASAOC). OU1 is defined as the property on which the sludge drying beds were located (Drying Beds Parcels). OU2 is defined as the former Burlington Industries manufacturing property purchased in 1988 by Highland Industries, the Western Ditch, and downstream waterways as specified in the ASAOC (Figure 1-2). OU1 is not included in the scope of this RI/FS.

1.2 Purpose of the QAPP

CDM Smith will perform oversight of RI field activities and will split up to 10% of the PRP samples. Sampling activities are described below and in the worksheets in this document. This QAPP specifies the quality objectives and requirements for oversight of the RI sampling and analysis and provides information and procedures to accept split samples. CDM Smith will conduct field oversight to evaluate the PRP's implementation of RI/FS, activities. CDM Smith assumes the following activities will be performed during the RI Oversight:

- Review implementation of work plans, sampling and analytical plans (SAPs), and QAPPs in the field
- Observe sampling activities for compliance with the Federal Facility Agreement (FFA), settlement documents, and approved SAPs and QAPPs
- Maintain a log of detailed observations at the Site, including interactions with all parties, results of field tests, observations about conformance with the project-specific plans and deviations from the approved plans. Field notebooks/journals and logs may be supplemented by photographs and/or videotaping.
- Prepare technical field oversight reports, including period reports and a final summary report.

Split sample collection is anticipated to include surface water, sediment, soil, and groundwater

The following attachments provide details on the organization, data quality objectives (DQOs), sampling and analytical procedures, quality assurance (QA)/quality control (QC) requirements, project tasks, rationale for the work, and assessments and reporting protocols. Sample types and analyses are described in Attachments 1 and 2. Reporting limits (RLs) and method detection limits (MDLs) are provided in Attachment 3. Sample analyses will proceed via the EPA Field and Analytical Services Teaming Advisory Committee (FASTAC) process using EPA Region 4 Laboratory Services and Applied Science Division (LSASD) and EPA Contract Laboratory Program (CLP).

QAPP Worksheets #1 and #2: Title and Approval Page
(UFP-QAPP Manual Section 2.1)
(EPA 2106-G-05 Section 2.2.1)

Contract: Design and Engineering Services (DES), 68HE0318D0003

Work Assignment Number/Operable Unit: 68HE0421F0011

Document Control Number (DCN): F0011-DQAPP-2021.04.01

CDM Smith Project Manager (PM):
Tony Isolda Signature_____

CDM Smith QA Manager (QAM):
Jo Nell Mullins Signature_____ for
Mary Jo Apakian

EPA Task Order Contracting Officer Representative (TOCOR):
Jeffery Crowley Signature_____

EPA Quality Assurance Officer:
Signature_____

State Regulatory Agency /Stakeholders (name/title/signature/date) (as applicable):
South Carolina Department of Health and Environmental Control (SCDHEC), EPA

Dates and Titles of Plan and Reports Written for Previous Site Work, if Applicable:
SCDHEC

- Expanded Pre-CERCLIS Screening Assessment, May 2016
- Preliminary Assessment Report, September 2016
- Site Inspection Report, September 2016

TRC Environmental Corporation (Prepared deliverables for Highland Industries Inc.)

- Draft Remedial Investigation/Feasibility Study Work Plan, January 2021
- Draft Remedial Investigation/Feasibility Study Quality Assurance Project Plan, January 2021
- Draft Field Sampling Plan Analysis, January 2021

CDM Smith

- Part I: Technical Proposal, September 2021

Required QAPP elements and required information that are not applicable to the project, and an explanation for their exclusions:

All worksheets are included.

QAPP CROSSWALK
Identifying Information

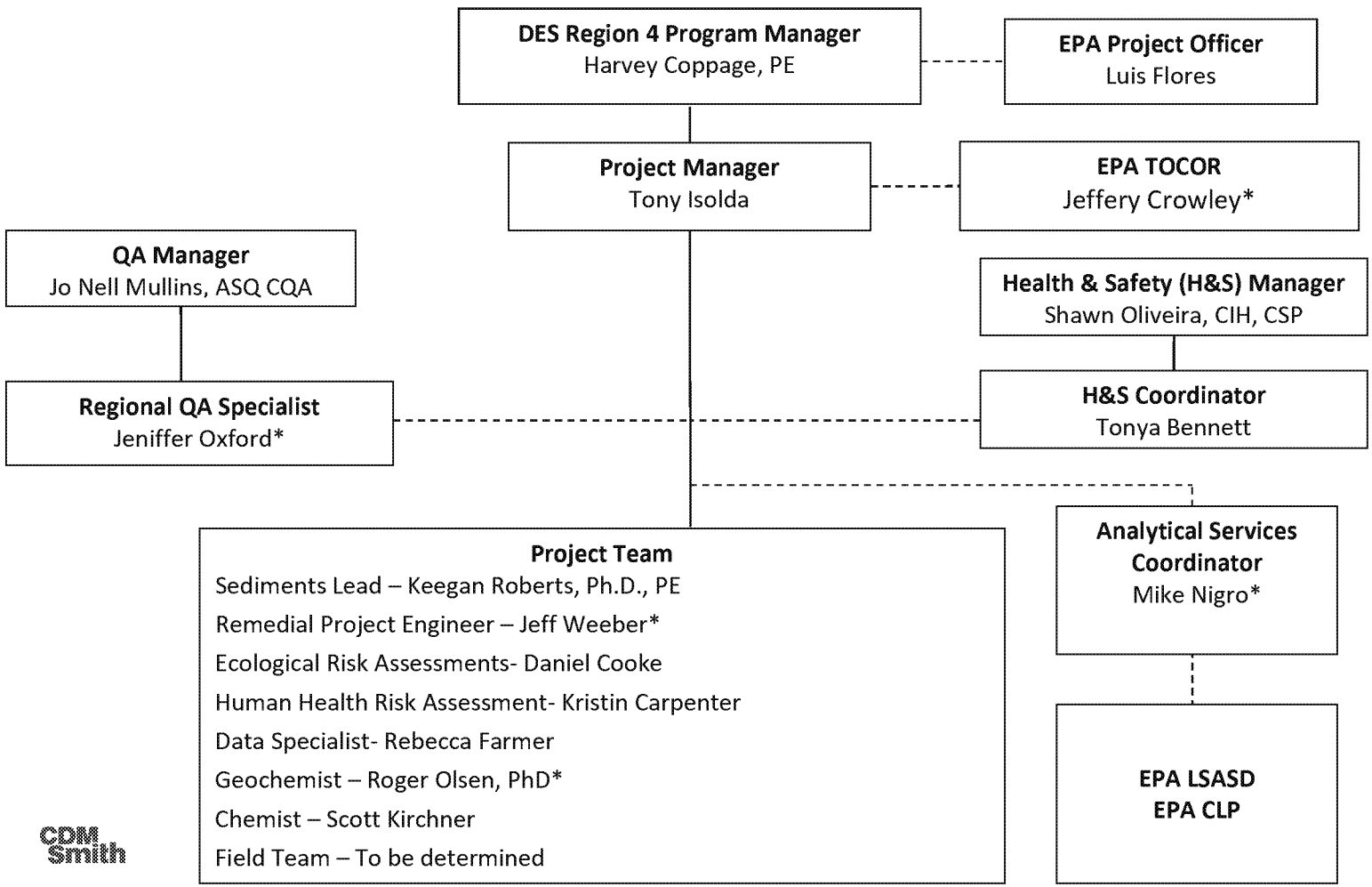
Optimized UFP-QAPP Worksheets		2106-G-05 QAPP Guidance Section	
1 & 2	Title and Approval Page	2.2.1	Title, Version, and Approval/Sign-Off
3 & 5	Project Organization and QAPP Distribution	2.2.3	Distribution List
		2.2.4	Project Organization and Schedule
4, 7 & 8	Personnel Qualifications and Sign-off Sheet	2.2.1	Title, Version, and Approval/Sign-Off
		2.2.7	Special Training Requirements and Certification
6	Communication Pathways	2.2.4	Project Organization and Schedule
9	Project Planning Session Summary	2.2.5	Project Background, Overview, and Intended Use of Data
10	Conceptual Site Model	2.2.5	Project Background, Overview, and Intended Use of Data
11	Project/Data Quality Objectives	2.2.6	Data/Project Quality Objectives and Measurement Performance Criteria
12	Measurement Performance Criteria	2.2.6	Data/Project Quality Objectives and Measurement Performance Criteria
13	Secondary Data Uses and Limitations	Chapter 3	QAPP ELEMENTS FOR EVALUATING EXISTING DATA
14 & 16	Project Tasks & Schedule	2.2.4	Project Organization and Schedule
15	Project Action Limits and Laboratory-Specific Detection / Quantitation Limits	2.2.6	Data/Project Quality Objectives and Measurement Performance Criteria
17	Sampling Design and Rationale	2.3.1	Sample Collection Procedure, Experimental Design, and Sampling Tasks
18	Sampling Locations and Methods	2.3.1	Sample Collection Procedure, Experimental Design, and Sampling Tasks
		2.3.2	Sampling Procedures and Requirements
19 & 30	Sample Containers, Preservation, and Hold Times	2.3.2	Sampling Procedures and Requirements
20	Field QC	2.3.5	Quality Control Requirements
21	Field SOPs	2.3.2	Sampling Procedures and Requirements
22	Field Equipment Calibration, Maintenance, Testing, and Inspection	2.3.6	Instrument/Equipment Testing, Calibration and Maintenance Requirements, Supplies and Consumables
23	Analytical SOPs	2.3.4	Analytical Methods Requirements and Task Description
24	Analytical Instrument Calibration	2.3.6	Instrument/Equipment Testing, Calibration and Maintenance Requirements, Supplies and Consumables

QAPP CROSSWALK
Identifying Information (continued)

Optimized UFP-QAPP Worksheets		2106-G-05 QAPP Guidance Section	
25	Analytical Instrument and Equipment Maintenance, Testing, and Inspection	2.3.6	Instrument/Equipment Testing, Calibration and Maintenance Requirements, Supplies and Consumables
26 & 27	Sample Handling, Custody, and Disposal	2.3.3	Sample Handling, Custody Procedures, and Documentation
28	Analytical Quality Control and Corrective Action	2.3.5	Quality Control Requirements
29	Project Documents and Records	2.2.8	Documentation and Records Requirements
31, 32 & 33	Assessments and Corrective Action	2.4	Assessments and Data Review
		2.5.5	Reports to Management
34	Data Verification and Validation Inputs	2.5.1	Data Verification and Validation Targets and Methods
35	Data Verification Procedures	2.5.1	Data Verification and Validation Targets and Methods
36	Data Validation Procedures	2.5.1	Data Verification and Validation Targets and Methods
37	Data Usability Assessment	2.5.2	Quantitative and Qualitative Evaluations of Usability
		2.5.3	Potential Limitations on Data Interpretation
		2.5.4	Reconciliation with Project Requirements

QAPP Worksheet #3 and #5: Project Organization and QAPP Distribution
(UFP-QAPP Manual Section 2.3 and 2.4)
(EPA 2106-G-05 Section 2.2.3 and 2.2.4)

*QAPP recipient Lines of authority ——— Lines of Communication - - - - -



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QAPP Worksheet #4, 7, and 8: Personnel Qualifications and Sign-off Sheet
(UFP-QAPP Manual Sections 2.3.2 – 2.3.4)
(EPA 2106-G-05 Section 2.2.1 and 2.2.7)

ORGANIZATION: CDM Smith

Name	Project Title/Role	Education/Experience	Specialized Training/Certifications[1]	Signature/Date[2]
Tony Isolda	**Project Manager (PM)** – Oversees project and responds to EPA TOCOR. Manages subcontractors. Responsible for implementing and maintaining QA program. Determines the need for any corrective action.	M.S., Microbiology; B.S. Microbiology; 33 years of experience		
Jeff Weeber, PE	**Remediation Project Engineer** – Provides guidance on review of RI/FS documents.	B.S. Chemical Engineering, MS Environmental Engineering. 18 years of experience	PE	
TBD	**Field Team Leader (FTL)** – Responsible for coordination and execution of all field activities outlined in the QAPP.	TBD	TBD	
Shawn Oliveira	**H&S Manager** — Oversees adherence to H&S requirements.	B.S. Chemistry; M.S. Environmental Engineering; 14 years of experience	Certified Industrial Hygienist (CIH); Certified Safety Professional No. 18988	
Keegan Roberts, Ph.D., PE	**Sediment Lead** Provides guidance on review of RI/FS documents.	B.S., Civil Engineering; M.S., Civil Engineering; PhD, Civil Engineering	PE	

QAPP Worksheet #4, 7, and 8: Personnel Qualifications and Sign-off Sheet
(UFP-QAPP Manual Sections 2.3.2 – 2.3.4)
(EPA 2106-G-05 Section 2.2.1 and 2.2.7)

Name	Project Title/Role	Education /Experience	Specialized Training/Certifications[1]	Signature/Date[2]
Dan Cooke	**Senior Ecological Risk Assessor**– Oversees the completion of the Ecological Risk Assessment	B.S. Marine Biology. M.S. Biology; 29 years of experience		
Kristen Carpenter	**Senior Human Health Risk Assessor**– Oversees the completion of the Human Health Risk Assessment (HHRA)	B.S. Biology; M.S. Environmental Health and Management; over 20 years of experience		
Mike Nigro	**Analytical Services Coordinator (ASC)** – Coordinates with EPA Regional Sample Control Center (RSCC), LSASD laboratory, and subcontract laboratories, reviews trip reports	B.S Biology and over 18 years of experience		
Mike Nigro	**Data Coordinator (DC) –** Facilitates data management planning, receives data and EDDs, maintains project tracking sheet, ensures all data are received	B.S Biology and over 18 years of experience		

QAPP Worksheet #4, 7, and 8: Personnel Qualifications and Sign-off Sheet
(UFP-QAPP Manual Sections 2.3.2 – 2.3.4)
(EPA 2106-G-05 Section 2.2.1 and 2.2.7)

ORGANIZATION: EPA[3]

Name	Project Title/Role	Education/Experience	Specialized Training/Certifications	Signature/Date[2]
Jeffery Crowley	TOCOR	TBD	TBD	

ORGANIZATION: Laboratories

Name	Project Title/Role	Education/Experience	Specialized Training/Certifications	Signature/Date[2]
EPA CLP Laboratory -TBD	QA Officer	TBD (Experience vetted by accreditation body)	National Environmental Laboratory Accreditation Program (NELAP)/CLP	
LSASD – TBD	QA Officer	TBD (Experience vetted by accreditation body)	NELAP/Trained in EPA and standard analytical methods	

Notes:
1. Signatures indicate personnel have read and agree to implement this QAPP as written.
2. EPA Headquarters staff reviews and maintains the résumés of education and experience for key laboratory staff. This information is not available for the QAPP.

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, Pathways, Documentation, etc.)
Regulatory agency interface	CDM Smith PM	Tony Isolda	404-720-1325	The CDM Smith PM will send all information about the project to the EPA TOCOR. Field changes will be discussed with the EPA TOCOR prior to implementation.
Manage field tasks	CDM Smith FTL	TBD	TBD	Act as liaison to PM concerning investigation activities. Daily communication with project team and PM. Communicate implementation issues to PM.
QAPP changes: prior to fieldwork, in the field, and during project execution	CDM Smith FTL	TBD	TBD	FTL will notify PM immediately and promptly complete a Field Change Notification (FCN) form and/or corrected worksheets. Send FCN forms to QAS. FTL to notify PM and ASC of delays or changes to field work. Prepare QAPP Addendums or revisions in consultation with the client.
	CDM Smith PM	Tony Isolda	404-720-1325	Notify EPA TOCOR and ASC of delays or changes to field work. Prepare QAPP addendums or revisions in consultation with the client.
Field corrective actions	CDM Smith FTL	TBD	TBD	CDM Smith FTL will oversee implementation of corrective action and notify PM by email. CDM Smith PM will complete the corrective action report form.
	CDM Smith FTL	TBD	TBD	Complete daily report or summary and submit to CDM Smith PM. CDM Smith PM will forward to EPA TOCOR upon request.
Booking analytical services	CDM Smith FTL	TBD	TBD	Submit request to ASC before the timeframe below.
	CDM Smith ASC	Mike Nigro	610-263-2610	Coordinate LSASD and CLP analytical services through RSCC 4 weeks prior to sampling.
Facilitate database setup and data management planning	CDM Smith FTL	TBD	TBD	Provide sample identification (ID), locations, and analyses prior to sample collection to CDM Smith ASC and DC. Provide DC and Data Manager (DM) with sample and analytical reporting groups, screening criteria and types of report tables required for project.

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, Pathways, Documentation, etc.)
Facilitate data management	CDM Smith DC	Mike Nigro	610-263-2610	Transmit completed sample tracking information and field EDD to DM by the completion of each sampling case.
Incomplete EDDs or other EDD issues	CDM Smith DM	Catherine Love	406-441-1445	Personnel identifying the issue (validator, DC, ASC) will notify DM who will request resubmittal of corrected EDD by email.
Data verification issues, e.g., incomplete records	CDM Smith DM	Catherine Love	406-441-1445	DC will send an email to the DM when an issue is found. DC or DM will address questions or any discrepancies.
Field corrective action	CDM Smith QAS	Jeniffer Oxford	212-377-4536	PM and FTL will identify corrective actions. Corrective actions may also be identified by the field team. FTL initiates corrective action on identified field issues immediately or within QAM recommended timeframe.
	CDM Smith FTL	TBD	TBD	
Procurement of subcontract analytical services	CDM Smith FTL	TBD	TBD	FTL will prepare laboratory request; ASC will review and send email to RSCC. If a subcontract laboratory is needed the project chemist will prepare an analytical statement of work (SOW) and submit for review. FTL or ASC will initiate a kick-off call with subcontract laboratory (ies) and email agenda.
	CDM Smith ASC	Mike Nigro	610-263-2610	
Analytical services support	CDM Smith ASC	Mike Nigro	610-263-2610	Act as liaison with RSCC for CLP laboratories and with point of contact for LSASD, Coordinate data validation if a subcontract laboratory is procured.
Laboratory QC variances and analytical corrective actions	LSASD or subcontract laboratory manager or QC Officer, or RSCC	TBD	TBD	Communicate with CDM Smith ASC, QAS, or designee. Provide oversight and direction on technical issues as needed.
Notification of analytical issues sample receipt variances	CDM Smith ASC	Mike Nigro	610-263-2610	Notify FTL of any sample collection/shipment issues. Respond to RSCC and LSASD to initiate corrective action. Elevate to PM as needed.

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, Pathways, Documentation, etc.)
Reporting of issues relating to analytical data quality (including ability to meet reporting limits and usability of data)	CDM Smith ASC	Mike Nigro	610-263-2610	Communicate to CDM Smith PM and project team as appropriate.
	CDM Smith Data Validator	Mary Lou Fox	425-519-8398	Communicate to CDM Smith PM as appropriate. Document results and data impacts in the Data Validation Report.
Release of analytical data	CDM Smith DM	Catherine Love	406-441-1445	Assign and oversees review of database after receipt of all data. Signs release of hold point release form to facilitate use of data for reporting purposes.
Site health and safety issues	CDM Smith SHSO	TBD	TBD	Make decisions regarding health and safety issues and upgrading personal protective equipment (PPE). Communicate to CDM Smith PM and Health and Safety Manager, as appropriate.

QAPP Worksheet #9: Project Planning Session Summary
(UFP-QAPP Manual Section 2.5.1)
(EPA 2106-G-05 Section 2.2.5)

Projected Date(s) of Sampling: Not discussed	**Site Name:** Burlington Industries Cheraw OU2 RI/FS **Site Location:** Cheraw, South Carolina

Date of Session: January 22, 2021
Scoping Session Purpose: Technical Scoping Meeting Summary

Name	Affiliation	Phone #	E-mail Address	Project Role
Jeffery Crowley	EPA	404-562-9587	Crowley.Jeffery@epa.gov	EPA TOCOR
Harvey Coppage	CDM Smith	404-720-1347	coppagehb@cdmsmith.com	CDM Smith Region 4 DES Program Manager
Kris Chapman	CDM Smith	303-383-2355	chapmanke@cdmsmith.com	CDM Smith National DES Program Manager
Tony Isolda	CDM Smith	404-720-1325	isoldaa@cdmsmith.com	CDM Smith Project Manager
Andy Bullard	CDM Smith	610-263-2613	bullardak@cdmsmith.com	Senior Scientist
Keegan Roberts	CDM Smith	303-383-2352	robertsk@cdmsmith.com	Sediments Lead
Jeff Weeber	CDM Smith	404-720-1369	WeeberJL@cdmsmith.com	Remediation Project Engineer

Meeting Summary

Jeff Crowley, the EPA TOCOR for the Burlington Industries site located in Cheraw, South Carolina, provided site background information and history. He provided information regarding:

- Past removal activities
- Site and adjacent area hydrology
- Facility operations, including current operations by Highland Industries (manufacturing advanced fabrics), which employs between 500 and 750 residents
- History with the PRP
- Interactions between EPA and the PRP
- Community involvement and temperament
- Coordination with SCDHEC
- Potential need for access agreements
- Recommendation for a site visit prior to remedial investigation activities
- Future direction of the project

QAPP Worksheet #9: Project Planning Session Summary
(UFP-QAPP Manual Section 2.5.1)
(EPA 2106-G-05 Section 2.2.5)

Detailed Notes

- OU1 is a fund lead OU and is approximately 2 to 3 acres in size.
- Primary PCB Aroclors associated with the site are PCB-1254 and PCB-1248.
- PRP has retained an aggressive environmental attorney and phrasing in communications must be closely monitored. For example, must ensure that there are only references to PCB Aroclors, not congeners, and questions in the field regarding the Site should be referred to EPA.
- PRP has been adversarial regarding sampling in the Pee Dee River. Fish tissue sample analyses have previously utilized fillets, and not whole body.
- PRP has retained TRC Environmental Corporation as their environmental consultant. Harry Morris is the TRC PM.
- This work is being done in coordination with SCDHEC. Sara McDonald is the SCDHEC PM.
- Removal efforts have previously been performed at the site in western ditch areas. However, elevated PCB concentrations are still being found in sediments due to mobilization by flood events. Prior removal actions do not preclude additional action within these footprints, if warranted.
- Legal point of contention between EPA Region 4 and the PRP is the sampling of a former sanitary sewer outfall. The issue was settled, and the sewer outfall is within scope of the investigation.
- EPA has established a SharePoint site for sharing of documents between CDM Smith and EPA. At the time of the conference call, EPA had uploaded the PRP-provided: (1) Health and Safety Plan (HASP), (2) FSP, (3) QAPP, and (4) RI/FS Workplan.
  - Following the call, EPA also provided the Administrative Order on Consent (AOC) on the SharePoint site.
- EPA has requested that the CDM Smith team prioritize review of the RI/FS Workplan and FSP for comparison against the AOC. During review, the team should focus on:
  - All conditions in the AOC are adequately covered in the PRP-provided documents.
  - There are no phrases or wording that indicates the PRP is performing actions "voluntarily" or going above-and-beyond EPA requirements; all the work is mandated by the AOC.
- EPA has requested that all comments be provided in a bullet list, broken out by Section Number for integration into a comprehensive set of EPA comments to be sent to the PRP.
- EPA Region 4 will make notifications to other stakeholders that CDM Smith has been retained as EPA's consultant.
- Tony Isolda, as the CDM Smith Team PM, will be the point of contact within CDM Smith for other stakeholders.

QAPP Worksheet #9: Project Planning Session Summary
(UFP-QAPP Manual Section 2.5.1)
(EPA 2106-G-05 Section 2.2.5)

Action Item Assigned to	Action Item	Due Date
CDM Smith Team	Review PRP-provided FSP and RI/FS Workplan against AOC to ensure the PRP documents are in compliance. Review the QAPP and HASP as necessary for any additional background information. Review current task order scope and potential for site visit.	Provide comments by 2/17/21
EPA Region 4	Provide notification to stakeholders that CDM Smith has been brought in as EPA's consultant and Tony Isolda is the point of contact.	2/22/2021

QAPP Worksheet #10: Conceptual Site Model
(UFP-QAPP Manual Section 2.5.2)
(EPA 2106-G-05 Section 2.2.5)

The Burlington Site consists of two OUs. OU1 is defined as the Drying Bed Property where Burlington's former sludge drying beds were located. OU2 includes the northwest portion of the 51.75-acre Highland Plant property (former Burlington property); the Western Ditch; the surface water features between the Western Ditch and the Great Pee Dee River; various other recreational, residential, and commercial properties situated along the surface water features including Huckleberry Park and the Town Lot; and a portion of the Great Pee Dee River. This RI/FS focuses on OU2 and will be performed by the PRP with CDM Smith performing oversight. The preliminary CSM provided below is a brief summary based on the PRP's RI/FS Work Plan (TRC 2021a). It is anticipated that the preliminary CSM will be updated and refined in the RI Report as more information becomes available through the RI field program.

Physical Setting

OU2 of the Site begins at the northwest portion of the Highland Plant property (former Burlington property), located at 650 Chesterfield Highway in Cheraw, South Carolina. The Site extends generally to the northeast along surface water features including the Western Ditch, the unnamed tributary to Wilson Branch, Wilson Branch, Huckleberry Branch, and the Great Pee Dee River. The area surrounding the Highland Plant property is relatively flat at elevations of approximately 170 to 175 feet above mean sea level (amsl). Topography slopes eastward to an elevation of approximately 95 feet amsl at the confluence of Wilson Branch and Huckleberry Branch and an elevation of 60 feet amsl at the Great Pee Dee River. According to previous investigations, soil along the Western Ditch and unnamed tributary to Wilson Branch consist primarily of stiff clay. The upstream portion of Wilson Branch contains a bed of coarse gravel outcrops along the stream bank, while the bed and stream sides of the downstream portion of Wilson Branch are almost completely covered with fine to coarse gravel. The Huckleberry Branch appears to contain flood plain deposits. Sand bars have been observed in the downstream portion of the Huckleberry Branch.

Potential Sources of Contamination

The former Burlington Industries plant manufactured specialty fabrics and textiles from 1960 to 1988 before selling its operations to Highland Industries, who continues to operate the plant. While Burlington operated the plant, PCBs were likely used as coatings in the manufacture of fiberglass textiles. Beginning in 1960, Burlington discharged sanitary wastewater from the facility to the Town's sewer collection system. It is unclear if process wastewater was also discharged to the Town's sewer collection system. At the time, the Town's sewer collection system discharged directly through an outfall to a drainage feature located near Riverside Park. It is believed that several other industrial facilities in the area used the Town's sewer collection system at this time to discharge their wastewater. Due to clogging problems with the sewer lines, Burlington constructed a 6,000-gallon concrete test basin as part of a pilot test in an attempt to see if plain sedimentation would separate the material. A contract hauler pumped out solids from the basin and the process wastewater was likely

QAPP Worksheet #10: Conceptual Site Model
(UFP-QAPP Manual Section 2.5.2)
(EPA 2106-G-05 Section 2.2.5)

discharged to the Western Ditch. In 1970, several complaints were filed regarding the discharge of a waste product to the Western Ditch. In response, Burlington constructed a new concrete settling basin at the rear of the main building. At the new settling basin, the heavier solids partially settled out and a portion of the wastewater was pumped into the Town's sewer system. The remaining portion of liquid and solid waste was pumped to newly constructed

Potential Sources of Contamination (Continued)
drying beds located on the property, but offsite of the current Highland property. The drying beds are included in OU1. Another potential on-site source is the area where the former clarifier pumps were located near the northwest corner of the plant. The pumps in this area are believed to have been used to pump wastewater from the back of the plant to the solids settling tank near the Western Ditch.

The investigation of sediments and soils at the Burlington Site was initiated in 2015 by a call to the State from a landowner who lived adjacent to property that Burlington previously owned. After several sampling events were conducted, a time-critical removal action was initiated in 2017 on several residential properties. Later in 2017, Highland voluntarily entered into an administrative settlement with EPA which led to additional sampling and removal actions on the Highland Plant property, Western Ditch, and Huckleberry Park. During these removal actions, soil with concentrations greater than 1 milligram per kilogram (mg/kg) of total PCBs was removed. During the residential removal action, 4,638 tons of soil were removed with PCB concentrations below 50 mg/kg, and 969 tons of soil were removed with total PCB concentrations greater than 50 mg/kg. All removal activities were completed in 2019.

Fate and Transport
PCBs have very low solubility and very high octanol-water partition coefficients. PCBs released to the environment adsorb to solids, and therefore, migration through subsurface soil is expected to be low. Migration in surface water is mostly limited to the movement of the sediment in which the PCBs are adsorbed. PCBs in sediment tend to be at higher concentrations in depositional environments within surface water bodies. Flooding events may also mobilize PCB-contaminated sediments and redistribute them along the waterway. In addition, flooding over the banks of the waterways may deposit PCBs outside the normal banks of a surface water feature.

Exposure Pathways
Preliminary exposure pathways for human receptors and ecological receptors are summarized in the PRP's Figure 4-1 (Attachment 2).

QAPP Worksheet #10: Conceptual Site Model
(UFP-QAPP Manual Section 2.5.2)
(EPA 2106-G-05 Section 2.2.5)

Major exposure pathways for human receptors include:

- Incidental ingestion and dermal contact with contaminated sediment, soil, or surface water
- Ingestion of contaminated fish tissue from recreational angling

Major exposure pathways for ecological receptors:

- Direct exposure to contaminated water and sediment
- Ingestion of contaminated prey/plants
- Direct uptake of contaminants in sediment and water by plants
- Bioaccumulation of contaminants through food chain

QAPP Worksheet #11: Project Data Quality Objectives (UFP-QAPP Manual Section 2.6.1) (EPA 2106-G-05 Section 2.2.6)

Refer to the PRP's Work Plan Section 4.4 Data Quality Objectives (TRC 2021a) and the PRP's QAPP Section A.6 Project/Task Description and Section A.7 Quality Objective and Criteria (TRC 2021b). The main purpose of this RI/FS is to evaluate whether or not the previous removal actions have adequately addressed risks to human health and the environment. Split samples will be used to support the goals of the oversight program. The problem and framework for oversight are as follows:

1. **State the Problem –** The RI field program is being led by the PRP. EPA needs to determine the accuracy of the PRP's generated data to verify that work is executed in compliance with EPA-approved documents. CDM Smith will assist EPA in oversight of field activities and analysis of split samples collected by the PRP to verify compliance with their approved project plans and determine accuracy of their data. To evaluate the PRP's data accuracy, CDM Smith will submit up to 10% split samples for select analyses at locations determined by field observations, pre-set criteria, or as directed by EPA.
2. **Identify Study Goals** – The data will be used to verify, through independent oversight and split sampling analysis, that the PRP's activities are in accordance with the EPA-approved Work Plan, QAPP, and HASP and that the data collected are representative of site contaminant concentrations. Oversight and split sample data will be used to answer the environmental questions below:
   - Is the PRP's contractor complying with the approved plans or approved deviations?
   - Does the data adequately describe the site conditions and is it representative for project decisions?
   - Are the PRP and CDM Smith data complete and accurate?
   - Are data sets comparable as defined on Worksheet #37?
   - Does the data show any analytical bias?
   - Are the calculated relative percent difference (RPD) values for the PRP's data versus the CDM Smith split sample data within the measurement performance criteria (MPC)?

QAPP Worksheet #11: Project Data Quality Objectives (continued)
(UFP-QAPP Manual Section 2.6.1)
(EPA 2106-G-05 Section 2.2.6)

3. Identify Information Inputs – The primary information inputs will be the analytical results of up to 10% split samples. CDM Smith and EPA will determine sample locations to be split based on the PRP's project plans. CDM Smith's QC data will be used to determine CDM Smith's split samples data quality and comparability with the PRP's data and whether sample results are acceptable based on the established project DQOs. QC sample results will be compared to the MPC of the data quality indicators (DQIs).

To further achieve these objectives, CDM Smith field personnel will observe the PRP's contractor's field implementation of the RI/FS project plans and note any deviations. Deviations will be brought to the attention of the PRP's contractor and reported to the CDM Smith PM who will communicate this information to the EPA TOCOR. Any deviations from the PRP's project plans will be documented in daily reports and in the data evaluation report. The documentation will include a discussion of the impact of the deviation(s) on the data quality. The PRP's contractor's activities will be documented in the field logbook and oversight forms.

4. Define the Boundaries of the Study – CDM Smith will accept up to 10% split samples during the field investigation activities. Field oversight will be performed on the field investigation activities. The exact percentage of field oversight will be determined after discussion with EPA and upon review of the PRP's schedule. The field investigation will take place according to the PRP's schedule.

5. Determine the Analytical Approach – Field observations and split sample data will enable CDM Smith to perform technical review and evaluation on the PRP field program, analytical data, and reports and to qualitatively assess any potential bias in the PRP dataset. Sample results will be evaluated against the PRP's RL and MDLs (Attachment 3) and against the PRP's data using the split samples DQIs in Attachment 1. Field implementation will be measured against procedures in the PRP's project plans. The project decision criteria below will apply.

6. Project Decision Conditions ("If..., then..." statements)-

- If field work is inconsistent with the PRP's QAPP or Work Plan, then the field oversight personnel will verify tasks with respect to the PRP's QAPP and Work Plan and discuss deviations with the PRP's field project leader. All such conversations will be documented in the daily reports submitted to EPA. The CDM Smith PM and EPA RPM will be informed if there are deviations from the PRP's QAPP or Work Plan.
- If the PRP team needs to relocate sample locations, or there are any changes to the planned field program, CDM Smith will communicate this change to EPA and document it on the daily reports.

QAPP Worksheet #11: Project Data Quality Objectives (continued)
(UFP-QAPP Manual Section 2.6.1)
(EPA 2106-G-05 Section 2.2.6)

7. Select Performance and Acceptance Criteria –

- CDM Smith's QC data will be used to determine split samples data quality and whether sample results are acceptable based on the established project DQOs. Sampling results will be compared to the measurement performance criteria (MPC) of the DQIs presented on Attachment 1
- EPA's FASTAC policy for obtaining laboratory resources will be utilized for sampling events.
- Definitive level data is required for full validation of the data.
- The project-specific action limits and quantitation limits are specified on Worksheet #15. Analytical data generated will be compared to these limits. Data must meet the DQOs that have been specified for the site. Refer to Attachment 1
- In addition, to ensure that MPC for usability (criteria for measures of precision, accuracy, representativeness, comparability, completeness, and sensitivity) are met, all data will be subject to validation and the outputs used to perform a data usability assessment.

8. Detail the Plan for Obtaining Data – Field sampling procedures are described in the PRP's Work Plan, FSP and QAPP. Sampling oversight will be performed according to the PRP's schedule, unless unanticipated delays occur. The PRP's contractor's representative will collect and fill sample containers and CDM Smith's field personnel will accept and prepare the split samples for shipment. CDM Smith will perform sample management, prepare, package, and ship the split samples to the assigned laboratory.

Data Reporting

- CDM Smith will prepare daily reports summarizing field activities performed by the PRP, number of split samples collected, and compliance or deviations with the PRP Work Plan, FSP and QAPP.
- Following receipt of the PRP data, CDM Smith will prepare a Data Evaluation Summary Report and submit to EPA. The report will include tabulated results and a discussion of the data quality and its comparability with the PRP's data. This review will be used to evaluate the accuracy of the PRP data. Data usability assessment will be included as an attachment to the Data Evaluation Summary Report.
- CDM Smith will submit the Final EDD for all split samples data to EPA, meeting all EPA Region 4 EDD requirements.

QAPP Worksheet #11: Project Data Quality Objectives (continued)
(UFP-QAPP Manual Section 2.6.1)
(EPA 2106-G-05 Section 2.2.6)

Data archiving

- Validated data will be downloaded from the EPA website or emailed to CDM Smith.
- Electronic data will be input into the project's EQuIS database.
- EPA will archive CLP laboratory raw data in its document control system.
- PDF copies of analytical data received by CDM Smith will be archived in the project files for 10 years after contract expiration.

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

The information is based on information available during the QAPP preparation. The goal for split sample analyses is to verify accuracy of the PRP's data, meet RLs and MDLs, and obtain data that meet the measurement performance criteria established in the PRP's QAPP. CDM Smith will make an attempt to meet PRPs RL and MDLs; however, actual achievable limits and performance will be based on the laboratory assignments, analytical method, and sample matrix. Tables referencing measurement performance criteria in the PRP's Draft FSP and Draft QAPP can be found in Attachment 1 of this document. Tables referencing the CLP method CDM Smith anticipates using are referenced in this document (Worksheet 12, 15 (Table 1) and 28).

It is CDM Smith's intent to implement the FASTAC policy; however, due to the nature of investigation, it is critical for the analytical program to mirror that of the PRP. CDM Smith will work with the Region 4 LSASD and CLP laboratories to facilitate any required modifications to the SOPs so any differences in the split sample results are not subject to uncertainty due to differences in sample handling, extraction, and analysis.

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

Matrix Aqueous
Analytical Group TCL VOCs/SFAM01.1
Concentration Level Trace or Low (microgram per liter [µg/L])

DQIs	QC Sample or Measurement Performance Activity	Measurement Performance Criteria
Overall Precision	Split Sample	≤40% relative percent difference (RPD) when VOCs in both samples ≥ 5x contract required quantitation limit (CRQL) otherwise absolute difference (ABS) ≤ CRQL when one or both results < 5x CRQL
Overall Accuracy/Bias (contamination)	Equipment and Trip blanks	No analyte > CRQL; No target analyte concentrations > CRQL
Analytical Accuracy/Bias	Method blank	≤CRQLs (meet limits on WS #15) and laboratory SOPs
Accuracy (preservation)	Temperature blank	0 to 6 degrees Celsius (°C)
Analytical Precision	Matrix spike (MS)/matrix spike duplicate (MSD)**	See Worksheet #28 for compound-specific RPD values. RPD limits range from 0-14 for trace level and low/medium level VOCs.
Analytical Accuracy	Deuterated monitoring compounds (DMC); matrix spike/matrix spike duplicate (MS/MSD)	See Worksheet #28 for list of compound-specific values and range of acceptable percent recoveries (%Rs) (per SFAM01.1 DMC recovery limits range:40-140%R for trace; 40-135%R for low-level VOCs. MS/MSD limits range from 61-145%R for trace and low level VOCs.
Sensitivity	Sample Reporting limits evaluated during Data Assessment	Sample QLs meet (≤) CRQLs on WS #15 at a minimum
Completeness	Data assessment/ Verification and Completeness Checks	≥90 percent valid data versus total data collected and ≥90 percent valid data versus data planned to be collected -See WS #34 and 35
Comparability	Assessed during data quality assessment (DQA)	Comparable units, and methods

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

Matrix Aqueous
Analytical Group TCL SVOCs/SFAM01.1
Concentration Level Low/Medium (µg/L)

DQIs	QC Sample or Measurement Performance Activity	Measurement Performance Criteria
Overall Precision	Split Sample	≤40%RPD when SVOCs in both samples ≥ 5xCRQL otherwise ABS ≤ CRQL when one or both results < 5x CRQL
Analytical Precision	MS/MSD**	See Worksheet #28b for compound specific values
Analytical Accuracy	***DMCs; MS/MSD**	See Worksheet #28b for list of compound specific values and range of acceptable %Rs
Analytical Accuracy	Method blank	No analyte > CRQL (meet QLs on WS#15)
Overall Accuracy/ bias	Equipment blank	≤ QLs (meet limits on WS#15 and laboratory SOP
Accuracy (preservation)	Temperature blank	0 to 6 degrees Celsius (°C)
Sensitivity	Method detection limit (MDL) standard verification or lowest calibration verification standard	Results meet SOP criteria
	Sample Reporting limits evaluated during Data Assessment	Sample QLs meet (≤) CRQLs on WS #15 at a minimum
Overall Accuracy/bias	Equipment blanks - assessed during DV and DQA	Results ≤QLs on WS #15
Completeness	Data assessment, Data Verification and Completeness Checks	≥90 percent valid data versus total data collected and ≥90 percent valid data versus data planned to be collected See WS #34 and 35
Comparability	Data review	Similar units (µg/L)

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

Matrix Aqueous
Analytical Group TCL PCB Aroclors/SFAM01.1
Concentration Level Low/Medium (µg/L)

DQIs	QC Sample or Measurement Performance Activity	Measurement Performance Criteria
Overall Precision	Split Sample	≤40%RPD when PCBs in both samples ≥ 5xCRQL, otherwise ABS ≤ CRQL when one or both results < 5x CRQL
Analytical accuracy/bias (contamination)	Method/Instrument blank	No analyte > CRQL No target analyte concentrations ≥ ½ CRQL
Analytical Precision	MS/MSD*	See Worksheet #28 for compound specific values Range is 0-20% RPD
Analytical Accuracy	LCS; MS/MSD** Surrogates (Table 6 of method)	See Worksheet #28 for the list of compound-specific values. Range is 50-150%R for LCS; 29-135%R for MS/MSD; 30-150%R for surrogates
Analytical Accuracy/bias (contamination)	Method blank	No analyte > CRQL (meet QLs on WS#15) No target analyte concentrations ≥ ½ CRQL
Overall Accuracy/ bias (contamination)	Equipment blank	≤ CRQLs
Accuracy (preservation)	Temperature blank	0 to 6 degrees Celsius (°C)
Sensitivity	Sample Reporting limits	Sample QLs meet (≤) CRQLs on WS #15 at a minimum
	Data assessment	
Completeness	Data assessment Verification and Completeness Checks	≥90 percent valid data versus total data collected and ≥90 percent valid data versus data planned to be collected See Worksheets #34 and 35
Comparability	Data review	Similar units (µg/L) and methods

*MS/MSD – Reference CLP SFAM01.1, Exhibit D,
**LCS – Reference CLP SFAM01.1, Exhibit D,

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

Matrix Aqueous
Analytical Group Metals – SFAM01.1 – Inductively coupled plasma atomic emission spectroscopy (ICP-AES)
Concentration Level Low/Medium (µg/L)

DQIs	QC Sample or Measurement Performance Activity	Measurement Performance Criteria
Overall Precision	Split Sample	≤40% RPD when both results ≥ 5xCRQL otherwise, ABS ≤ CRQL The validation SOP requires qualification of results ≤20% RPD. For project purposes and data use, these criteria are satisfactory.
Analytical Precision	Laboratory duplicate sample *	≤ 20% RPD**
Analytical Accuracy	Matrix spike **; LCS ***	75–125 %R; 70–130 %R (except Ag and Sb)
Analytical Accuracy/bias (contamination)	Method blank	No analyte > CRQL (meet QLs on WS#15) No target analyte concentrations ≥ ½ CRQL
Overall Accuracy/ bias (contamination)	Equipment blank	≤ CRQLs
Accuracy (preservation)	Temperature blank	0 to 6 degrees Celsius (°C)
Comparability	Assessed during DQA	Comparable units, and methods
Completeness	Assessed during DQA; Data Verification and Completeness Checks	≥90 percent valid data versus total data collected and ≥90 percent valid data versus data planned to be collected See Worksheets #34 and 35
Sensitivity	Sample Reporting limits assessed during DQA	Sample QLs meet (≤) CRQLs on WS #15 at a minimum

*Reference EPA CLP SFAM01.1, Exhibit D for Duplicate Sample Analysis, includes absolute difference criteria
**Reference EPA CLP SFAM01.1, Exhibit D of ICP-AES for Spike Sample Analysis
***Reference EPA CLP SFAM01.1, Exhibit D of ICP-AES for LCS Sample Criteria

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

Matrix Aqueous
Analytical Group Target analyte list (TAL) Metals /SFAM01.1 Inductively coupled plasma mass spectrophotometer (ICP-MS)
Concentration Level Low/Medium (µg/L)

DQIs	QC Sample or Measurement Performance Activity	Measurement Performance Criteria
Overall Precision	Split Sample	≤40%RPD when both results ≥ 5xCRQL ABS ≤ CRQL when either result < 5xCRQL
Analytical Precision	Laboratory duplicate sample *	≤20%RPD*
Analytical Accuracy	Matrix spike **; LCSW ***	75-125%R; 70-130%R (except Ag and Sb)
Analytical Accuracy/bias (contamination)	Method blank	No analyte > CRQL (meet QLs on WS#15) No target analyte concentrations ≥ ½ CRQL
Overall Accuracy/ bias (contamination)	Equipment blank	≤ CRQLs
Accuracy (preservation)	Temperature blank	0 to 6 degrees Celsius (°C)
Comparability	Assessed during DQA	Comparable units and methods
Completeness	Assessed during DQA Verification and Completeness Checks	≥90 percent valid data versus total data collected and ≥90 percent valid data versus data planned to be collected See Worksheets #34 and 35
Sensitivity	Sample Reporting limits assessed during DQA	Sample QLs meet (≤) CRQLs on WS #15 at a minimum

*Reference EPA CLP SFAM01.1, Exhibit D of ICP-MS for Duplicate Sample Analysis
**Reference EPA CLP SFAM01.1, Exhibit D of ICP-MS for Spike Sample Analysis
***Reference EPA CLP SFAM01.1, Exhibit D of ICP-MS for aqueous LCS (LCS) Analysis

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

Matrix Aqueous
Analytical Group TAL Total Cyanide (CN) – SFAM01.1 – Spectrophotometer
Concentration Level Low (µg/L)

DQIs	QC Sample or Measurement Performance Activity	Measurement Performance Criteria
Overall Precision	Split Sample	≤40% RPD when both results ≥ 5xCRQL ABS ≤ CRQL when either result < 5xCRQL
Analytical Accuracy/bias (contamination)	Method blank	No analyte > CRQL (meet QLs on WS#15) No target analyte concentration ≥ ½ CRQL
Overall Accuracy/ bias (contamination)	Equipment blank	No analyte > CRQL
Accuracy (preservation)	Temperature blank	0 to 6 degrees Celsius (°C)
Analytical Precision	Laboratory duplicate sample *	≤ 20% RPD*
Analytical Accuracy	Matrix spike**	75–125 %R
Comparability	Assessed during DQA	Comparable units and methods
Completeness	Assessed during DQA Verification and Completeness Checks	≥90 percent valid data versus total data collected and ≥90 percent valid data versus data planned to be collected See Worksheets #34 and 35
Sensitivity	Sample Reporting limits	Sample QLs meet (≤) CRQLs on WS #15 at a minimum

*Reference EPA CLP SFAM01.1, Exhibit D of Cyanide for Duplicate Sample Analysis
**Reference EPA CLP SFAM01.1, Exhibit D of Cyanide for Spike Sample Analysis

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

Matrix Sediment/Soil
Analytical Group TCL VOCs/SFAM01.1
Concentration Level Low/Medium (micrograms per kilogram [µg/kg])

DQIs	QC Sample or Measurement Performance Activity	Measurement Performance Criteria
Overall Precision	Split Samples	≤60%RPD for sediments ABS ≤ 2xCRQL when either result < 5xCRQL
Precision	MS/MSD*	%RPD – see Worksheet #28
Accuracy	**DMCs; MS/MSD*	Compound specific %Rs are on Worksheet #28
Comparability	Assessed during DQA	Comparable units and methods
Completeness	Assessed during DQA Verification and Completeness Checks	≥ 90 percent collection and analysis See Worksheet #34
Sensitivity/Accuracy	Method blanks assessed during DV and DQA	≤ CRQLs (WS#15 and laboratory SOP)

*MS/MSD – Reference CLP SFAM01.1, Exhibit D, VOCs
**(DMCs) – Reference CLP SFAM01.1, Exhibit D, VOCs

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

Matrix Sediment/Soil
Analytical Group TCL SVOCs/SFAM01.1
Concentration Level Low/Medium (µg/kg)

DQIs	QC Sample or Measurement Performance Activity	Measurement Performance Criteria
Overall Precision	Split Sample	≤60%RPD for sediments ABS ≤ 2xCRQL when either results <5xCRQL
Precision	Laboratory duplicate; MS/MSD*	Worksheet #28 lists compound-specific RPDs
Accuracy	**DMCs; MS/MSD**	Worksheet #28 lists compound-specific %Rs
Comparability	Assessed during DQA	Comparable units and methods
Completeness	Assessed during DQA Verification and Completeness Checks	≥ 90 percent collection and analysis See Worksheet #34
Sensitivity/Accuracy	Method blanks assessed during DV and DQA	≤ CRQLs (WS#15 and laboratory SOP)

**– Reference CLP SFAM01.1, Exhibit D, SVOCs
***(DMCs) – Reference CLP SOM01.1, Exhibit D, SVOCs

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

Matrix Sediment/Soil
Analytical Group TCL PCBs Aroclors/SFAM01.1
Concentration Level Low/Medium (µg/kg)

DQIs	QC Sample or Measurement Performance Activity	Measurement Performance Criteria
Overall Precision	Split Sample	≤60%RPD for sediments ABS ≤ 2xCRQL when either result is <5xCRQL
Precision	MS/MSD*	See list of compound-specific RPDs and %Rs on Worksheet #28
Accuracy	LCS**	
	MS/MSD*	
	Surrogates	
Comparability	Assessed during DQA	Comparable units and methods
Completeness	Assessed during DQA Verification and Completeness Checks	≥ 90 percent collection and analysis See Worksheet #34
Sensitivity/Accuracy	Method blanks assessed during DV and DQA	≤ QLs (WS#15 and laboratory SOP)

*MS/MSD – Reference CLP SOM02.4, Exhibit D, Table 7 for Criteria – Not typically required for Region 2
**LCS – Reference CLP SOM02.4, Exhibit D, Table 8 for Criteria

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

Matrix	Sediment/Soil
Analytical Group	TAL Metals/SFAM01.1
Concentration Level	ICP-AES (mg/kg)

DQIs	QC Sample or Measurement Performance Activity*	Measurement Performance Criteria
Overall Precision	Split Sample	When both results ≥ 5xCRQL, ≤60%RPD for sediments ABS ≤ 2xCRQL when either result < 5xCRQL ([1]Note. Validation SOP requires qualification of results ≤50%RPD. For project purposes the above criteria are satisfactory)
Precision	Laboratory duplicate sample *	≤ 35%RPD* (DV action based on this value)
Accuracy	Equipment blank*	No analyte > CRQL
Accuracy	Matrix spike**; LCS***	75-125 %R 70-130 %R (Sb and Ag 50-150%R)
Comparability	Assessed during DQA	Comparable units and methods
Completeness	Assessed during DQA Verification and Completeness Checks	≥ 90 percent collection and analysis See Worksheet #34
Sensitivity/Accuracy	Method blanks assessed during DV and DQA	≤ CRQLs (WS#15 and laboratory SOP)

*Reference EPA CLP SFAM01.1 Exhibit D of ICP-AES for Duplicate Sample Analysis, includes absolute difference criteria
**Reference EPA CLP SFAM01.1, Exhibit D of ICP-AES for Spike Sample Analysis
***Reference EPA CLP SFAM01.1, Exhibit D of ICP-AES for LCS Sample Criteria

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

Matrix Sediment/Soil
Analytical Group TAL Metals/SFAM01.1
Concentration Level ICP-MS (mg/kg)

DQIs	QC Sample or Measurement Performance Activity*	Measurement Performance Criteria
Overall Precision	Split Sample	≤60%RPD for sediments when both results ≥ 5xCRQL ABS ≤ 2xCRQL when either result < 5xCRQL
Precision	Laboratory duplicate sample *	≤ 35%RPD* (DV action based on this value)
Accuracy	Equipment blank*	No analyte > CRQL
Accuracy	Matrix spike**; LCS***	75-125%R 70-130%R
Comparability	Assessed during DQA	Comparable units and methods
Completeness	Assessed during DQA Verification and Completeness Checks	≥ 90 percent collection and analysis See Worksheet #34
Sensitivity/Accuracy	Method blanks assessed during DV and DQA	≤ CRQLs (WS#15 and laboratory SOP)

*Reference EPA CLP SFAM01.1, Exhibit D of ICP-MS for Duplicate Sample Analysis
**Reference EPA CLP SFAM01.1, Exhibit D of ICP-MS for Spike Sample Analysis
***Reference EPA CLP SFAM01.1, Exhibit D of ICP-MS for LCS Sample Criteria

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

Matrix Sediment/Soil
Analytical Group TAL –Total Cyanide/SFAM01.1Colorimeter or Spectrophotometer
Concentration Level Low (mg/kg)

DQIs	QC Sample or Measurement Performance Activity	Measurement Performance Criteria
Precision	Split Sample	≤60%RPD for sediments when both results ≥ 5xCRQL ABS ≤ 2xCRQL when either result <5xCRQL
Accuracy	Equipment Blank	No analyte > CQRL
Precision	Laboratory duplicate sample	≤ 35% RPD; ABS ≤ 2xCRQL when either result ≤5xQL
Accuracy	Equipment blank*	No analyte > CRQL
Accuracy	MS**	75-125%R
Comparability	Assessed during DQA	Comparable units and methods
Completeness	Assessed during DQA Verification and Completeness Checks	≥ 90 percent collection and analysis See Worksheet #34
Sensitivity/Accuracy	Field rinsate/ Method blanks assessed during DV and DQA	≤ CRQLs (WS#15 and laboratory SOP)

*Reference EPA CLP SFAM01.1, Exhibit D of Cyanide for Duplicate Sample Analysis
**Reference EPA CLP SFAM01.1, Exhibit D of Cyanide for Spike Sample Analysis

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

Matrix Sediment/Soil
Analytical Group TAL –Total Mercury/SFAM01.1
Concentration Level Cold Vapor Atomic Absorption (CVAA) (mg/kg)

DQIs	QC Sample or Measurement Performance Activity*	Measurement Performance Criteria
Overall Precision	Split Sample	≤60%RPD for sediments when both results ≥ 5xCRQL ABS ≤ 2xCRQL when either result <5xCRQL ([1]Note. The validation SOP requires qualification of results ≤50%RPD. For project purposes, the above criteria are satisfactory)
Precision	Laboratory duplicate sample *	≤ 35%RPD* (DV action based on this value)
Accuracy	Equipment blank*	No analyte > CRQL
Accuracy	Matrix spike**	75-125%R
Comparability	Assessed during DQA	Comparable units and methods
Completeness	Assessed during DQA Verification and Completeness Checks	≥ 90 percent collection and analysis See Worksheet #34
Sensitivity/Accuracy	Field rinsate/ Method blanks assessed during DV and DQA	≤ QLs (WS#15 and laboratory SOP)

*Reference EPA CLP SFAM01.1 Exhibit D of Mercury for Duplicate Sample Analysis
**Reference EPA CLP SFAM01.1, Exhibit D of Mercury for Spike Sample Analysis

QAPP Worksheet #13: Secondary Data Criteria and Limitations Table
(UFP-QAPP Manual Section 2.7)
(EPA 2106-G-05 Chapter 3: QAPP Elements for Evaluating Existing Data)

Secondary Data	Data Source (Originating Organization, Report Title, and Date)	Data Use Relative to Current Project	How Data Will Be Used	Factors affecting the Reliability of Data and Limitations on Data Use
Sediment, Soil and Aqueous split samples	TRC Companies. 2021b. Remedial Investigation/Feasibility Study Quality Assurance Project Plan, Burlington Industries Cheraw Superfund Site, Operable Unit 2 TRC Companies. 2021c. Field Sampling Plan, Burlington Industries Cheraw Superfund Site, Operable Unit 2, Cheraw, South Carolina.	Sampling activities anticipated to occur in Summer through Winter 2021 by the PRP's contractor	Parent sample data generated by the PRP will be compared to the split sample data	Any uncertainty or error associated with the parent sampling data will affect the usability of the data.

QAPP Worksheet #14 and #16: Project Tasks and Schedule
(UFP-QAPP Manual Section 2.8.2)
(EPA 2106-G-05 Section 2.2.4)

A summary of major project tasks is provided below. Field activities are anticipated to begin in May 2021 and conclude in September 2021.

Activities	Deliverable	Deliverable Due Date*
Prepare and submit draft version of the oversight QAPP to EPA	UFP-QAPP	March 2021
Prepare and submit final version of the oversight QAPP to EPA	UFP-QAPP	April 2021
Prepare and submit QAPP addendums as appropriate	UFP-QAPP addendums	TBD
Request Region 4 LSASD and EPA CLP assignments and complete subcontract laboratory selection	Subcontract laboratories and EPA CLP/LSASD laboratory assignments	TBD
Oversight of field activities	Summary report of field observations including photos	TBD
Collection of split samples and submission for analysis	Samples obtained per Oversight QAPP andshipped to assigned laboratories.	TBD; Split samples collected during the PRPs implemented Phase I field sampling program
Data Assessment	Assess data quality and usability of validated data as per WS #37	Assess data quality and usability of validated data as per WS #37 in 30 days after receipt of validated data
Oversight /Data Evaluation	Oversight Summary Report/ Data Quality Report	To be determined

*Deliverable due dates may be moved pending unexpected delays during field work

QAPP Worksheet #15
Project Action Limits and Laboratory-Specific Detection/Quantitation Limits
(UFP-QAPP Manual Section 2.6.2.3)
(EPA 2106-G-05 Section 2.2.6)

The information in the is based on information available during the QAPP preparation. The goal for split sample analyses is to verify accuracy of the PRP's data, meet RL and MDLs, and obtain data that meet the measurement performance criteria established in the PRP's QAPP. CDM Smith will make an attempt to meet PRPs RL and MDLs; however, actual achievable limits and performance will be based on the laboratory assignments, analytical method, and sample matrix. Tables referencing MDL and RL from the PRP's Draft FSP and Draft QAPP can be found in Attachment 1 of this document. CRQLs for the SFAM01.1 method are provided in Table 1 of this QAPP.

It is CDM Smith's intent to implement the FASTAC policy; however, due to the nature of investigation, it is critical for the analytical program to mirror that of the PRP's. CDM Smith will work with the Region 4 LSASD and CLP laboratories to facilitate any required modifications to the SOPs so any differences in the split sample results are not subject to uncertainty due to differences in sample handling, extraction, and analysis.

When the laboratories are determined, the methods, SOPs and Worksheets will be documented in an Addendum or a field change request.

QAPP Worksheet #17: Sampling Design and Rationale
Field Oversight and Split Sample Collection
(UFP-QAPP Manual Section 3.1.1)
(EPA 2106-G-05 Section 2.3.1)

As part of the Burlington Industries Cheraw OU2 Site, the PRP is implementing a physical investigation and biological field sampling program in support of the RI/FS. On behalf of the EPA, CDM Smith will provide oversight and will accept and analyze split samples to ensure that the PRP's data is accurate and usable. The total number of split samples will be up to 10% of total PRP samples. The oversight program is designed to provide technical review and evaluation of the PRP's QAPP and SAP. Table 2-1 (Attachment 1) lists the oversight activities that will occur during the field sampling program, and Table 3-1 (Attachment 1) provides details on the collection of samples. Split sample locations will be defined as the project progresses; the exact number and locations of split samples will be determined by CDM Smith in consultation with EPA and will be documented in QAPP addenda or field change notifications before each major field event begins. The intent is to collect samples representative of a range of concentrations, locations, and physical characteristics. As necessary, this QAPP will be modified as the PRP's schedule and scope of work is better defined.

As part of this oversight task, CDM Smith anticipates accepting surface water, sediment, soil and groundwater samples. CDM Smith understands the current scope of the PRP's proposed RI sampling to include the following components:

- Highland Plant – Soil samples collected from 9 soil borings advanced to depths ranging from 4–15 feet (ft) below ground surface (bgs) and groundwater samples from six temporary monitoring wells. Analyses will include: Target Compound List (TCL) metals, TCL semivolatile organic compounds (SVOCs), TCL volatile organic compounds (VOCs), and polychlorinated biphenyl (PCB) Aroclors.
- Western Ditch – No samples proposed.
- Unoccupied Parcels – At least two parcels that were not sampled during previous investigations. The same analytes selected for Highplant locations will be assumed
- Unnamed Tributary East of Western Ditch and Wilson Branch – 25 sampling stations with one surface water and one soil sample collected from each location at a depositional area (some of these will be for all analytes and some will start to drop analytes as data allows)
- Town Lot – 12 soil borings – Analysis for determined contaminants of potential concern (COPCs) based on previous sampling.

QAPP Worksheet #17: Sampling Design and Rationale
Field Oversight and Split Sample Collection
(UFP-QAPP Manual Section 3.1.1)
(EPA 2106-G-05 Section 2.3.1)

- Ponds – Five ponds are located adjacent to the unnamed tributary. Two sediment samples will be collected from the shore of each pond. One additional sample will be collected from the sediment in the center of the two largest ponds. Analysis of determined COPCs.

- Huckleberry Branch/Pee Dee – Surface Water and sediment samples from proposed seven locations. One sample of each type from each location. Analysis of determined COPCs.

- Pee Dee – Sediment samples collected along three profiles on the River. Analyzed for PCBs.

Based on the scope assumptions used to develop this QAPP, CDM Smith assumed the PRP RI field program would include the collection of approximately 130 samples. The PRP RI field program currently assumes the collection of 270 samples. CDM Smith will coordinate with EPA to determine the split samples to be collected and any changes regarding oversight scope and budget needed to conduct requested split sample collection. CDM Smith assumes accepting up to 10 percent of those samples. Samples will be collected from the locations discussed and shown, respectively in Attachments 1, 2 and Table 2 of this QAPP.

Associated field procedures for these activities are detailed in Attachment 4:
CDM Smith
- Technical SOP 2-1 Packaging and Shipping of Environmental Samples
- Technical SOP 4-1 Field Logbook Content and Control
- Technical SOP 4-2 Photographic Documentation of Field Activities

EPA Region 4
- SESDPROC-005-R3 Sample and Evidence Management
- SESDPROC-1002-R0 Logbooks

Attachment 5
EPA Superfund Oversight Guidance Memo

QAPP Worksheet #18: Sampling Locations and Methods
(UFP-QAPP Manual Section 3.1.1 and 3.1.2)
(EPA 2106-G-05 Section 2.3.1 and 2.3.2)

See Attachments 1 and 2 for PRP Locations
See WS #19 & 30 for methods.

QAPP Worksheet #19 and #30: Sample Containers, Preservation, and Hold Times
(UFP-QAPP Manual Section 3.1.2.2)
(EPA 2106-G-05 Section 2.3.2)

Laboratory: CLP/LSASD
List of required accreditations/certifications: CLP/LSASD (maintained by EPA)
Sample Delivery Method: FedEx Overnight

Analyte/ Analyte Group	Matrix	Analytical and Preparation Method/ SOP	Accreditation Expiration Date	Container(s) (number, size, and type per sample)	Preservation	Preparation Holding Time	Analytical Holding Time	Data Package Turn-around Time
VOCs	Sediment/ Soil	SFAM01.1	Maintained by EPA	Three 40 milliliter (mL) pre-weighed VOC vials with spin bars	0-6°C	None	Analyze or freeze in 48 hours. Technical - 14 days	42 days
% Moisture – send with VOC vials				One 4-ounce (oz.) jar w/ Teflon lined cap and no headspace	None – no headspace	Technical – 48 hours		42 days
SVOCs				One 8-oz. glass jar Teflon lined cap	0-6°C	14 days	40 days	42 days
PCBs				One 8-oz. glass jar Teflon lined cap	0-6°C	14 days	40 days	42 days 42 days
TAL Metals		SFAM01.1		One 8-oz. glass jar Teflon lined cap	0-6°C	6 months	None	42 days
TAL Cyanide						14 days		
TAL Total Mercury						28 days		

QAPP Worksheet #19 and #30: Sample Containers, Preservation, and Hold Times (continued)
(UFP-QAPP Manual Section 3.1.2.2)
(EPA 2106-G-05 Section 2.3.2)

Laboratory: CLP/Subcontract Laboratory
List of required accreditations/certifications: CLP (maintained by EPA)
Sample Delivery Method: FedEx Overnight

Analyte/ Analyte Group	Matrix	Analytical and Preparation Method/ SOP	Accreditation Expiration Date	Container(s) (number, size, and type per sample)	Preservation	Preparation Holding Time	Analytical Holding Time	Data Package Turnaround Time
VOCs	Aqueous	SFAM01.1	Maintained by EPA	Three 40 mL VOA vials with Teflon lined septa	0-6°C hydrochloric acid (HCl) to pH<2	7 days unpreserved and 14 days preserved		42 days
SVOCs				Two 1-liter (L) amber glass with polytetrafluoroethylene (PTFE)-lined lid	0-6°C; store in the dark	7 days	40 days	42 days
PCBs				Two 1 L amber glass with PTFE-lined lid	0-6°C; store in the dark	7 days	40 days	42 days
TAL Metals and Mercury				One 1 L high density polyethylene (HDPE)	0-6°C; nitric acid to pH <2	None	6 months/ 28 days	42 days
TAL Cyanide				One 1 L HDPE	NaOH to pH>12; cool to 6°C	14 days	14 days	42 days

QAPP Worksheet #20: Field Quality Control Summary
(UFP-QAPP Section 3.1.1 and 3.1.2)
(EPA 2106-G-05 Section 2.2.6)

See Table 2

QAPP Worksheet #21: Field SOPs
(UFP-QAPP Manual Section 3.1.2)
(EPA 2106-G-05 Section 2.3.2)

SOP # or Reference	Title, Revision, Date, and URL (if available)	Originating Organization	SOP Option or Equipment Type (if SOP Provides Different Options)	Modified for Project? Y/N	Comments
CDM Smith Technical Standard Operating Procedures					
1-2	Sample Custody, Rev. 9, August 2020	CDM Smith		N	Sample tags are not required. Use Scribe generated chain-of-custody (COCs) forms.
2-1	Packaging and Shipping of Environmental Samples, Rev. 7 August 2020	CDM Smith	SOP Section 1.3 lists materials needed	N	Vermiculite shall not be used.
2-2	Guide to Handling of Investigation-Derived Waste, Rev. 9, August 2020	CDM Smith		N	All waste will be stored in marked drums. FTL will coordinate handling of waste on-site with field team and drilling subcontractor.
4-1	Field Logbook Content and Control, Rev. 9, August 2020	CDM Smith		N	Logbook notes should include decontamination procedures; photograph descriptions;notes of conversations; CLP numbers; and visual observations[1].
4-2	Photographic Documentation of Field Activities, Rev. 10, August 2020	CDM Smith	Camera	N	A note will be added in the logbook that a Photo Log was used.

[1]The following information will be recorded (at a minimum) in the field logbook for each sample collected and shipped:

- Name of field personnel, CDM Smith assigned sample number/location, Date sampled, Date shipped
- Sample location number, Corresponding CLP routine analytical services (RAS) sample number, and CLP case number
- Media type, type of analysis to be performed
- Sample volume and containers, perservatives added to samples
- Any unusual discoloration or evidence of contamination
- Field parameter measurements
- Courier airbill number and means of delivery to the laboratory

QAPP Worksheet #21: Field SOPs
(UFP-QAPP Manual Section 3.1.2)
(EPA 2106-G-05 Section 2.3.2)

SOP # or Reference	Title, Revision, Date, and URL (if available)	Originating Organization	SOP Option or Equipment Type (if SOP Provides Different Options)	Modified for Project? Y/N	Comments
EPA Region 4					
SESDPROC-005-R3	Sample and Evidence Management, May 2016	EPA		N	
SESDPROC-1002-R0	Logbooks, October 2017	EPA		N	

QAPP Worksheet #23: Analytical SOPs
(UFP-QAPP Manual Section 3.2.1)
(EPA 2106-G-05 Section 2.3.4)

SOP #	Title, Date, and URL (if available)	Definitive or Screening Data	Matrix/Analytical Group	SOP Option or Equipment Type	Modified for Project? Y/N
SFAM01.1	*EPA Contract Laboratory Program Statement of Work for Superfund Analytical Methods (Multi-Media, Multi-Concentration) SFAM01.1 November 2020* https://www.epa.gov/clp/epa-contract-laboratory-program-statement-work-superfund-analytical-methods-multi-media-multi-0	Definitive	Aqueous, Soil & Sediment-VOC, SVOC, PCBs, moisture content	Gas chromatograph/mass spectroscopy (GC/MS) GC/electron capture detector (ECD); flame ionization detector (FID)	N
			Aqueous & Sediment-TAL Metals, CN + Hg	ICP-AES/ICP-MS, Colorimeter, CVAA	N

FASTAC policy will be implemented for procuring laboratory services.

QAPP Worksheet #24: Analytical Instrument Calibration
(UFP-QAPP Manual Section 3.2.2)
(EPA 2106-G-05 Section 2.3.6)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Title/Position Responsible for Corrective Action[1]	SOP Reference[1,2]
GC/MS; GC; GC/FID	Initial calibration: 5 points standards	Upon award of the contract, whenever the laboratory takes corrective action that may change or affect the initial calibration criteria (e.g., ion source cleaning or repair, column replacement), or if the continuing calibration acceptance criteria have not been met	Relative response factor (RRF) ≥ minimum acceptable RRF listed in Table 5 of procedure. All target compounds, initial RSD ≤ 10 percent or 20 percent and correlation coefficient (r)> 0.995. %RSD ≤ value in of SFAM01.1 or other laboratory SOP as applicable.	Inspect system for problems (e.g., clean ion source, change the column, service the purge and trap device), correct problem, re-calibrate.	Laboratory technician	TBD
GC/MS	Calibration standards verification	Each lot of standards	As per laboratory established control limits.	Inspect system; correct problem; re-run standard and affected samples.	Laboratory GC/MS technician	TBD
GC/MS	Tuning	Daily: Every 12 hours	RFs and RRF as method specified	Inspect system; correct problem; re-run standard and affected samples.	Laboratory GC/MS technician	
GC/FID	Mass discrimination check	Every 12 hours	RF ratio of C32/C20 should be >0.8	Per laboratory SOP.	Laboratory GC/FID technician	TBD
CV-GAS	Calibration; 3-point standards	After instrument set up	$R^3 \geq 0.995$	Inspect system; correct problem.	Laboratory technician	TBD

QAPP Worksheet #24: Analytical Instrument Calibration
(UFP-QAPP Manual Section 3.2.2)
(EPA 2106-G-05 Section 2.3.6)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Title/Position Responsible for Corrective Action[1]	SOP Reference[1,2]
	Initial calibration verification (ICV)	Before sample analysis	80-120%R; source of standard separate from calibration standards	Do not analyze samples until problem is corrected.		
	CCV	10 percent or every 2 hours, whichever is more frequent	80-120%R	Inspect system, re-calibrate and rerun associated samples.		
ICP-MS/AES SFAM01.1	See SFAM01.1/ per instrument manufacturer's procedures	Initial calibration: Daily or once every 24 hours and each time the instrument is set up	ICP-MS: As per instrument manufacturer's procedures, at least 2 standards	Inspect the system, correct problem, re-calibrate, and re-analyze samples.	Laboratory ICP-AES/ICP-MS technician or LSASD laboratory analyst/QA office	TBD
	Initial calibration	Daily; after tuning and optimizing instrument	Correlation coefficient >0.995 with a minimum of 3 standards and a blank	Repeat analysis; re-prepare calibration standards and reanalyze.		
	ICV	Before sample analysis	90-110%R; source of standard separate from calibration standards	Re-calibrate instrument; prepare fresh ICV standards; do not analyze samples until problem is corrected.		
ICP-MS/AES SFAM01.1	Reporting limit standard	After initial calibration verification standard	80-120%R or concentration ≤ 30 percent difference (from true value)	Re-analyze failed standard.	Laboratory ICP-AES/ICP-MS technician or LSASD laboratory analyst/QA office	TBD
	CCV	Every 10 samples and at end of analytical sequence	90-110%R; source of standard separate from calibration standards	Re-check: re-calibrate and rerun all samples analyzed after last valid CCV.		

QAPP Worksheet #24: Analytical Instrument Calibration
(UFP-QAPP Manual Section 3.2.2)
(EPA 2106-G-05 Section 2.3.6)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Title/Position Responsible for Corrective Action[1]	SOP Reference[1,2]
Thermometer	Calibration	Quarterly, serviced annually	±1°C of true value of National Institute of Standards and Technology traceable thermometer	Replace defective thermometer.		
pH meter	Daily buffer checks (2-point bracketing sample pH)	Before use/per batch; other checks as per rental company and manufacturer's recommendations	± 0.1 pH units or ± 0.05 pH units	Recheck; replace buffer solutions and recheck. If still fails, perform instrument check or place out of service.	Laboratory analyst/QA officer - TBD	TBD

Notes:
1. The FASTAC decision process will be used for procuring laboratory services. CLP and LSASD, laboratory calibration and/or method SOPs will be utilized to meet calibration criteria. Specific instrument information (Manufacturer and model) is not available at this time.
2. TBD - Reference SOP depends on the laboratory assignment. EPA maintains the CLP laboratory SOP information. For the subcontract laboratory, if it is not proprietary, CDM Smith will submit the laboratory's SOP as a field change notification or addendum after procurement is completed If the SOP is proprietary, CDM Smith will submit the cover and signature page of the laboratory's SOP and a summary of the SOP, as appropriate (as a field change notification or addendum).
3. R represents the correlation coefficient.
4. The laboratory SOP will include the calibration range information.

QAPP Worksheet #25: Analytical Instrument and Equipment Maintenance, Testing, and Inspection (UFP-QAPP Manual Section 3.2.3) (EPA 2106-G-05 Section 2.3.6)

Instrument/ Equipment	Maintenance Activity	Testing Activity Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Title/Position Responsible for Corrective Action	Reference
Analytical instrument maintenance, testing and inspection information, and availability of spare parts are not available since the FASTAC decision process will be utilized for analytical services, and laboratories have not yet been assigned. It is anticipated that subcontract laboratories will be necessary to perform the methylmercury, hexavalent chromium, and geotechnical analyses. Information on analytical instrument and equipment maintenance, testing, and inspection will be provided in their QA manuals. Maintenance, testing, and inspection frequencies are documented in the laboratories' SOPs.							

QAPP Worksheet #26 and 27: Sample Handling, Custody, and Disposal
(UFP-QAPP Manual Section 3.3)
(EPA 2106-G-05 Section 2.3.3)

Sampling Organization: CDM Smith
Laboratory: LSASD, CLP,
Method of sample delivery (shipper/carrier): FedEx
Number of days from reporting until sample disposal: LSASD 30 days or CLP as per contract

Activity	Organization and Title or Position of Person Responsible for the Activity	SOP reference
Sample labeling	CDM Smith – FTL	Technical SOP 2-1
Chain-of-custody form completion	CDM Smith – FTL	Technical SOP 1-2
Packaging	CDM Smith – FTL	Technical SOP 1-2 and 2-1; EPA CLP guidance for field samplers
Shipping coordination	CDM Smith – FTL, CDM Smith ASC	Technical SOP 2-1
Sample receipt, inspection, and log-in	Laboratory custodian (LSASD, CLP))	Analytical scope of work and laboratory SOP
Sample custody and storage	CDM Smith and laboratories (LSASD, CLP))	Technical SOP 1-2; analytical SOW or laboratory Technical SOP
Sample disposal	Laboratory custodian (LSASD, CLP),)	Laboratory Technical SOP

Notes:

Split samples would have "CMMYY- "sample name"" indicates split sample; MM- month and YY- year. Trip blanks will be identified using the abbreviation TB followed by the date. For example, TB-070121 indicates the trip blank was collected on July 1, 2021.

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 information is based on information available during the QAPP preparation. The goal for split sample analyses is to verify accuracy of the PRP's data, meet reporting limits (RL) and method detection limits (MDLs), and obtain data that meet the measurement performance criteria established in the PRP's QAPP. CDM Smith will make an attempt to meet PRPs RL and MDLs; however, actual achievable limits and performance will be based on the laboratory assignments, analytical method, and sample matrix. Tables referencing Analytical Quality Control and Corrective Action from the PRP's Draft FSP and Draft QAPP can be found in Attachment 1 of this document.

It is CDM Smith's intent to implement the FASTAC policy; however, due to the nature of investigation, it is critical for the analytical program to mirror that of the PRP's. CDM Smith will work with the Region 4 LSASD and CLP laboratories to facilitate any required modifications to the SOPs so any differences in the split sample results are not subject to uncertainty due to differences in sample handling, extraction, and analysis.

QAPP Worksheet #28a: 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)

Matrix Aqueous

Analytical Group TCL VOCs Trace or Low (µg/L)

Analytical Method/SOP Reference SFAM01.1

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Measurement Performance Criteria	
Split Samples	Up to 10% of PRP sample total	None		Notify PM and flag duplicate results.	CDM Smith ASC and FTL	≤40%RPD when both samples ≥5x otherwise use ABS criterion, ABS ≤ CRQL	
Temperature Blank	1 per cooler	0 to 6°C		Laboratory will inform RSCC/CDM Smith and note in data narrative. CDM Smith will check packing procedure and increase coolant	Laboratory Analyst and CDM Smith FTL	0 to 6° C acceptable Validator will apply professional judgment in qualifying data above 6 degrees C	
Trip Blank	1 per cooler	≤ CRQL		Verify results; re-analyze. Flag outliers.	Laboratory analyst	≤ CRQL	
Method Blank	1 every 12 hours	No analyte > CRQL*		Suspend analysis unit source recertified.	LSASD or EPA CLP Laboratory GC/MS Technician	No analyte > CRQL*	
Deuterated Monitoring Compounds	all samples	Vinyl chloride-d3	40-130%R	Check calculations and instruments, reanalyze affected samples.		Vinyl chloride-d3	40-130%R
		Chloroethane-d5	65-130%R			Chloroethane-d5	65-130%R

*Except for methylene chloride, 2-butanone and acetone, which can be up to 2 times the CRQL.

QAPP Worksheet #28a: Analytical Quality Control and Corrective Action (Aqueous TCL VOCs continued)

QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Measurement Performance Criteria	
TCL Low VOCs Continued							
Deuterated Monitoring Compounds [cont'd]	all samples	1,1-Dichloroethene-d2	60-125%R	Check calculations and instruments, reanalyze affected samples; up to 3 DMCs per sample may fail to meet recovery limits	LSASD or EPA CLP laboratory GC/MS technician	1,1-Dichloroethene-d2	60-125%R
		2-Butanone-d5	40-130%R			2-Butanone-d5	40-130%R
		Chloroform-d	70-125%R			Chloroform-d	70-125%R
		1,2-Dichloroethane-d4	70-130%R			1,2-Dichloroethane-d4	70-130%R
		Benzene-d6	70-125%R			Benzene-d6	70-125%R
		1,2-Dichloropropane-d6	60-140%R			1,2-Dichloropropane-d6	60-140%R
		Toluene-d8	70-130%R			Toluene-d8	70-130%R
		trans-1,3-Dichloropropene-d4	55-130%R			trans-1,3-Dichloropropene-d4	55-130%R
		2-Hexanone-d5	45-130%R			2-Hexanone-d5	45-130%R
		1,1,2,2-Tetrachloroethane-d2	60-125%R			1,1,2,2-Tetrachloroethane-d2	60-125%R
		1,2-Dichlorobenzene-d4	80-120%R			1,2-Dichlorobenzene-d4	80-120%R
Internal Standards	all samples	60-140 percent		Check calculations and instruments, reanalyze affected samples		± 40 percent of response area, ± 20 sec retention time shift	

QAPP Worksheet #28a: Analytical Quality Control and Corrective Action (Aqueous TCL VOCs continued)

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Measurement Performance Criteria	
Matrix Spike/ Matrix Spike (Not Required for CLP) Accuracy	1 per 20 samples or less (if requested)	1,1-Dichloroethene	61-145%R	Flag outliers	LSASD/ CLP Laboratory GC/MS Technician	1,1-Dichloroethene	61-145%R
		Trichloroethene	71-120%R			Trichloroethene	71-120%R
		Benzene	71-127%R			Benzene	71-127%R
		Toluene	76-125%R			Toluene	76-125%R
		Chlorobenzene	75-130%R			Chlorobenzene	75-130%R
Matrix Spike Duplicate (Not Required for CLP) Precision	1 per 20 samples or less (if requested)	1,1-Dichloroethene	0-14%RPD	Flag outliers		1,1-Dichloroethene	0-14%RPD
		Trichloroethene	0-14%RPD			Trichloroethene	0-14%RPD
		Benzene	0-11%RPD			Benzene	0-11%RPD
		Toluene	0-13%RPD			Toluene	0-13%RPD
		Chlorobenzene	0-13%RPD			Chlorobenzene	0-13%RPD

QAPP Worksheet #28b: 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)

Matrix Aqueous
Analytical Group TCL SVOCs
Analytical Method/SOP Reference SFAM01.1

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Measurement Performance Criteria
Split Sample	Up to 10% of PRP sample total	None	Notify PM and flag duplicate results.	CDM Smith ASC and PM	≤40%RPD when both results ≥ 5xCRQL otherwise ABS ≤ CRQL
Temperature Blank	1 per cooler	0 to 6° C	Laboratory will inform RSCC/CDM Smith and note in data narrative. CDM Smith will check packing procedure and increase coolant.	Laboratory analyst and CDM Smith FTL	0 to 6° C acceptable Validator will apply professional judgment in qualifying data above 6 degrees C
Method Blank	1 per ≤20 samples or batch	No analyte > CRQL*	Stop analysis, re-extract and reanalyze affected samples.	LSASD or CLP laboratory GC/MS technician	≤ CRQL

*Except for bis (2-Ethylhexyl) phthalate, which can be up to 5 times the CRQL. (EPA CLP National Functional Guidelines)

QAPP Worksheet #28b: Analytical Quality Control and Corrective Action (Aqueous TCL SVOCs Continued)

Laboratory QC Sample	Frequency / Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Measurement Performance Criteria
TCL SVOCs [cont'd]						
Deuterated Monitoring Compounds (DMCs)	all samples	1,4-Dioxane-d8	40-110%R	Check calculations and instruments, reanalyze affected samples; up to 4 DMCs may fail to meet recovery limits.	LSASD or CLP laboratory GC/MS technician	Same as method acceptance limits
		Phenol-d5	10-130%R			
		Bis(2-chloroethyl)ether-d8	25-120%R			
		2-Chlorophenol-d4	20-130%R			
		4-Methylphenol-d8	25-125%R			
		4-Chloroaniline-d4	1-146%R (advisory)			
		Nitrobenzene-d5	20-125%R			
		2-Nitrophenol-d4	20-130%R			
		2,4-Dichlorophenol-d3	20-120%R			
		Dimethylphthalate-d6	25-130%R			
		Acenaphthylene-d8	10-130%R			
		4-Nitrophenol-d4	10-150%R			
		Fluorene-d10	25-125%R			
		4,6-Dinitro-2-methylphenol-d2	10-130%R			
		Anthracene-d10	25-130%R			
		Pyrene-d10	15-130%R			
		Benzo(a)pyrene-d12	20-130%R			
		Fluoranthene-d10 (SIM)	30-130%R			
		2-Methylnaphthalate-d10 (SIM)	30-130%R			
		simultaneous ion monitoring [SIM])				
Internal Standards	all samples	50-100 percent of area, ± 20 second retention time shift		Check calculations /instruments. Re-analyze affected samples.	LSASD or CLP laboratory GC/MS technician	50-100 percent of area, ± 20 second retention time shift

QAPP Worksheet #28b: Analytical Quality Control and Corrective Action (Aqueous TCL SVOCs continued)

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Measurement Performance Criteria
Matrix Spike/Matrix Spike Duplicate (Not Required for CLP) Accuracy	1 per 20 samples or less (if requested)	Phenol	12-110%R	Flag outliers	LSASD/ CLP laboratory GC/MS technician	Same as Method QC Limits
		2-Chlorophenol	27-123%R			
		N-Nitroso-di-n-propylamine	41-116%R			
		4-Chloro-3-methylphenol	23-97%R			
		Acenaphthene	46-118%R			
		4-Nitrophenol	29-94%R			
		2,4-Dinitrotoluene	24-96%R			
		Pentachlorophenol	9-103%R			
		Pyrene	26-127%R			
Matrix Spike/Matrix Spike Duplicate (Not Required for CLP) Precision	1 per 20 samples or less (if requested)	Phenol	0-42%RPD	Flag outliers		
		2-Chlorophenol	0-40%RPD			
		N-Nitroso-di-n-propylamine	0-38%RPD			
		4-Chloro-3-methylphenol	0-42%RPD			
		Acenaphthene	0-31%RPD			
		4-Nitrophenol	0-50%RPD			
		2,4-Dinitrotoluene	0-38%RPD			
		Pentachlorophenol	0-50%RPD			
		Pyrene	0-31%RPD			

QAPP Worksheet #28c: 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)

Matrix Aqueous
Analytical Group TCL PCBs/Aroclors
Analytical Method/SOP Reference SFAM01.1

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Measurement Performance Criteria	
Split Sample	Up to 10% of PRP Sample total	None		Notify PM and flag duplicate results.	CDM Smith ASC and PM	≤40%RPD when PCBs in both samples ≥ 5xCRQL Otherwise ABS ≤ CRQL	
Temperature Blank	1 per cooler	0 to 6°C		Laboratory will inform RSCC/CDM Smith and note in data narrative. CDM Smith will check packing procedure and increase coolant.	Laboratory analyst and CDM Smith FTL	0 to 6° C acceptable Validator will apply professional judgment in qualifying data above 6 degrees C	
Method Blank	1 per ≤20 samples or whenever samples extracted	No analyte > CRQL		Suspend analysis – re-extract and reanalyze affected samples.	LSASD or CLP laboratory GC/ECD technician	No analyte > CRQL No target analyte concentrations ≥ ½ CRQL	
Matrix Spike	1 per ≤20 samples; if requested	Aroclor-1016	29-135%R	Flag outliers.	LSASD or CLP laboratory GC/ECD technician	Aroclor-1016	29-135%R
		Aroclor-1260	29-135%R			Aroclor-1260	29-135%R
Matrix Spike Duplicate		Aroclor-1016	0-15%RPD			Aroclor-1016	0-15%RPD
		Aroclor-1260	0-20%RPD			Aroclor-1260	0-20%RPD
LCS	1 per ≤20 samples	Aroclor-1016	50-150%R	Check calculations and instruments; reanalyze affected samples.	LSASD or CLP laboratory GC/ECD technician	Aroclor-1016	50-150%R
		Aroclor-1260	50-150%R			Aroclor-1260	50-150%R
Surrogate	all samples	30-150%R		Check calculations and instruments; reanalyze affected samples.	LSASD or CLP laboratory GC/ECD technician	30-150%R	

QAPP Worksheet #28d: 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)

Matrix Aqueous

Analytical Group TAL Metals ICP MS/AES

Analytical Method/SOP Reference SFAM01.1

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Measurement Performance Criteria
Split Sample	Up to 10% of PRP sample total	None	Notify PM and flag duplicate results.	CDM Smith ASC and PM	≤40%RPD when both results ≥ 5xCRQL, ABS ≤ 2xCRQL when any result < 5xCRQL
Temperature Blank	1 per cooler	0 to 6°C	Laboratory will inform RSCC/CDM Smith and note in data narrative. CDM Smith will check packing procedure and increase coolant.	Laboratory analyst and CDM Smith FTL	0 to 6° C acceptable Validator will apply professional judgment in qualifying data > 6 degrees C
Preparation Blank	1 per ≤20 samples	No constituent > CRQL	Suspend analysis rectify source; redigest and reanalyze affected samples.	LSASD or CLP laboratory ICP technician	No constituent > CRQL
Spike	1 per ≤20 samples	75-125%R*	Flag outliers.		75-125%R*
Laboratory Duplicate	1 per ≤20 samples	± 20%RPD**	Flag outliers.		≤20% RPD**
Post-Digestion Spike	after any analyte (except Ag) fails spike %R	75-125%R	Flag outliers.		75-125%R
Interference Check Sample [ICP Analysis Only]	Beginning of each run	± CRQL + true value or ± 20 percent of true value, whichever is greater	Check calculations and instruments; reanalyze affected samples.	LSASD or CLP laboratory ICP technician	± 2 times CRQL of true value or ± 20 percent of true value, whichever is greater
LCS	1 per ≤20 samples	70-130%R	Suspend analysis until source rectified; re-digest and reanalyze affected samples.	LSASD or CLP laboratory ICP technician	70-130%R

*Except when the sample concentration is greater than 4 times the spike concentration, then disregard the recoveries; no data validation action taken.
** Except when the sample and/or duplicate concentration is less than 5 times the CRQL, then + CRQL.

CDM Smith

QAPP Worksheet #28e: 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)

Matrix Aqueous
Analytical Group TAL – Total Cyanide – Spectrophotometer
Analytical Method/SOP Reference SFAM01.1

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Measurement Performance Criteria
Split Sample	Up to 10% of PRP Sample total	None	Notify PM and flag duplicate results.	CDM Smith ASC and PM	≤40%RPD when both results ≥ 5xCRQL, ABS ≤ 2xCRQL when either result < 5xCRQL
Temperature Blank	1 per cooler	0 to 6°C	Laboratory will inform RSCC/CDM Smith and note in data narrative. CDM Smith will check packing procedure and increase coolant.	Laboratory analyst and CDM Smith FTL	0 to 6° C acceptable Validator will apply professional judgment in qualifying data above 6 degrees C
Equipment Blank	1 per decontamination event not to exceed 1 per day	≤ CRQL	Verify results; re-analyze. Flag outliers. Check decontamination procedures.	Laboratory analyst and CDM Smith FTL	≤ CRQL
Preparation Blank (PB)	1 per ≤20 samples	No analyte > CRQL	Suspend analysis; re-digest and reanalyze.	LSASD or CLP laboratory technician	No analyte > CRQL
Laboratory Duplicate	1 per ≤20 samples	± 20%RPD*	Flag outliers.	LSASD or CLP laboratory technician	≤ 20%RPD
Spike Sample	1 per ≤20 samples	75-125- %R	Flag outliers.	LSASD or CLP laboratory technician	75-125%R

QAPP Worksheet #28f: 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)

Matrix Aqueous
Analytical Group TAL – Total Mercury CVAA
Analytical Method/SOP Reference SFAM01.1

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Measurement Performance Criteria
Split Sample	Up to 10% of PRP sample total	None	Notify PM and flag duplicate results.	CDM Smith ASC and PM	≤40%RPD when both results ≥ 5xCRQL, ABS ≤ 2xCRQL when either result < 5xCRQL
Temperature Blank	1 per cooler	0 to 6°C	Laboratory will inform RSCC/CDM Smith and note in data narrative. CDM Smith will check packing procedure and increase coolant.	Laboratory analyst and CDM Smith FTL	0 to 6° C acceptable Validator will apply professional judgment in qualifying data above 6° C
Equipment Blank	1 per decontamination event not to exceed 1 per day	≤ CRQL	Verify results; re-analyze. Flag outliers. Check decontamination procedures.	Laboratory analyst and CDM Smith FTL	≤ CRQL
Preparation Blank (PB)	1 per ≤20 samples	No analyte > CRQL	Suspend analysis; re-digest and reanalyze.	LSASD or CLP laboratory technician	No analyte > CRQL
Laboratory Duplicate	1 per ≤20 samples	± 20%RPD*	Flag outliers.	LSASD or CLP laboratory technician	≤ 20%RPD
Spike Sample	1 per ≤20 samples	75-125- %R	Flag outliers.	LSASD or CLP laboratory technician	75-125%R

QAPP Worksheet #28g: 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)

Matrix Sediment/Soil

Analytical Group TCL VOCs

Analytical Method/SOP Reference SFAM01.1

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Measurement Performance Criteria
Split Sample	10 % of PRP sample total	None	Notify PM and flag duplicate results.	CDM Smith FTL and Laboratory Analyst	≤60%RPD for sediments ABS ≤ 2xQL when either result < 5xCRQL
Temperature Blank	1 per cooler	0 to 6° C	Laboratory will inform RSCC/CDM Smith and note in data narrative. CDM Smith will check packing procedure and increase coolant.	Laboratory analyst and CDM Smith FTL	0 to 6° C acceptable Validator will apply professional judgment in qualifying data above 6° C
Method Blank	1 every 12 hours	No analyte > CRQL*	Suspend analysis unit source recertified.	LSASD/CLP laboratory GC/MS technician	No analyte > CRQL*

*Except as noted in the EPA CLP National Functional Guidelines, Final, January 2017

QAPP Worksheet #28g: Analytical Quality Control and Corrective Action (TCL VOCs Sediment continued)

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Measurement Performance Criteria	
Deuterated Monitoring Compounds	all samples	Vinyl chloride-d3	68-122%R	Check calculations and instruments, reanalyze affected samples; up to three DMCs per sample may fail to meet necessary limits (Section 11.3.4, Page D45 of SOM01.2).	LSASD/ CLP laboratory GC/MS technician	Vinyl chloride-d3	68-122%R
		Chloroethane-d5	61-130%R			Chloroethane-d5	61-130%R
		1,1-Dichloroethene-d2	45-132%R			1,1-Dichloroethene-d2	45-132%R
		2-Butanone-d5	20-182%R			2-Butanone-d5	20-182%R
		Chloroform-d	72-123%R			Chloroform-d	72-123%R
		1,2-Dichloroethane-d4	79-122%R			1,2-Dichloroethane-d4	79-122%R
		Benzene-d6	80-121%R			Benzene-d6	80-121%R
		1,2-Dichloropropane-d6	74-124%R			1,2-Dichloropropane-d6	74-124%R
		Toluene-d8	78-121%R			Toluene-d8	78-121%R
		trans-1,3-Dichloropropene-d4	72-130%R			trans-1,3-Dichloropropene-d4	72-130%R
		2-Hexanone-d5	17-184%R			2-Hexanone-d5	17-184%R
		1,4-Dioxane-d8	50-150%R			1,4-Dioxane-d8	50-150%R
		1,1,2,2-Tetrachloroethane-d2	56-161%R			1,1,2,2-Tetrachloroethane-d2	56-161%R
		1,2-Dichlorobenzene-d4	70-131%R			1,2-Dichlorobenzene-d4	70-131%R
Internal Standards	all samples	50-200 percent of area, ± 30 second retention time shift		Check calculations/ instruments reanalyze affected samples.	LSASD or CLP laboratory GC/MS technician	50-200 percent of area, ± 30 second retention time shift	

QAPP Worksheet #28g: Analytical Quality Control and Corrective Action (TCL VOCs Sediment continued)

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Measurement Performance Criteria	
Matrix Spike (Not Required)	1 per 20 samples or less (if requested)	1,1-Dichloroethene	59-172%R	Flag outliers.	LSASD/ CLP laboratory GC/MS technician	1,1-Dichloroethene	59-172%R
		Trichloroethene	62-137%R			Trichloroethene	62-137%R
		Benzene	66-142%R			Benzene	66-142%R
		Toluene	59-139%R			Toluene	59-139%R
		Chlorobenzene	60-133%R			Chlorobenzene	60-133%R
Matrix Spike Duplicate (Not Required)	1 per 20 samples or less (if requested)	1,1-Dichloroethene	0-22%RPD	Flag outliers.		1,1-Dichloroethene	0-22%RPD
		Trichloroethene	0-24%RPD			Trichloroethene	0-24%RPD
		Benzene	0-21%RPD			Benzene	0-21%RPD
		Toluene	0-21%RPD			Toluene	0-21%RPD
		Chlorobenzene	0-21%RPD			Chlorobenzene	0-21%RPD

QAPP Worksheet #28h: 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)

Matrix Sediment/Soil
Analytical Group TCL SVOCs
Analytical Method/SOP Reference SFAM01.1

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Measurement Performance Criteria
Split Samples	Up to 10% of PRP sample total	None	Notify PM and flag duplicate results.	CDM Smith FTL and Laboratory analyst	≤60%RPD for sediments ABS ≤ 2xCRQL when either result ≤ 5xCRQL
Temperature Blank	1 per cooler	0 to 6°C	Laboratory will inform RSCC/CDM Smith and note in data narrative. CDM Smith will check packing procedure and increase coolant.	Laboratory analyst and CDM Smith FTL	0 to 6° C acceptable Validator will apply professional judgment in qualifying data above 6 degrees C
Method Blank	1 per 20 samples or less whenever samples are extracted	No analyte > CRQL*	Suspend analysis and reanalyze blank and affected sample.	LSASD or CLP laboratory GC/MS technician	No analyte > CRQL*

*Except as noted in the EPA National Functional Guidelines, Final, January 2017

QAPP Worksheet #28h: Analytical Quality Control and Corrective Action (TCL SVOC Sediment continued)

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	DQIs	Measurement Performance Criteria
TCL SVOCs – Soil Continued							
Deuterated Monitoring Compounds	all samples	1,4-Dioxane	40-110%R	Check calculations and instruments, reanalyze affected samples; up to four DMCs may fail to meet recovery limits	LSASD or CLP laboratory GC/MS technician	Accuracy	
		Phenol-d5	10-130%R				
		Bis(2-chloroethyl)ether-d8	25-120%R				
		2-Chlorophenol-d4	20-130%R				
		4-Methylphenol-d8	25-125%R				
		4-Chloroaniline-d4	1-146%R (advisory)				
		Nitrobenzene-d5	20-125%R				
		2-Nitrophenol-d4	20-130%R				
		2,4-Dichlorophenol-d3	20-120%R				
		Dimethylphthalate-d6	25-130%R				
		Acenaphthylene-d8	10-130%R				
		4-Nitrophenol-d4	10-150%R				
		Fluorene-d10	25-125%R				
		4,6-Dinitro-2-methylphenol-d2	10-130%R				
		Anthracene-d10	25-130%R				
		Pyrene-d10	15-130%R				
		Benzo(a)pyrene-d12	20-130%R				
		Fluoranthene-d10 (SIM)	30-130%R				
		2-Methylnaphthalate-d10 (SIM)	30-130%R				
Internal Standards	all samples	50-200 percent of area, ± 30 second retention time shift		Check calculations and instruments, reanalyze affected samples.	LSASD or CLP laboratory GC/MS technician	Accuracy	50-200 percent of area, ± 30 second retention time shift

QAPP Worksheet #28h: Analytical Quality Control and Corrective Action (TCL SVOCs Sediment continued)

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Measurement Performance Criteria
Matrix Spike/ Matrix Spike Duplicate (Not Required for CLP) Accuracy	1 per 20 samples or less (if requested)	Phenol	12-110%R	Flag outliers.	LSASD/ CLP laboratory GC/MS technician	See method acceptance limits
		2-Chlorophenol	27-123%R			
		N-Nitroso-di-n-propylamine	41-116%R			
		4- Chloro-3-methylphenol	23-97%R			
		Acenaphthene	46-118%R			
		4-Nitrophenol	29-94%R			
		2,4-Dinitrotoluene	24-96%R			
		Pentachlorophenol	9-103%R			
		Pyrene	26-127%R			
Matrix Spike/ Matrix Spike Duplicate (Not Required for CLP) Precision	1 per 20 samples if requested (if requested)	Phenol	0-42%RPD	Flag outliers.		
		2-Chlorophenol	0-40%RPD			
		N-Nitroso-di-n-propylamine	0-38%RPD			
		4-Chloro-3-methylphenol	0-42%RPD			
		Acenaphthene	0-31%RPD			
		4-Nitrophenol	0-50%RPD			
		2,4-Dinitrotoluene	0-38%RPD			
		Pentachlorophenol	0-50%RPD			
		Pyrene	0-31%RPD			

QAPP Worksheet #28i: 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)

Matrix Sediment/Soil
Analytical Group TCL PCBs/Aroclors
Analytical Method/SOP Reference SFAM01.1

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Measurement Performance Criteria	
Split Samples	Up to 10% of PRP sample total	None		Notify PM and flag duplicate results.	CDM Smith FTL and Laboratory analyst	≤60% RPD for sediments ABS ≤ 2xCRQL when either result ≤ 5xCRQL	
Temperature Blank	1 per cooler	0 to 6°C		Laboratory will inform RSCC/CDM Smith and note in data narrative. CDM Smith will check packing procedure and increase coolant.	Laboratory analyst and CDM Smith FTL	0 to 6° C acceptable Validator will apply professional judgment in qualifying data above 6° C	
Method Blank	1 per 20 samples or whenever samples extracted	No analyte > CRQL		Suspend analysis unit source recertified.	LSASD or CLP laboratory GC/ECD technician	No analyte > CRQL	
Matrix Spike	1 per 20 samples	Aroclor-1016	29-135%R	Flag outliers.	LSASD or CLP laboratory GC/ECD technician	Aroclor-1016	29-135%R
		Aroclor-1260	29-135%R			Aroclor-1260	29-135%R
Matrix Spike Duplicate	1 per 20 samples	Aroclor-1016	0-15%RPD	Flag outliers.	LSASD or CLP laboratory GC/ECD technician	Aroclor-1016	0-15%RPD
		Aroclor-1260	0-20%RPD			Aroclor-1260	0-20%RPD
LCS	all samples	Aroclor-1016	50-150%R	Check calculations and instruments; reanalyze affected samples.	LSASD or CLP laboratory GC/ECD technician	Aroclor-1016	50-150%R
		Aroclor-1260	50-150%R			Aroclor-1260	50-150%R
Surrogate	all samples	30-150%R		Check calculations and instruments; reanalyze affected samples.	LSASD or CLP laboratory GC/ECD technician	30-150%R	

QAPP Worksheet #28j: 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)

Matrix Sediment/Soil
Analytical Group TAL Metals
Analytical Method/SOP Reference SFAM01.1

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Measurement Performance Criteria
Split Samples	Up to 10% of PRP sample total	None	Notify PM; flag duplicate results.	Laboratory analyst and CDM Smith FTL	≤60%RPD for sediments ABS ≤ 2xCRQL when either result < 5xCRQL
Temperature Blank	1 per cooler	0 to 6°C	Laboratory inform RSCC/CDM Smith - note in data narrative. CDM Smith will check packing procedure and increase coolant.	Laboratory analyst and CDM Smith FTL	0 to 6° C - Validator will apply professional judgment in qualifying data above 6° C
Preparation Blank	1 per 20 samples	No constituent > CRQL	Suspend analysis until source rectified; re-digest and reanalyze affected samples.	LSASD or CLP laboratory ICP-AES/ICP-MS technician	No constituent > CRQL
Spike	1 per 20 samples	75-125%R*	Flag outliers.		75-125%R*
Laboratory Duplicate	1 per 20 samples	≤35% RPD	Flag outliers.		≤ 35%RPD
Post-Digestion Spike	After an analyte (except Ag & Hg) fails spike %R	75-125%R	Flag outliers.		75-125%R
Interference Check Sample [ICP Analysis Only]	Beginning, end, and periodically during run (2 times every 8 hours)	Within ± 2 times CRQL of true value or ± 20 percent of true value, whichever is greater	Check calculations and instruments; reanalyze affected samples.		Within ± 2 times CRQL of true value or ± 20 percent of true value, whichever is greater
LCS**	1 per 20 samples	70-130 %R (Sb and Ag 50-150%R)	Suspend analysis rectify source; re-digest and reanalyze affected samples.		70-130 %R (Sb and Ag 50-150%R)

*When the sample concentration is greater than 4 times the spike concentration; no data validation action taken.
** If the EPA LCS is unavailable, other EPA QC samples or other certified materials may be used. In such cases, control limits for the LCS must be documented and provided.

QAPP Worksheet #28k: 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)

Matrix	Sediment/Soil
Analytical Group	TAL – Total Cyanide
Analytical Method/SOP Reference	SFAM01.1– Colorimeter or Spectrophotometer

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Measurement Performance Criteria
Split Samples	Up to 10% of PRP sample total	None	Notify PM and flag duplicate results.	CDM Smith FTL and Laboratory analyst	≤60%RPD for sediments ABS ≤ 2xCRQL when either result < 5xCRQL
Temperature Blank	1 per cooler	0 to 6°C	Laboratory will inform RSCC/CDM Smith and note in data narrative. CDM Smith will check packing procedure and increase coolant.	Laboratory analyst and CDM Smith FTL	0 to 6° C
Equipment Blank	1 per decontamination event not to exceed 1 per day	≤ CRQL	Verify results; re-analyze. Flag outliers. Check decontamination procedures.	Laboratory analyst and CDM Smith FTL	≤ CRQL
Preparation Blank (PB)	1 per ≤20 samples	No analyte > CRQL	Suspend analysis; redigest and reanalyze.	LSASD or CLP laboratory technician	No analyte > CRQL
Laboratory Duplicate	1 per ≤20 samples	≤ 35%RPD	Flag outliers.	LSASD or CLP laboratory technician	≤ 35%RPD
Spike Sample	1 per ≤20 samples	75-125%R	Flag outliers.	LSASD or CLP laboratory technician	75-125%R

QAPP Worksheet #28I: 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)

Matrix Sediment/Soil

Analytical Group TAL – Total Mercury – Cold Vapor Atomic Absorption (CVAA)

Analytical Method/SOP Reference SFAM01.1

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Measurement Performance Criteria
Split Samples	Up to 10% of PRP sample total	None	Notify PM and flag duplicate results.	CDM Smith FTL and Laboratory analyst	≤60%RPD for sediments ABS ≤ 2xCRQL when either result < 5xCRQL
Temperature Blank	1 per cooler	0 to 6°C	Laboratory will inform RSCC/CDM Smith and note in data narrative. CDM Smith will check packing procedure and increase coolant.	Laboratory analyst and CDM Smith FTL	0 to 6° C Validator will apply professional judgment in qualifying data above 6 degrees C
Equipment Blank	1 per decontamination event not to exceed 1 per day	≤ CRQL	Verify results; re-analyze. Flag outliers. Check decontamination procedures.	Laboratory analyst and CDM Smith FTL	≤ CRQL
Preparation Blank (PB)	1 per ≤20 samples	No analyte > CRQL	Suspend analysis; redigest and reanalyze if blank results meet criteria outlined in SOP.	LSASD or CLP laboratory technician	No analyte > CRQL
Laboratory Duplicate	1 per 20 samples	≦ 20%RPD	Flag outliers.	LSASD or CLP laboratory technician	≦ 35%RPD
Spike Sample	1 per ≤20 samples	75-125%R	Flag outliers and perform post-digestion spike. No flags required if sample concentration is >4x spike added.	LSASD or CLP laboratory technician	75-125%R

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)

PROCEDURE FOR COLLECTION OF FIELD QC SAMPLES

Duplicates: will not be required for this project. Split samples are duplicates of PRP field samples.

Trip Blanks: A trip blank will be prepared at the start of each day on which aqueous samples will be collected for analysis of VOCs. Trip blanks are used to determine whether on site atmospheric contaminants are seeping into the sample vials, or if any cross-contamination of samples is occurring during shipment or storage of sample containers. A trip blank consists of demonstrated analyte-free water sealed in 40-mL Teflon septum vials with no headspace (including bubbles) in the vials. Trip blank water will be considered analyte-free when analysis results for VOCs are below the associated quantitation limit.

Certification of blank water quality will be kept on site and will be filed in the project files once field work is completed. A sample of the blank water used in the field will be submitted for confirmatory analysis.

Trip blanks are to be kept in close proximity to the samples being collected and will be maintained between 0 and 6 °C. They will be handled in the same manner as the other VOC aqueous samples. Preservation of trip blanks is presented on Worksheet #19. One trip blank will be included with each cooler that contains aqueous samples collected for VOC.

Field Rinsate Blanks (Equipment Blanks): Equipment blanks will be collected to evaluate field sampling and decontamination procedures by pouring demonstrated analyte-free water over or through the decontaminated sampling equipment. Equipment blanks are used to assess the effectiveness of equipment decontamination and will be collected before the use of decontaminated sampling equipment. One equipment blank will be collected for each equipment type per decontamination event and will be analyzed for the same constituents as the environmental samples. The frequency of equipment blanks is one per decontamination event, not to exceed one per day, for each equipment type and for each sample matrix. If disposable sampling equipment will be used, no equipment blanks are required.

The definition of demonstrated analyte-free water is discussed in the previous section. The use of the same aliquot of water on all equipment associated with a particular matrix for the required analyses is permissible. However, a separate equipment blank may be collected for each piece of equipment associated with a particular sample matrix that will be analyzed.

QAPP Worksheet #28: Analytical Quality Control and Corrective Action (continued)
(UFP-QAPP Manual Section 3.4 and Tables 4, 5, and 6)
(EPA 2106-G-05 Section 2.3.5)

Equipment Blanks (Continued): Equipment blanks may be minimized by decreasing the frequency of decontamination and using additional equipment. In this case the samples associated with the equipment blank will be noted in the field logbooks and sample trip report. Equipment blank samples should be analyzed prior to environmental samples.

Cooler Temperature Indicators: One cooler temperature indicator or "temperature blank" will be placed in each cooler containing environmental samples (solid and aqueous) being sent to the laboratory for analysis. The temperature blank will consist of a sample container filled with non-preserved water (potable or distilled). The container will be labeled "COOLER TEMPERATURE INDICATOR" and dated.

Matrix Spikes: Matrix spikes are not required for aqueous VOCs and SVOCs for sampling going through the CLP. CLP laboratories will require additional volume for MS/MSDs for PCBs and metals.

QAPP Worksheet #29: Project Documents and Records
(UFP-QAPP Manual Section 3.5.1)
(EPA 2106-G-05 Section 2.2.8)

Sample Collection and Field Records			
Record	**Generation (CDM Smith)**	**Verification (CDM Smith)**	**Storage Location/Archival**
Air Bills	FTL	FTL or designee	Project file
Analytical Services Tracking System	CDM Smith project manager	ASC	Project file
Correspondence	Site manager	Site manager or designee	Project file
Data Usability Assessment Report	ASC or designee	Chemist	Project file
Data Validation Report	Data validator	Chemist	Project file
Data Verification Checklists	FTL	ASC	Project file
Deviations – Field Change Notification	FTL	SM	Project file
Field Logbook or Data Collection Sheets	FTL	FTL	Project file
Sampling Trip Reports	FTL or designee	Laboratory coordinator (ASC)	Project file
Project Assessments			
Photographic Log	FTL or designee	PM or designee	Project file
Sample Tracking Forms	Sample manager or designee	FTL or designee	Project file
Scribe Chain-of-Custody Forms	Sample manager or designee	FTL or designee	Project file
Laboratory Records			
Laboratory Data Packages	Laboratory QA officer	Chemist or QA specialist	EPA file
Laboratory QA Plans	Laboratory QA officer	Chemist or QA specialist	Procurement file
SOPs	Laboratory QA officer	Chemist or QA specialist	Procurement file

QAPP Worksheet #29: Project Documents and Records (continued)
(UFP-QAPP Manual Section 3.5.1)
(EPA 2106-G-05 Section 2.2.8)

Laboratory Data Deliverables		
Record	**Organics**	**Metals, Mercury, Cyanide,**
Narrative	X	X
COC	X	X
Summary Results	X	X
Analytical sample results	X	X
QC Results	X	X
Chromatograms	X	NA
Sample Preparation Log	X	X
Sample Run Log	X	X
Tentatively Identified Compounds (TICs)	NA	NA
Raw Data	X	X

QAPP Worksheet #31, #32 and #33: Assessments and Corrective Action
(UFP-QAPP Manual Sections 4.1.1 and 4.1.2)
(EPA 2106-G-05 Section 2.4 and 2.5.5)

Assessment Type	Number/ Frequency	Organization	Responsible Party	Assessment Deliverable and Due Dates	Party to Identify and Implement Corrective Actions	Person(s) Responsible for Monitoring Effectiveness of Corrective Actions
					Title and Organizational Affiliation	
Project Readiness Review	Prior to field work	CDM Smith	FTL	Immediately, to within 24 hours of review.	PM, CDM Smith	Tony Isolda (PM), CDM Smith
Sample Collection and Documentation QC checks	Once per overall field program	CDM Smith	FTL	Email within 24 hours.	PM, CDM Smith	Jeniffer Oxford (QAS), CDM Smith
QAPP	Annually	CDM Smith	QA Specialist and PTL	E-mail/FCN if required.	PM, CDM Smith	Tony Isolda (PM), CDM Smith
Data Usability Evaluation/Data Comparison Evaluation	Once after receipt of data and database review and release	CDM Smith	ASC	Memorandum based on project requirements.	Project chemist, FTL, or PM, depending on nature of issue	Tony Isolda (PM), CDM Smith

Notes:
1. Findings and deviations from plans will require corrective actions, which will be documented and discussed appropriately. The EPA TOCOR will be notified by the CDM Smith PM.

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)

Item	Input	Description	Verification (completeness)	Validation (conformance to specifications)
Planning Documents/Records				
1	QAPP	All planning documents will be available to reviewers to allow reconciliation with planned activities and objectives.	X	X
2	Field Technical SOPs		X	X
3	Laboratory SOPs		X	X
Field Records				
4	Field logbooks	Field notes will be prepared daily by the field team and will be complete, appropriate to the project tasks, and legible. The FTL will review logbooks and records for accuracy and completeness. Upon completion of fieldwork, logbooks and records will be placed in the project files. Field reports will be verified to ensure correct reporting of information. Review will be conducted prior to completion of each report.	X	X
			X	X
5	COC	Sample manager, FTL, or designee will review the COC forms against the samples packed in each cooler prior to shipment. COCs will be sent with the samples to the laboratory and copies retained for the trip report and project files. The data validator will review COC forms upon completion of analytical activities and verify against the laboratory report.	X	X
6	Sampling Trip Reports	FTL or designee; laboratory coordinator will review these for each case of field sampling for which samples are sent to a CLP laboratory. Information will be reviewed against the COC forms, and potential discrepancies will be discussed with field personnel to verify locations, dates, etc.	X	X
7	Correspondence	Relevant correspondence will be used to reconcile field records and data.	X	X

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)

Item	Input	Description	Verification (completeness)	Validation (conformance to specifications)
8	Field Change Notifications	ASC and data evaluator will review during completion of each data usability assessment/measurement report.	X	X
Analytical Data Package				
9	Laboratory analytical data packages	Laboratory analyst and QA officer will review/verify internally the completeness and technical accuracy of data prior to submittal. All laboratory data will be verified by the laboratory performing the analysis prior to submittal. EPA DV contractor-data validator or LSASD data validator or CDM Smith data validator will review data packages for content and sample information upon receipt. Data packages will be evaluated for completeness and compliance. Table 9 of the Intergovernmental Data Quality Task Force UFP-QAPP shows items for compliance review.	X	X
10	Communication Records	Relevant correspondence will be used to reconcile analytical data.	X	X
11	EDDs fields	Data manager will determine whether required EQuIS compatible EDD fields and format were provided.	X	X
12	Outputs of the EQuIS database	Project task leader and team will compile the project data results in a data comparison report. Data tables, figures, and reported entries will be reviewed/verified against hardcopy information or EQuIS output.	X	X
13	Data validation and audit reports, QAPP, and FCRs	Data assessor will prepare the project data quality and usability assessment report. The data will be evaluated against project DQOs and measurement performance criteria such as completeness. Evaluate whether field sampling procedures were followed with respect to equipment and proper sampling support.	X	X

QAPP Worksheet #35: Data Verification Procedures
(UFP-QAPP Manual Section 5.2.2)
(EPA 2106-G-05 Section 2.5.1)

Requirement Documents	Records Reviewed	Process Description	Responsible Person /Organization
QAPP, Technical SOP 4-1	Field logbook	Verify records are present and complete for each day of field activities. Verify all planned samples, including field QC samples were collected and sample collection locations are documented. Verify meteorological data were provided for each day of field activities and changes/exceptions are documented and reported in accordance with requirements. Verify any required field monitoring was performed and results are documented.	Daily – FTL At conclusion of field activities – project QC staff
SOPs	Field logbook and FCRs	Ensure the sampling methods/procedures outlined in the QAPP were followed and any deviations were noted/approved. Determine potential impacts from noted/approved deviations, regarding project quality objectives (PQOs).	FTL
QAPP, Technical SOP 1-2	COC forms	Verify the completeness of COC records. Examine entries for consistency with the field logbook. Check that appropriate methods and sample preservation have been recorded. Verify the required volume of sample has been collected and sufficient sample volume is available for QC samples (e.g., MS/MSD). Verify all required signatures and dates are present. Check for transcription errors.	Daily – FTL At conclusion of field activities – project chemist or data assessor
QAPP, Technical SOP 1-2	COC	Examine traceability of data from sample collection to generation of project reported data. Provide sampling dates and time, verification of sample ID, and QC sample information.	At conclusion of field activities – project QC staff (data manager,
QAPP	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, and QC samples). Determine potential impacts from noted/approved deviations regarding PQOs.	EPA Region 4 or CDM Smith Data validator

QAPP Worksheet #35: Data Verification Procedures
(UFP-QAPP Manual Section 5.2.2)
(EPA 2106-G-05 Section 2.5.1)

Requirement Documents	Records Reviewed	Process Description	Responsible Person /Organization
QAPP	Laboratory deliverable	Verify the laboratory deliverable contains all records specified in the subcontract SOW. 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 COCs 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 necessary signatures and dates are present.	Before release – Laboratory QAM Upon receipt – project chemist or data validator (EPA Region 4 or ASC)
	Methods	Verify records support implementation of the SOP sampling and analysis.	CDM Smith ASC, or data assessor
	Data narrative	Determine deviations from methods and contract and the impact.	
	Field and laboratory data and QC report	A summary of all QC samples and results will be verified for measurement performance criteria, completeness, and 10 percent verified to field and laboratory data reports from vendors. A report on meeting the established criteria shall be prepared within 30 days of receipt.	

QAPP Worksheet #36: Data Validation Procedures
(UFP-QAPP Manual Section 5.2.2)
(EPA 2106-G-05 Section 2.5.1)

Validation Code and Label Identifier Table

Validation Code*	Validation Label	Description/Reference	
S1VE	Stage 1 Validation Electronic	Stage 1 Validation - Verification and validation based only on completeness and compliance of sample receipt condition checks.	EPA 540-R-08-005
S1VM	Stage 1 Validation Manual		
S1VEM	Stage 1 Validation Electronic and Manual		
S2aVE	Stage 2a Validation Electronic	Stage 2A Validation - Verification and validation based on completeness and compliance checks of sample receipt conditions and ONLY sample-related QC results.	
S2aVM	Stage 2a Validation Manual		
S2aVEM	Stage 2a Validation Electronic and Manual		
S2bVE	Stage 2b Validation Electronic	Stage 2B Validation - Verification and validation based on completeness and compliance checks of sample receipt conditions and BOTH sample-related and instrument-related QC results.	
S2bVM	Stage 2b Validation Manual		
S2bVEM	Stage 2b Validation Electronic and Manual		
S3VE	Stage 3 Validation Electronic	Stage 3 Validation - Verification and validation based on completeness and compliance checks of sample receipt conditions, both sample-related and instrument-related QC results, and recalculation checks.	
S3VM	Stage 3 Validation Manual		
S3VEM	Stage 3 Validation Electronic and Manual		
S4VE	Stage 4 Validation Electronic	Stage 4 Validation - Verification and validation based on completeness and compliance checks of sample receipt conditions, both sample-related and instrument-related QC results, recalculation checks, and the review of actual instrument outputs.	
S4VM	Stage 4 Validation Manual		
S4VEM	Stage 4 Validation Electronic and Manual		
NV	Not Validated		

Note:
The following data qualifiers will be applied during data validation by a third party. Potential impacts on project DQOs will be discussed in the data validation report.

NM – Measurement Performance Criteria contained in WS#12 were not met.
J – The result is an estimated value. The nature of the bias will be discussed in the data validation report.
E – Erroneous result (e.g., improper calculation, peak integration, etc.)
R – Rejected data

QAPP Worksheet #36: Data Validation Procedures
(UFP-QAPP Manual Section 5.2.2)
(EPA 2106-G-05 Section 2.5.1)

Analytical Group/Method	Data deliverable requirements	Analytical specifications	Measurement performance criteria	Percent of data packages to be validated [1]	Percent raw data review/percent results to recalculate	Validation Procedure[3]	Validation code	Electronic validation program/version	Data Validator
FASTAC Tiers 1 and 2 (LSASD or CLP)									
VOCs	SEDD Stage 3	SFAM01.1	Worksheet #12 and Worksheet #28	100 percent	100 percent/10 percent	SOP QAS-SOP-0025, Rev 0, LSASD Worksheet #35 or National Functional Guidelines (NFG)	S3VEM	EXES	EPA DV staff, or Region 4 LSASD
SVOCs	SEDD Stage 3	SFAM01.1					S3VEM	EXES	EPA DV staff, or LSASD
PCBs Aroclors	SEDD Stage 3	SFAM01.1					S3VEM	EXES	EPA DV staff, or LSASD
TAL Metals (ICP-AES)	SEDD Stage 2B	SFAM01.1					S2BVEM	EXES	EPA DV staff, or LSASD
TAL Metals (ICP-MS)		SFAM01.1							
TAL Metals (Mercury)		SFAM01.1							

QAPP Worksheet #36: Data Validation Procedures
(UFP-QAPP Manual Section 5.2.2)
(EPA 2106-G-05 Section 2.5.1)

Analytical Group/Method	Data deliverable requirements	Analytical specifications	Measurement performance criteria	Percent of data packages to be validated [1]	Percent raw data review/percent results to recalculate	Validation Procedure[3]	Validation code	Electronic validation program/version	Data Validator
FASTAC Tiers 1 and 2 (LSASD or CLP) [Continued]									
TAL Metals (Cyanide)	SEDD Stage 2B	ISM02.4	Worksheets #12 and #28	100 percent	100 percent/10 percent	SOP QAS-SOP-0025, Rev 0, LSASD Worksheet #35 or National Functional Guidelines (NFG)	S2BVEM	EXES	EPA DV staff, or LSASD

QAPP Worksheet #37: Data 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)

The Data Comparability Report will be prepared by CDM Smith personnel. The PM will be responsible for its content and for assigning work to the CDM Smith personnel who will be supporting this assessment. The data comparability review and usability assessment will be conducted on validated data. The effectiveness of control actions will be evaluated during the laboratory review of the data, data validation, data evaluation and data quality assessment process. A summary of the laboratory results will be documented in the laboratory narrative, data validation report and in the Data Comparability Report. The report will include an overall assessment of the PRP's analytical data using the results of the split sampling and field oversight including the field oversight observations of deficiencies and compliance, and an assessment of the split sampling data quality. The following items will be assessed for CDM Smith split samples and conclusions drawn based on their results:

A comparison of the split sample data and the PRP's parent sample data will only be completed for parameters that were analyzed and detected by both the PRP's program and the oversight program. Data comparison will not be conducted on concentrations that are non-detect. (Note that if a consistent bias in detections is observed in either the split samples or PRP's samples, an evaluation of detection limits will be completed.) The data comparison will be presented in a table showing the relative percent difference for values that are five times the quantitation limits. As appropriate, alternative data comparisons will be provided. For analytical groups that contain multiple isomers (e.g., PCB), data comparison will be completed on select isomer per chemical class. Parameters will be selected by the project chemist/analytical service coordinator to cover a range of concentrations from non-detects to high concentrations. In addition, analytes of greater concern will be selected for comparison over other analytes. This selection will be made with the consensus of the EPA.

At this time, it is anticipated that VOCs, SVOCs, polychlorinated biphenyls and inorganics will be the primary contaminants of concern. Split samples for these analytes will be compared using the process below.

Split samples will be compared by matrix using the relative percent difference (RPD) for each pair of results reported above quantitation limits (QL) or for organic and inorganic analyses, respectively. RPD acceptance criteria less than or equal to those listed in this QAPP will be used to assess analytical precision. Absolute difference will be used when either or both results are at or below the QL. An absolute difference of less than five times the QL will be the acceptance criteria. A discussion summarizing the results of laboratory precision and any limitations on the use of data will be described in the report.

Personnel (organization and position/title) responsible for participating in the data usability assessment:
CDM Smith PM – Tony Isolda
CDM Smith Data Coordinator –Mike Nigro

QAPP Worksheet #37: Data 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)

The following steps will be taken in preparing the data usability assessment:

Step 1 – Review the project's objectives and sampling design

Review the sampling design documented in the QAPP for consistency with stated objectives. This provides the context for interpreting the data in subsequent steps.

Step 2 – Review the data verification and data validation outputs

Review available QA reports, including the data verification and data validation reports. Look for patterns, trends, and anomalies (i.e., unexpected results). Review deviations from planned activities (e.g., number and locations of samples, holding time exceedances, damaged samples, non-compliant sample results, and SOP deviations), audits or assessments and determine their impacts on the data usability. Evaluate implications of unacceptable QC sample results.

Step 3 – Verify the assumptions of the selected statistical method

N/A

Step 4 – Implement the statistical method

N/A

Step 5 – Document data usability and draw conclusions

Determine if the data can be used as intended, considering implications of deviations and corrective actions. Discuss DQIs. Assess the performance of the sampling design and identify limitations on data use. Prepare the data usability summary report in the form of text and/or a table.

The usability assessment will be documented as follows:

The CDM Smith PM will assign tasks to the individuals supporting the data usability assessment. The data usability assessment will be conducted on validated data. The results of the data usability assessment will be presented in the data evaluation report. The following items will be assessed, and conclusions drawn based on their results.

QAPP Worksheet #37: Data Usability Assessment (continued)
(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)

Precision – Results of laboratory duplicates will be assessed during data validation, and data will be qualified according to the data validation procedures cited on Worksheet #36. Field duplicates will be assessed by matrix using RPD acceptance criteria, presented in Worksheet #12, will be used to assess analytical comparability. Absolute difference will be used when one or both results are at or below five times QL (see Worksheets 12 and 28). An absolute difference of less than twice the QL will be the acceptance criteria (see Worksheets #12 and 28 for specific criteria). A discussion summarizing the results of laboratory and field precision and any limitations on the use of the data will be described in the RI Report.

To calculate field duplicate precision:

$RPD = 100 \times 2 |X1 - X2| / (X1 + X2)$ where X1 and X2 are the reported concentrations for sample and duplicate results

Accuracy/Bias Contamination – Laboratory blank results will be assessed as part of data validation. During the data validation process, the validator will qualify the data following the procedures listed on Worksheet #36. A discussion summarizing the results of laboratory accuracy and bias based on contamination will be presented in the data usability assessment.

Overall Accuracy/Bias – The results of instrument calibration and matrix spike recoveries will be reviewed, and data will be qualified according to the data validation procedures cited on Worksheet #36. A discussion summarizing the results of laboratory accuracy and any limitations on the use of the data will be described in the data usability assessment.

Sensitivity – Data results will be compared to criteria (RL and MDLS) provided in Attachment 3. A discussion summarizing any conclusions about sensitivity of the analyses will be presented, and any limitations on the use of the data will be described in the Data Usability Report.

Representativeness – A review of adherence to the sampling plan and QAPP will be performed to assess the representativeness of the sampling program. Data validation narratives also will be reviewed, and any conclusions about the representativeness of the data set will be discussed.

Comparability – Study results will be used in conjunction with existing data to make qualitative and quantitative assessments of the data to be used to produce the site reports.

QAPP Worksheet #37: Data 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)

Reconciliation – The results of the DQIs presented in Worksheet #12 will be examined to determine if the MPCs were met. This examination will include a combined overall assessment of the results of each analysis pertinent to an objective. Each analysis will first be evaluated separately in terms of major impacts observed from data validation, DQIs, and measurement performance criteria assessments. Based on the results of these assessments, the quality of the data will be determined. The data quality will be used to determine usability of the data and if project goals were achieved. As part of the reconciliation of each objective, conclusions will be drawn, and any limitations on the usability of any of the data will be described.

Completeness – A completeness check will be done on analytical data using database queries. Completeness will be calculated for each analyte by matrix and compared to the project completeness goal of 90 percent. The calculations below will be used to assess completeness based on the number of samples collected versus the number planned to be collected and based on the number of valid data generated. A discussion summarizing the results of project completeness and any limitations on the use of the data will be described in the report.

The following equations will be used:

To calculate completeness:

% Completeness = V/n * 100 where V= number of measurements judged valid; n = total number of measurements made and

% Completeness = C/X * 100 where C= number of samples collected; X = total number of measurements planned

Tables

Table 1a
Volatile Organic Compounds Contract Required Quantatition Limits
Burlington Industries Cheraw OU2 Site
Cheraw, South Carolina

TRACE VOLATILES AND LOW/MEDIUM VOLATILES TARGET ANALYTE LIST AND CONTRACT REQUIRED QUANTITATION LIMITS

Analyte Name	CAS Number	CRQLs			
		Trace Water (µg/L)	Trace Water By SIM (µg/L)	Low Aqueous/ Water (µg/L)	Low Soil/ Sediment (µg/kg)
Dichlorodifluoromethane	75-71-8	0.50	--	5.0	5.0
Chloromethane	74-87-3	0.50	--	5.0	5.0
Vinyl chloride	75-01-4	0.50	0.050	5.0	5.0
Bromomethane	74-83-9	0.50	--	5.0	5.0
Chloroethane	75-00-3	0.50	--	5.0	5.0
Trichlorofluoromethane	75-69-4	0.50	--	5.0	5.0
1,1-Dichloroethene	75-35-4	0.50	--	5.0	5.0
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	0.50	--	5.0	5.0
Acetone	67-64-1	5.0	--	10	10
Carbon disulfide	75-15-0	0.50	--	5.0	5.0
Methyl acetate	79-20-9	0.50	--	5.0	5.0
Methylene chloride	75-09-2	0.50	--	5.0	5.0
trans-1,2-Dichloroethene	156-60-5	0.50	--	5.0	5.0
Methyl tert-butyl ether	1634-04-4	0.50	--	5.0	5.0
1,1-Dichloroethane	75-34-3	0.50	--	5.0	5.0
cis-1,2-Dichloroethene	156-59-2	0.50	--	5.0	5.0
2-Butanone	78-93-3	5.0	--	10	10
Bromochloromethane	74-97-5	0.50	--	5.0	5.0
Chloroform	67-66-3	0.50	--	5.0	5.0
1,1,1-Trichloroethane	71-55-6	0.50	--	5.0	5.0
Cyclohexane	110-82-7	0.50	--	5.0	5.0
Carbon tetrachloride	56-23-5	0.50	--	5.0	5.0
Benzene	71-43-2	0.50	--	5.0	5.0
1,2-Dichloroethane	107-06-2	0.50	--	5.0	5.0
Trichloroethene	79-01-6	0.50	0.050	5.0	5.0
Methylcyclohexane	108-87-2	0.50	--	5.0	5.0
1,2-Dichloropropane	78-87-5	0.50	--	5.0	5.0
Bromodichloromethane	75-27-4	0.50	--	5.0	5.0
cis-1,3-Dichloropropene	10061-01-5	0.50	--	5.0	5.0
4-Methyl-2-pentanone	108-10-1	5.0	--	10	10
Toluene	108-88-3	0.50	--	5.0	5.0
trans-1,3-Dichloropropene	10061-02-6	0.50	--	5.0	5.0
1,1,2-Trichloroethane	79-00-5	0.50	--	5.0	5.0
Tetrachloroethene	127-18-4	0.50	--	5.0	5.0
2-Hexanone	591-78-6	5.0	--	10	10

Table 1a
Volatile Organic Compounds Contract Required Quantatition Limits
Burlington Industries Cheraw OU2 Site
Cheraw, South Carolina

Analyte Name	CAS Number	CRQLs			
		Trace Water (µg/L)	Trace Water By SIM (µg/L)	Low Aqueous/ Water (µg/L)	Low Soil/ Sediment (µg/kg)
Dibromochloromethane	124-48-1	0.50	--	5.0	5.0
1,2-Dibromoethane	106-93-4	0.50	0.050	5.0	5.0
Chlorobenzene	108-90-7	0.50	--	5.0	5.0
Ethylbenzene	100-41-4	0.50	--	5.0	5.0
o-Xylene	95-47-6	0.50	--	5.0	5.0
m,p-Xylene	179601-23-1	0.50	--	5.0	5.0
Styrene	100-42-5	0.50	--	5.0	5.0
Bromoform	75-25-2	0.50	--	5.0	5.0
Isopropylbenzene	98-82-8	0.50	--	5.0	5.0
1,2,3-Trichloropropane	96-18-4	0.50	0.050	5.0	5.0
1,1,2,2-Tetrachloroethane	79-34-5	0.50	--	5.0	5.0
1,3-Dichlorobenzene	541-73-1	0.50	--	5.0	5.0
1,4-Dichlorobenzene	106-46-7	0.50	--	5.0	5.0
1,2-Dichlorobenzene	95-50-1	0.50	--	5.0	5.0
1,2-Dibromo-3-chloropropane	96-12-8	0.50	0.050	5.0	5.0
1,2,4-Trimethylbenzene	95-63-6	0.50	--	5.0	5.0
1,3,5-Trimethylbenzene	108-67-8	0.50	--	5.0	5.0
1,2,4-Trichlorobenzene	120-82-1	0.50	--	5.0	5.0
1,2,3-Trichlorobenzene	87-61-6	0.50	--	5.0	5.0

Notes

µg/L-microgram per liter

µg/kg- milligram/killogram

Table 1b
Semi Volatile Organic Compounds Contract Required Quantatition Limits
Burlington Industries Cheraw OU2 Site
Cheraw, South Carolina

Analyte Name	CAS Number	CRQLs			
		Low Water By SIM (µg/L)	Aqueous/ Water (µg/L)	Low Soil/ Sediment/ Waste By SIM (µg/kg)	Low Soil/ Sediment (µg/kg)
1,4-Dioxane	123-91-1	0.20	2.0	6.7	67
Pyridine	110-86-1	--	--	--	--
Benzaldehyde	100-52-7	--	10	--	330
Phenol	108-95-2	--	10	--	330
Bis(2-chloroethyl) ether	111-44-4	--	10	--	330
2-Chlorophenol	95-57-8	--	5.0	--	170
2-Methylphenol	95-48-7	--	10	--	330
3-Methylphenol	108-39-4	--	--	--	--
2,2'-Oxybis(1-chloropropane)	108-60-1	--	10	--	330
Acetophenone	98-86-2	--	10	--	330
4-Methylphenol	106-44-5	--	10	--	330
N-Nitroso-di-n propylamine	621-64-7	--	5.0	--	170
Hexachloroethane	67-72-1	--	5.0	--	170
Nitrobenzene	98-95-3	--	5.0	--	170
Isophorone	78-59-1	--	5.0	--	170
2-Nitrophenol	88-75-5	--	5.0	--	170
2,4-Dimethylphenol	105-67-9	--	5.0	--	170
Bis(2-chloroethoxy)methane	111-91-1	--	5.0	--	170
2,4-Dichlorophenol	120-83-2	--	5.0	--	170
Naphthalene	91-20-3	0.10	5.0	3.3	170
4-Chloroaniline	106-47-8	--	10	--	330
Hexachlorobutadiene	87-68-3	--	5.0	--	170
Caprolactam	105-60-2	--	10	--	330
4-Chloro-3-methylphenol	59-50-7	--	5.0	--	170
1-Methylnaphthalene	90-12-0	0.10	5.0	3.3	170
2-Methylnaphthalene	91-57-6	0.10	5.0	3.3	170
Hexachlorocyclo-pentadiene	77-47-4	--	10	--	330
2,4,6-Trichlorophenol	88-06-2	--	5.0	--	170
2,4,5-Trichlorophenol	95-95-4	--	5.0	--	170
1,1'-Biphenyl	92-52-4	--	5.0	--	170
2-Chloronaphthalene	91-58-7	--	5.0	--	170
2-Nitroaniline	88-74-4	--	5.0	--	170
Dimethylphthalate	131-11-3	--	5.0	--	170
2,6-Dinitrotoluene	606-20-2	--	5.0	--	170
Acenaphthylene	208-96-8	0.10	5.0	3.3	170
3-Nitroaniline	99-09-2	--	10	--	330
Acenaphthene	83-32-9	0.10	5.0	3.3	170
2,4-Dinitrophenol	51-28-5	--	10	--	330
4-Nitrophenol	100-02-7	--	10	--	330
Dibenzofuran	132-64-9	--	5.0	--	170
2,4-Dinitrotoluene	121-14-2	--	5.0	--	170
Diethylphthalate	84-66-2	--	5.0	--	170
Fluorene	86-73-7	0.10	5.0	3.3	170
4-Chlorophenyl-phenyl ether	7005-72-3	--	5.0	--	170
4-Nitroaniline	100-01-6	--	10	--	330
4,6-Dinitro-2-methylphenol	534-52-1	--	10	--	330
N-Nitrosodiphenylamine	86-30-6	--	5.0	--	170
1,2,4,5-Tetrachlorobenzene	95-94-3	--	5.0	--	170
4-Bromophenyl-phenylether	101-55-3	--	5.0	--	170
Hexachlorobenzene	118-74-1	--	5.0	--	170
Atrazine	1912-24-9	--	10	--	330
Pentachlorophenol	87-86-5	0.20	10	6.7	330

Table 1b
Semi Volatile Organic Compounds Contract Required Quantatition Limits
Burlington Industries Cheraw OU2 Site
Cheraw, South Carolina

Analyte Name	CAS Number	CRQLs			
		Low Water By SIM (µg/L)	Aqueous/ Water (µg/L)	Low Soil/ Sediment/ Waste By SIM (µg/kg)	Low Soil/ Sediment (µg/kg)
Phenanthrene	85-01-8	0.10	5.0	3.3	170
Anthracene	120-12-7	0.10	5.0	3.3	170
Carbazole	86-74-8	--	10	--	330
Di-n-butylphthalate	84-74-2	--	5.0	--	170
Fluoranthene	206-44-0	0.10	5.0	3.3	170
Pyrene	129-00-0	0.10	5.0	3.3	170
Butylbenzylphthalate	85-68-7	--	5.0	--	170
3,3'-Dichlorobenzidine	91-94-1	--	10	--	330
Benzo(a)anthracene	56-55-3	0.10	5.0	3.3	170
Chrysene	218-01-9	0.10	5.0	3.3	170
Bis(2-ethylhexyl)phthalate	117-81-7	--	5.0	--	170
Di-n-octylphthalate	117-84-0	--	10	--	330
Benzo(b)fluoranthene	205-99-2	0.10	5.0	3.3	170
Benzo(k)fluoranthene	207-08-9	0.10	5.0	3.3	170
Benzo(a)pyrene	50-32-8	0.10	5.0	3.3	170
Indeno(1,2,3-cd)pyrene	193-39-5	0.10	5.0	3.3	170
Dibenzo(a,h)anthracene	53-70-3	0.10	5.0	3.3	170
Benzo(g,h,i)perylene	191-24-2	0.10	5.0	3.3	170
2,3,4,6-Tetrachlorophenol	58-90-2	--	5.0	--	170

Notes:
µg/L-microgram per liter
µg/kg- milligram/killogram

Table 1c
PCBs/Aroclors Contract Required Quantatition Limits
Burlington Industries Cheraw OU2 Site
Cheraw, South Carolina

Analyte Name	CAS Number	CRQLs	
		Aqueous/ Water (µg/L)	Soil/ Sediment/ Waste (µg/kg)
Aroclor 1016	12674-11-2	1.0	33
Aroclor 1221	11104-28-2	1.0	33
Aroclor 1232	11141-16-5	1.0	33
Aroclor 1242	53469-21-9	1.0	33
Aroclor 1248	12672-29-6	1.0	33
Aroclor 1254	11097-69-1	1.0	33
Aroclor 1260	11096-82-5	1.0	33
Aroclor 1262	37324-23-5	1.0	33
Aroclor 1268	11100-14-4	1.0	33

µg/L-microgram per liter
µg/kg- milligram/killogram

Table 1d
TAL Metals ICP AES and ICP MS Contract Required Quantitation Limits
Burlington Industries Cheraw OU2 Site
Cheraw, South Carolina

Analyte Name	CAS Number	CRQLs			
		ICP-AES Aqueous/ Water (µg/L)	ICP-AES Soil/ Sediment (mg/kg)	ICP-MS Aqueous/ Water (µg/L)	ICP-MS Soil/ Sediment (mg/kg)
Aluminum	7429-90-5	200	20	20	--
Antimony	7440-36-0	60	6.0	2.0	1.0
Arsenic	7440-38-2	10	1.0	1.0	0.50
Barium	7440-39-3	200	20.0	10	5.0
Beryllium	7440-41-7	5.0	0.50	1.0	0.50
Cadmium	7440-43-9	5.0	0.50	1.0	0.50
Calcium	7440-70-2	5000	500	500	--
Chromium	7440-47-3	10	1.0	2.0	1.0
Cobalt	7440-48-4	50	5.0	1.0	0.50
Copper	7440-50-8	25	2.5	2.0	1.0
Iron	7439-89-6	100	10	200	--
Lead	7439-92-1	10	1.0	1.0	0.50
Magnesium	7439-95-4	5000	500	500	--
Manganese	7439-96-5	15	1.5	1.0	0.50
Nickel	7440-02-0	40	4.0	1.0	0.50
Potassium	7440-09-7	5000	500	500	--
Selenium	7782-49-2	35	3.5	5.0	2.5
Silver	7440-22-4	10	1.0	1.0	0.50
Sodium	7440-23-5	5000	500	500	--
Thallium	7440-28-0	25	2.5	1.0	0.50
Vanadium	7440-62-2	50	5.0	5.0	2.5
Zinc	7440-66-6	60	6.0	5.0	2.5

Notes:
µg/L-microgram per liter
mg/kg- milligram per killogram

Table 1e
TAL Mercury by CVAA Contract Required Quantitation Limits
Burlington Industries Cheraw OU2 Site
Cheraw, South Carolina

Analyte Name	CAS Number	CRQLs	
		Aqueous/Water (µg/L)	Soil/ Sediment (mg/kg)
Mercury	7439-97-6	0.20	0.10

Notes:

µg/L-microgram per liter

mg/kg- milligram per killogram

CVAA- cold vapor atomic absportion

CDM Smith

Table 1f
TAL Cyanide by Spectrophotometry Contract Required Quantitation Limits
Burlington Industries Cheraw OU2 Site
Cheraw, South Carolina

Analyte Name	CAS Number	CRQLs	
		Aqueous/Water and SPLP Leachate (µg/L)	Soil/ Sediment/ Waste[B] (mg/kg)
Cyanide	57-12-5	10	0.50

Notes:

µg/L-microgram per liter

mg/kg- milligram per killogram

CDM Smith

Table 2
Field Analytical and Quality Control Summary
Burlington Industries Cheraw OU2 Site
Cheraw, South Carolina

SAMPLE TYPE	LOCATION	PRP SAMPLE INFORMATION*					EPA SAMPLE** INFORMATION
		PRP SAMPLE DESIGNATOR	SAMPLE LOCATION QUANTITY	SAMPLE QUANTITY	DUPLICATE QUANTITY	PRP SAMPLE TOTAL	PROPOSED SPLIT SAMPLE QUANTITY
Soil Borings	Highland Plant	PLSB# (*-*)	9	24	2	24	TBD
	Off-site Properties	OPSB# (*-*)	6	12	1	12	TBD
	Town Lot	TLSB# (*-*)	12	24	2	24	TBD
	Unnamed Tributary	SB501@ (*-*) to SB510@ (*-*)	24	48	3	48	TBD
	Wilson Branch	SB511@ (*-*) to SB517@ (*-*)	14	28	2	28	TBD
	Huckleberry Branch	SB518@ (*-*) and SB519@ (*-*)	12	24	1	24	TBD
Monitoring Well Groundwater	Highland Plant	PLMW#	6	6	1	6	TBD
	Huckleberry Park	HPMW#	1	1	0	1	TBD
Surface Water	Unnamed Tributary	UTBGSW01, UTBGSW02, SW501 – SW5112	14	14	1	14	TBD
	Wilson Branch	WBBGSW01 – WBBGSW04, SW513 – SW519	11	11	1	11	TBD
	Huckleberry Branch	HBBGSW01, SW520 and SW525	7	7	0	7	TBD
	Ponds	PDSW#	12	12	1	12	TBD
	Drainage Feature	SW530 – SW532	3	3	0	3	TBD
Sediment	Unnamed Tributary	UTBGSD01, UTBGSD02, SD501 – SD5112	14	14	1	14	TBD
	Wilson Branch	WBBGSD01 – WBBGSD04, SD513 – SD519	11	11	1	11	TBD
	Huckleberry Branch	HBBGSD01, SD518 and SD519	7	7	0	7	TBD
	Ponds	PDSD#	12	12	1	12	TBD
	Pee Dee River	SD526# - SD529#	9	9	1	9	TBD
	Drainage Feature	SD530 – SD532	3	3	0	3	TBD
			187		**Total**	**270**	

*Analyses will include: Target Compound List (TCL) metals, TCL semivolatile organic compounds (SVOCs), TCL volatile organic compounds (VOCs), and polychlorinated biphenyl (PCB) Aroclors.

** CDM Smith and EPA will select split sample locations before the sample event

Attachment 1

Tables

Excerpt from Potentially Responsible Party (PRP) Field Sampling Plan (FSP)

Table 2-1 Summary of Data Collection Needs
Table 3-1 Summary of Sample Types and Designators
Table 5-1 Grain Size Analysis of Sand for Packing Well Screens

Excerpt from PRP FSP

Table 2 Data Quality Indicators
Table 4 Sample Analytical Methods, Container Requirements, Preservatives, Holding Times and Laboratory
Table 5 Analytes, SOP Reference, and Quantitation Limits
Table 6 Field Quality Control Samples for Groundwater and Surface Water Matrices
Table 7 Laboratory Quality Control Samples for Groundwater and Surface Water Matrices

Table 2-1
Summary of Data Collection Needs

DATA COLLECTION NEEDS	RI TASK
Soil Borings	
Highland Facility – To refine the nature and distribution of Step 1 Constituents To support site-specific Site assessments and alternatives evaluation	Collect soil samples from nine borings at the following locations: 1) One boring at the location of the former clarifier pumps 2) One boring at the location of the former clarifier 3) One boring at the AST 4) At least four borings at random locations at the north and northeast portions of the facility property 5) At least two borings at background locations For the boring at the location of the former Clarifier, soil samples will be collected at 0 to 0.5 feet bls, 4 to 5 feet bls, and 9 to 10 feet bls. For the boring at the former Clarifier Pumps, soil samples will be collected at 0 to 0.5 feet bls, 1 to 2 feet bls, 4 to 5 feet bls, and 9 to 10 feet bls. For the boring at the AST, soil samples will be collected at 0 to 0.5 feet bls, 1 to 2 feet bls, 4 to 5 feet bls, 9 to 10 feet bls, and 14 to 15 feet bls. At the remaining six borings, soil samples will be collected at 0 to 0.5 feet bls and 1 to 2 feet bls. Samples will be analyzed for Step 1 constituents.
Off-site Unoccupied Properties – To refine the nature and distribution of COPCs on one parcel located on Pecan Drive and one parcel located on Little John Road. To support site-specific risk assessment an alternatives evaluation	Collect soil samples from six borings located on two parcels. At each boring, soil samples will be collected at depths of 0 to 0.5 feet bls and 1 to 2 feet bls. The samples will be analyzed for Step 1 constituents.
Unnamed Tributary to Wilson Branch – To refine the nature and distribution of COPCs near the banks of the unnamed tributary. To support site-specific risk assessment an alternatives evaluation	Collect soil samples from borings at 10 sample stations (Stations 503 through 512) located on the unnamed tributary. The stations are spaced approximately 400-feet apart. Specific station locations will be determined in the field based on observed stream features. At each station, one soil boring will be advanced on each side of the stream at the lowest topographic elevation or depositional area found within 40 feet of the stream. At each boring, soil samples will be collected from 0 to 0.5 feet bls and 1 to 2 feet bls. The samples collected from borings associated with Stations 503 and 504 will be analyzed for Step 1 constituents. Samples associated with Stations 505 through 512 will be analyzed for COPCs determined at the end of Step 1 (as presented in the Step 1 Technical Memorandum).
Wilson Branch – To refine the nature and distribution of COPCs near the banks of the Wilson Branch. To support site-specific risk assessment an alternatives evaluation	Collect soil samples from borings at each of seven sample stations (Stations 513 through 519) located on the Wilson Branch. The stations are spaced approximately 400 to 500 feet apart. Specific station locations will be determined in the field based on observed stream features. At each station, one soil boring will be advanced on each side of the stream at the lowest topographic elevation or depositional area found within 40 feet of the stream. At each boring, soil samples will be collected from 0 to 0.5 feet bls and 1 to 2 feet bls. The samples will be analyzed for COPCs determined at the end of Step 1.

Table 2-1
Summary of Data Collection Needs

DATA COLLECTION NEEDS	RI TASK
Huckleberry Branch – To refine the nature and distribution of COPCs near the banks of the Huckleberry Branch. To support site-specific risk assessment an alternatives evaluation	Collect soil samples from borings at each of six sample stations (Stations 520 through 525) located on the Huckleberry Branch. Specific station locations will be determined in the field based on observed stream features. At each station, one soil boring will be advanced on each side of the stream at the lowest topographic elevation or depositional area found within 40 feet of the stream. At each boring, soil samples will be collected from 0 to 0.5 feet bls and 1 to 2 feet bls. The samples will be analyzed for COPCs determined at the end of Step 1.
Town Lot – To refine the nature and distribution of COPCs on the Town Lot. To support site-specific risk assessment an alternatives evaluation	Collect soil samples from 12 borings. At each boring, soil samples will be collected at depths of 0 to 0.5 feet bls and 1 to 2 feet bls. The samples from 0 to 0.5 feet will be analyzed for PCBs. The samples will be analyzed for COPCs determined at the end of Step 1.
Groundwater	
Highland Facility - To evaluate groundwater quality at potential source areas and other areas on the Highland Property. To support site-specific risk assessment an alternatives evaluation	Install six temporary groundwater monitoring wells that will be screened at the observed water table surface. The wells will be installed at the following locations: 1) One well at the location of past *in situ* groundwater sample FBI-GW2 (2018) 2) Adjacent to the drum storage area/former clarifier 3) At the location of the former clarifier pumps 4) At the AST 5) At the north central portion of the facility property 6) At a background location on the south side of the Highland facility Collect one round of groundwater samples and analyze for Step 1 constituents.
Huckleberry Park - To evaluate groundwater quality at Huckleberry Park. To support site-specific risk assessment an alternatives evaluation	Install one temporary groundwater monitoring well that will be screened at the observed water table surface. Collect one round of groundwater samples and analyze for PCBs Aroclors.

Table 2-1
Summary of Data Collection Needs

DATA COLLECTION NEEDS	RI TASK
Surface Water	
Unnamed Tributary to Wilson Branch – To refine the nature and distribution of COPCs in surface water in the unnamed tributary. To support site-specific risk assessment an alternatives evaluation	Collect surface water samples at two background stations (UTBG01 and UTBG02) and 12 downstream stations (Stations 501 through 512) located on the unnamed tributary. The samples collected at the two background locations and stations 501 through 504 will be analyzed for Step 1 constituents. Samples collected at Stations 505 through 512 will be analyzed for COPCs determined at the end of Step 1. Samples for PCB Aroclor analysis will be analyzed using high resolution methods to meet the PCB aquatic standard of 0.014 ug/L. Surface water samples at all stations will also be analyzed for dissolved organic carbon and total suspended solids.
Wilson Branch – To refine the nature and distribution of COPCs in surface water in Wilson Branch To support site-specific risk assessment an alternatives evaluation	Collect surface water samples at four background stations (WBBG01 through WBBG04) and seven downstream stations (Stations 513 through 519) located on Wilson Branch. The samples will be analyzed for COPCs determined at the end of Step 1, dissolved organic carbon, and total suspended solids. Samples for PCB Aroclor analysis will be analyzed using high resolution methods to meet the PCB aquatic standard of 0.014 ug/L.
Huckleberry Branch – To refine the nature and distribution of COPCs in surface water in Huckleberry Branch. To support site-specific risk assessment an alternatives evaluation	Collect surface water samples at one background station (HBBG01) and six downstream stations (Stations 520 through 525) located on Huckleberry Branch. The samples will be analyzed for COPCs determined at the end of Step 1, dissolved organic carbon, and total suspended solids. Samples for PCB Aroclor analysis will be analyzed using high resolution methods to meet the PCB aquatic standard of 0.014 ug/L.
Ponds - To refine the nature and distribution of COPCs in surface water at five ponds. To support site-specific risk assessment an alternatives evaluation	Sample surface water in five ponds which include: – Collect three surface water samples from each of the two western larger ponds. – Collect two surface water samples from each of the three smaller ponds. – Analyze surface water for COPCs determined at the end of Step 1, dissolved organic carbon, and total suspended solids. Samples for PCB Aroclor analysis will be analyzed using high resolution methods to meet the PCB aquatic standard of 0.014 ug/L. .

Table 2-1
Summary of Data Collection Needs

DATA COLLECTION NEEDS	RI TASK
Former Cheraw Sewer Discharge Drainage Feature – To assess surface water for the presence of PCB Aroclors. To support site-specific risk assessment an alternatives evaluation	Collect surface water samples at three stations (Stations 530 through 532) located in the drainage feature. The samples will be analyzed for PCB Aroclors, dissolved organic carbon, and total suspended solids. Samples for PCB Aroclor analysis will be analyzed using high resolution methods to meet the PCB aquatic standard of 0.014 ug/L.
Sediment	
Unnamed Tributary to Wilson Branch – To collect data to confirm pre-flood PCB analytical results and to refine the nature and distribution of COPCs in sediments of the unnamed tributary To support site-specific risk assessment an alternatives evaluation	Collect sediment samples at two background stations (UTBG01 and UTBG02) and 12 downstream stations (Stations 501 through 512) located on the unnamed tributary. The downstream sampling stations are spaced approximately 400-feet apart. Specific station locations will be determined in the field based on observed stream features. The samples collected at the two background locations and stations 501 through 504 will be analyzed for Step 1 constituents. Samples collected at Stations 505 through 512 will be analyzed for COPCs determined at the end of Step 1. Select sediment samples may also be analyzed for total organic carbon and grainsize.
Wilson Branch – To collect data to confirm pre-flood PCB analytical results and to refine the nature and distribution of COPCs in sediments of Wilson Branch. To support site-specific risk assessment an alternatives evaluation	Collect sediment samples at four background stations (WBBG01 through WBBG04) and seven downstream stations (Stations 513 through 519) located on Wilson Branch. Downstream sample stations are spaced approximately 400 to 500 feet apart. Specific station locations will be determined in the field based on observed stream features. The samples will be analyzed for COPCs determined at the end of Step 1. Select sediment samples may also be analyzed for total organic carbon and grainsize.
Huckleberry Branch – To refine the nature and distribution of COPCs in sediments of Huckleberry Branch. To support site-specific risk assessment an alternatives evaluation	Collect sediment samples at one background station (HBBG01) and six downstream stations (Stations 520 through 525) located on Huckleberry Branch. Specific station locations will be determined in the field based on observed stream features. The samples will be analyzed for COPCs determined at the end of Step 1. Select sediment samples may also be analyzed for total organic carbon and grainsize.
Pee Dee River – To assess river sediment for the presence of PCB Aroclors To support site-specific risk assessment an alternatives evaluation	Collect sediment samples at two stations (526 and 527) located upstream of the confluence with Huckleberry Branch, at one station (528) located downstream of the confluence with Huckleberry branch, and one station (529) downstream of the confluence with the former Cheraw sewer discharge drainage feature. At each station, three sediment samples will be collected in profile across the river channel. A total of twelve sediment samples are anticipated. Sediment samples will be analyzed for PCB Aroclors.

Table 2-1
Summary of Data Collection Needs

DATA COLLECTION NEEDS	RI TASK
Ponds - To collect data to confirm pre-flood PCB analytical results and to refine the nature and distribution of COPCs in sediments of five ponds located adjacent to the unnamed tributary to Wilson Branch To support site-specific risk assessment an alternatives evaluation	Sample surface water in five ponds which include: – Collect three sediment samples from each of the two western larger ponds. – Collect two sediment samples from each of the three smaller ponds. – Analyze surface water for COPCs determined at the end of Step 1, Select sediment samples may also be analyzed for total organic carbon and grainsize.
Former Cheraw Sewer Discharge Drainage Feature – To assess drainage feature sediment for the presence of PCB Aroclors To support site-specific risk assessment an alternatives evaluation	Collect sediment samples at three stations (Stations 530 through 532) located in the drainage feature. Specific station locations will be determined in the field based on observed stream features. Sediment samples will be analyzed for PCB Aroclors,
Geophysical Investigation of Pipe located on Northwestern Portion of Highland Property	
Highland Facility - To investigate the physical location, orientation, and extent of the remaining portion of the concrete pipe.	The pipe will be investigated by using non-invasive/geophysical means typically utilized by underground utility locating services (utilizing ground penetrating radar or a similar geophysical means). After investigation of the pipe, a soil sampling plan may be requested by EPA in the vicinity of the remaining portions of the pipe, as necessary.

Table 3-1
Summary of Sample Types and Designators

SAMPLE TYPE	LOCATION	SAMPLE DESIGNATOR	NUMBER OF SAMPLING LOCATIONS	NUMBER OF SAMPLES	NUMBER OF DUPLICATES
Soil Borings	Highland Plant	PLSB# (*-*)	9	24	2
	Off-site Properties	OPSB# (*-*)	6	12	1
	Town Lot	TLSB# (*-*)	12	24	2
	Unnamed Tributary	SB501@ (*-*) to SB510@ (*-*)	24	48	3
	Wilson Branch	SB511@ (*-*) to SB517@ (*-*)	14	28	2
	Huckleberry Branch	SB518@ (*-*) and SB519@ (*-*)	12	24	1
Monitoring Well Groundwater	Highland Plant	PLMW#	6	6	1
	Huckleberry Park	HPMW#	1	1	0
Surface Water	Unnamed Tributary	UTBGSW01, UTBGSW02, SW501 – SW5112	14	14	1
	Wilson Branch	WBBGSW01 – WBBGSW04, SW513 – SW519	11	11	1
	Huckleberry Branch	HBBGSW01, SW520 and SW525	7	7	0
	Ponds	PDSW#	12	12	1
	Drainage Feature	SW530 – SW532	3	3	0
Sediment	Unnamed Tributary	UTBGSD01, UTBGSD02, SD501 – SD5112	14	14	1
	Wilson Branch	WBBGSD01 – WBBGSD04, SD513 – SD519	11	11	1
	Huckleberry Branch	HBBGSD01, SD518 and SD519	7	7	0
	Ponds	PDSD#	12	12	1
	Pee Dee River	SD526# - SD529#	9	9	1
	Drainage Feature	SD530 – SD532	3	3	0

Section 4
Sample Designation, Control, Field Records, and Photographs

This section presents procedures for sample identification, sample control, field records, photographs, and chain-of-custody procedures.

4.1 Sample Designation

Samples will be assigned a unique alpha-numeric sample descriptor identifying the location, media types, sample number; and, in certain instances, sample depth. Location types will be as follows:

- PL – Samples collected at the Highland Plant
- OP – Samples collected at off-site properties (adjacent to Western Ditch)
- TL– Samples collected at the Town Lot property
- PD – Samples collected at the ponds

Media types will be as follows:

- SS – Surface soil; 0 to 0.5 feet
- SB – Soil boring; 0 to 0.5 feet - subsurface soil, >0.5 feet - subsurface soil
- MW– Monitoring well for groundwater
- SW – Surface water collection point
- SD – Sediment collection point

Duplicate and other QA/QC samples will be given unique sample identification numbers, which will be noted in the field book. The QA/QC sample designations are outlined in the QAPP

4.1.1 Stream-Associated Samples

For stream-associated samples, a station designation will be used to identify the samples located on the unnamed tributary, Wilson Branch, and Huckleberry Branch. Stations 501 through 510 are located on the unnamed tributary. Stations 511 through 517 are located on Wilson Branch. Two stations, 518 and 519, are located on Huckleberry Branch. At each station, one sediment sample will be collected from depositional areas of the stream bottom. A soil boring will also be located on each side of the stream approximately 3 feet from the stream bank. At each boring, a sample will be collected at 0 to 0.5 feet using a stainless-steel scoop, spoon, or shovel, and a second sample will be collected from 0.5 to 1 foot using a hand auger.

All samples will have the same numeric station number. Sediment samples will be identified by the letters SD. Soil samples will be identified by the letters SB and the sample depth interval. In addition, the soil sample number will be followed by one letter indicating which compass direction the boring is relative to the stream. For soil samples collected adjacent to the unnamed tributary, the compass directions will be N (north) or S (south). On Wilson Branch, the compass directions will be W (west) or E (east).

For example, for Station 501, samples will be named as follows:

SD501	Sediment sample
SB501N (0-0.5)	Soil boring on north side of stream at depth of 0 to 0.5 feet bls
SB501N (0.5-1)	Soil boring on north side of stream at depth of 0.5 to 1 feet bls
SB501S (0-0.5)	Soil boring on south side of stream at depth of 0 to 0.5 feet bls
SB501S (0.5-1)	Soil boring on south side of stream at depth of 0.5 to 1 feet bls

4.1.2 Non-Stream-Associated Soil Samples

For non-stream-associated soil samples, the samples collected will be identified by locations. If at a location where only surface soil samples are being collected, then samples will be identified by the letters SS. If a location has borings with both surface and subsurface soils, the samples will be identified by the letters SB followed by the depth interval. The depth interval must be specified in units of feet without the use of an apostrophe to indicate "ft".

For example:

PLSS01 (0-0.5)	Surface soil sample collected at the Highland Plant (PL) a depth of 0 to 0.5 feet
PLSB05 (0.5-1)	Highland Plant (PL) soil boring at depth of 0.5 to 1 feet bls
OPSB01 (0-0.5)	Off-site Property (OP) soil boring at depth of 0 to 0.5 feet bls
OPSB01 (0.5-1)	Off-site Property (OP) soil boring at depth of 0.5 to 1 feet bls
TLSB01 (0.5-1)	Town Lot (TL) soil boring at depth of 0.5 to 1 feet bls

4.1.3 Pond Surface Water and Sediment Samples

Samples will be identified by sample location (PD for ponds), sample type (SD-sediment and SW-surface water), and location number.

For Example:

PDSW03	Surface water sample collected at pond location 3
PDSD06	Sediment sampled collected from the pond bottom at location 6

4.1.4 Pee Dee River Sediment Samples

Station designations 526 through 529 will be used to identify the sample stations located on the Pee Dee River. At each station, three sediment samples will be collected in profile across the river channel and identified from west to east by the letters A, B, and C. Sediment samples will be identified by the letters SD, station number and profile location. For Example:

SD528A	Sediment sample collected at west profile location at station 528

4.1.5 Former Cheraw Sewer Discharge Drainage Feature Water and Sediment Samples

Station designations 530, 531, and 532 will be used to identify surface water and sediment samples collected from the former Cheraw sewer discharge drainage feature. At each station, one surface water sample will be collected from the center of the stream and one sediment sample will be collected from depositional areas of the stream bottom. Both samples will have the same numeric station number. Sediment samples will be identified by the letters SD. Surface water samples will be identified by the letters SW. For example, for Station 531, samples will be named as follows:

SD531	Sediment sample
SW531	Surface water sample

4.1.6 Groundwater Samples

Groundwater samples will be named according to monitoring well name and location. For example, a monitoring well installed at the Highland property will be named PLMW01 and the groundwater sample will be identified by the same name.

4.2 Chain-of-Custody Procedures

Sample possession must be traceable from the time of collection to ultimate disposal through the use of chain-of-custody procedures. Chain-of-custody forms must accompany all sample shipping containers in order to document the transfer of the shipping containers and samples from the field to the laboratory. Procedures to be implemented include the following:

- Prepare sample containers in the laboratory with pre-applied labels.
- Complete chain-of-custody form(s) in the field indicating sample identification, size and number of containers filled, sampling date, sampling time, sample collector, and sample preservative, if applicable. Note that sampling time and date are left blank for blind duplicate samples. The sampling location of blind duplicates is recorded in the field notes.
- Pack shipping containers with samples, field chain-of-custody forms, and ice or ice packs. Each set of sample containers to be shipped together in a single shipping container will be assigned a field chain-of-custody form, which will travel with the shipping container.

- Seal containers and ship or deliver them to a laboratory certified in South Carolina. Common carriers or intermediate individuals shall be identified on the field chain-of-custody form, which will travel with the shipping container.
- In the laboratory, receive and check shipping containers for broken seals or damaged sample containers. If no problems are noted, samples will be logged into the laboratory, and the field chain-of-custody form will be completed. The person relinquishing the samples to the facility or agency should request the representative's signature acknowledging sample receipt. If the representative is unavailable or refuses, this is noted in the "Received By" space.
- Include copies of the field chain-of-custody form with the analytical data.

The chain-of-custody form will be filled out legibly in black or blue ink. Errors will be corrected by drawing a single line through the incorrect information and entering the correct information. All corrections will be initialed and dated by the person making the correction.

Completed chain-of-custody forms will be placed in a plastic bag, sealed, and taped to the inside cover of the shipping container. After the samples are iced, if required, the shipping container will be sealed, dated, and delivered by the sampling technician or shipped to the laboratory using an overnight delivery service. Samples will be received from the carrier and logged by the laboratory staff. In the event that samples are shipped for Saturday delivery, or delivered directly by the sampling technician after hours, arrangements will be made to have the appropriate personnel present to receive ad log the samples upon their arrival or the samples will be stored in a secured location until the next business day. Sample shipping containers will not be left unattended.

A separate sample receipt will be prepared whenever samples are split with a government agency. The receipt will be marked to indicate with whom the samples are being split. The person relinquishing the samples to the agency should request the agency representative's signature acknowledging sample receipt. If the representative is unavailable or refuses, this will be noted on the receipt and in the field book.

Three copies of the chain-of-custody must be kept with the field notes in the field. Two of the copies will accompany the samples to the laboratory. If a chain-of-custody for is damaged in shipment, the third (field copy) will be available. A written statement will be prepared by the person who collected the samples. The statement should include information contained in the field book/log entries regarding the sample.

Chain-of-custody procedures are further discussed in Section B.3 of the QAPP. An example of a laboratory chain-of-custody form is provided as Figure 4-1 and will be used for all samples.

Table 5-1
Grain Size Analysis of Sand for Packing Well Screens

US MESH	GRAMS RETAINED	PERCENT RETAINED CUMULATIVE	PERCENT RETAINED PER SIEVE
6	0.00	0.00	0.00
8	0.00	0.00	0.00
10	0.00	0.00	0.00
12	0.00	0.00	0.00
14	0.00	0.00	0.00
16	0.40	0.72	0.72
18	5.90	6.98	6.26
20	15.40	25.97	16.99
25	27.10	48.48	24.51
30	42.30	75.67	27.19
35	52.90	94.63	18.96
40	55.20	98.75	4.11
45	55.60	99.46	0.72
50	55.70	99.64	0.18
70	55.80	99.82	0.18
PAN	55.90	100.0	0.18

Effective Size: 0.524 mm
Uniformity Coefficient: 1.446

Table 2
Data Quality Indicators

DQI	DEFINITION	GOAL/REQUIREMENT/ACTION
Precision	The measure of agreement among repeated measurements of the same property under identical or substantially similar conditions; calculated as either the range or as the standard deviation. May also be expressed as a percentage of the mean of the measurements, such as relative range or relative standard deviation (coefficient of variation).	Relative Percent Difference (RPD) for laboratory control sample/laboratory control sample duplicates (LCS/LCSDs) and matrix spike/matrix spike duplicates (MS/MSDs) results will be used to verify laboratory analytical precision. The RPDs will be reviewed by the data validator. QC limits as specified by the analytical method or laboratory standard operating procedure (SOP) and provided in the laboratory report will be used as the maximum acceptable RPD value beyond which the data will be flagged as appropriate. The precision objectives for LCS/LCSD and MS/MSD RPDs are established in the EPA SW-846 Methods and other EPA-approved methods listed in Section B, Tables 4 and 5 of this QAPP. A co-located sample duplicate may be collected to assess the combined precision of field sampling and laboratory analysis. Appropriate RPDs will be calculated by the data validator.
Bias	The systematic or persistent distortion of a measurement process that causes errors in one direction.	Reference materials used for LCS or MS spiking compounds will be certified, commercially available materials whose term of use has not expired. QC limits as specified by the analytical method or laboratory SOP and provided in the laboratory report will be used as the range of acceptable recovery values beyond which the data will be appropriately flagged by the laboratory and/or the data validator. Recoveries of surrogates, LCS/LCSD, and MS/MSD analytes will be reviewed by the data validator and flagged if a substantial high or low bias exists in the analytical results. Extremely low bias indicated by poor recoveries of surrogates, LCS/LCSD or MS/MSD analytes will result in non-detect results being flagged as unusable (an “R” flag). Note that numerical fields in the database associated with “R” flagged results are set to Null so that the data cannot be inadvertently used.

Table 2
Data Quality Indicators

DQI	DEFINITION	GOAL/REQUIREMENT/ACTION
Accuracy	A measure of the overall agreement of a measurement to a known value; includes a combination of random error (precision) and systematic error (bias) components of both sampling and analytical operations.	Reference materials used as calibration standards, calibration verification standards, or surrogate spikes will be certified, commercially available materials whose term of use has not expired. Instruments used in this project will be checked each day that samples are analyzed, or more frequently if required by an analytical method or SOP, to demonstrate instrument performance. The accuracy objectives for instrument tuning, calibration, and surrogate recovery are established in the EPA SW-846 Methods and other EPA-approved methods listed in Section B, Tables 4 and 5 of this QAPP. The laboratory is responsible for verifying that instrument tuning and calibration meet method and SOP requirements. Geospatial data can have two levels of desired accuracy: Monitoring wells may need the depth to water measuring point elevation accurate to +/- 0.01 foot. Some geospatial measurements can tolerate uncertainty in the submeter or +/- 2-meter range. For these latter situations, a hand-held global positioning system (GPS) such as a Trimble GeoXT with ArcPad software will provide acceptable results.
Representativeness	A qualitative term that expresses "the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition."	Sampling sites for soils, sediments, surface waters, and groundwater monitoring wells will be selected to obtain spatially representative information. Sampling frequency may be established, if needed, to monitor temporal variations in conditions. Spatial and temporal representativeness are approved by the EPA with the approval of sampling plans. Appropriate sampling procedures, sampling equipment and sample preservation will be used to maintain sample integrity from time of sample collection until analysis.
Comparability	A qualitative term that expresses the measure of confidence that one data set can be compared to another and can be combined for the decision(s) to be made.	Analytical methods prescribed in this QAPP are industry standard methods developed by the EPA. It is expected that new data will be comparable with most, if not all, historical data from this site.
Completeness	A measure of the amount of valid data needed to be obtained from a measurement system.	The completeness goal is 90% of the samples collected for 90% of the desired analyses. If a planned sample cannot be collected for some reason (*e.g.,* a dry monitoring well, hazardous site or weather conditions), or if the laboratory cannot complete the analysis or a reported result is invalidated, then the project team will need to evaluate the importance of the missing information and take corrective action as necessary and appropriate.
Sensitivity	The capability of a method or instrument to discriminate between measurement responses representing different levels of the variable of interest.	Laboratory analytical methods must have Reporting/Quantitation Limits (RLs or QLs) (preferred) or Method Detection Limits (MDLs) (alternative) that meet the typical analytical method quantitation limits (aka reporting limits) used for RI/FS investigations as summarized in Section B, Table 4 and Appendix A of this QAPP. It is recognized that it may not be practical to achieve these limits if a sample requires dilution.

Table 4
Sample Analytical Methods, Container Requirements, Preservatives, Holding Times and Laboratory

ANALYTICAL PARAMETER	ANALYTICAL METHOD	CONTAINER SIZE AND TYPE	PRESERVATIVE	MAXIMUM HOLDING TIME	LABORATORY
TCL VOCs - aqueous	USEPA SW-846 Method 8260B	Three 40 mL clear glass with Teflon® lined septum	1:1 hydrochloric acid (HCl); ice	14 Days if preserved; 7 days if unpreserved	TestAmerica – Pittsburgh, PA
TCL VOCs - solid	USEPA SW-846 Method 8260B	TerraCore sampling kit	Ice; freeze within 48 hours or analyze immediately	14 days if preserved; analyze immediately if not preserved	TestAmerica – Pittsburgh, PA
TCL SVOCs - aqueous	USEPA SW-846 Method 8270D	Two one-liter amber glass with Teflon® lined lid	Ice	Extract in 7 days; analyze within 40 days after extraction	TestAmerica – Pittsburgh, PA
TCL SVOCs - solid	USEPA SW-846 Method 8270D	One 4 oz or 8 oz clear glass can be used for all analyses except VOAs. ***	Ice	Extract in 14 days; analyze within 40 days after extraction	TestAmerica – Pittsburgh, PA
TCL Chlorinated Pesticides - aqueous	USEPA SW-846 Method 8081B	Two one-liter amber glass with Teflon® lined lid	Ice	Extract in 7 days; analyze within 40 days after extraction	TestAmerica – Pittsburgh, PA
TCL Chlorinated Pesticides - solid	USEPA SW-846 Method 8081B	One 4 oz or 8 oz clear glass can be used for all analyses except VOAs. ***	Ice	Extract in 14 days; analyze within 40 days after extraction	TestAmerica – Pittsburgh, PA
TCL PCB Aroclors - aqueous	USEPA SW-846 Method 8082A or Low Level Method 8082A, as required	Two one-liter amber glass with Teflon® lined lid	Ice	Extract in 365 days; analyze within 40 days after extraction	TestAmerica – Pittsburgh, PA

Table 4
Sample Analytical Methods, Container Requirements, Preservatives, Holding Times and Laboratory

ANALYTICAL PARAMETER	ANALYTICAL METHOD	CONTAINER SIZE AND TYPE	PRESERVATIVE	MAXIMUM HOLDING TIME	LABORATORY
TCL PCB Aroclors - solid	USEPA SW-846 Method 8082A	One 4 oz or 8 oz clear glass can be used for all analyses except VOAs. ***	Ice	Extract in 365 days; analyze within 40 days after extraction	TestAmerica – Pittsburgh, PA
TCL PCB Aroclors – sediment low level	USEPA SW-846 Method 8082A_LL	One 4 oz or 8 oz clear glass can be used for all analyses except VOAs. ***	Ice	Extract in 365 days; analyze within 40 days after extraction	TestAmerica – Pittsburgh, PA
TAL Metals excluding mercury - aqueous	USEPA SW-846 Method 6020B or 6010	One 250 ml plastic	Nitric acid (HNO_3) to pH <2; ice	6 months	TestAmerica – Pittsburgh, PA
TAL Metals excluding mercury - solid	USEPA SW-846 Method 6020B or 6010	One 4 oz or 8 oz clear glass can be used for all analyses except VOAs. ***	Ice	6 months	TestAmerica – Pittsburgh, PA
Mercury - aqueous	USEPA SW-846 Method 7074A	Take sample volume from TAL metals container	Nitric acid (HNO_3) to pH <2; ice	28 days	TestAmerica – Pittsburgh, PA
Mercury - solid	USEPA SW-846 Method 7471B	Take sample volume from TAL metals container	Ice	28 days	TestAmerica – Pittsburgh, PA

*** Even though the lab says they will have sufficient sample with only a single jar to analyze SVOCs (BNAs), chlorinated pesticides, PCBs, and metals, two jars must be collected and sent to lab for these analyses as a safeguard against completely losing these analyses because of bottle breakage. Collect three additional bottles for samples that are to be used for MS/MSD analyses.

Table 4
Sample Analytical Methods, Container Requirements, Preservatives, Holding Times and Laboratory

ANALYTICAL PARAMETER	ANALYTICAL METHOD	CONTAINER SIZE AND TYPE	PRESERVATIVE	MAXIMUM HOLDING TIME	LABORATORY
pH	SESDPROC-100-R4, meter operation manual, and TRC SOP RMD011 R0 (aka ECR011 R0)	NA	NA	15 Minutes	Field Measurement
Temperature	SESDPROC-102-R4, meter operation manual, and TRC SOP RMD011 R0 (aka ECR011 R0)	NA	NA	15 Minutes	Field Measurement
DO	SESDPROC-106-R4, meter operation manual, and TRC SOP RMD011 R0 (aka ECR011 R0)	NA	NA	15 Minutes	Field Measurement
Specific Conductance	SESDPROC-101-R6, meter operation manual, and TRC SOP RMD011 R0 (aka ECR011 R0)	NA	NA	15 Minutes	Field Measurement
ORP	SESDPROC-113-R2, meter operation manual, and TRC SOP RMD011 R0 (aka ECR011 R0)	NA	NA	15 Minutes	Field Measurement
Turbidity	SESDPROC-103-R4, meter operation manual, and TRC SOP RMD011 R0 (aka ECR011 R0)	NA	NA	15 Minutes	Field Measurement
TOC Soil	USEPA Lloyd Kahn	4 oz. Clear Glass	Ice	14 Days	TestAmerica – Pittsburgh, PA
Grain Size	ASTM D422	—	NA	NA	TestAmerica – Pittsburgh, PA
DOC	USEPA SW-846 Method 9060A	2-40 mL Vials	Ice, H_2SO_4	20 Days	TestAmerica – Pittsburgh, PA
TOC Water	USEPA SW-846 Method 9060A	2-40 mL Vials	Ice, H_2SO_4	20 Days	TestAmerica – Pittsburgh, PA
TSS	Standard Method SM 2540D	1 Liter Plastic	Ice	7 Days	TestAmerica – Pittsburgh, PA

Samples are uniquely identified from the combination of the location name (soil location/station, sediment location/station, surface water location/station, monitoring well name, blank type and number, or field duplicate number), sample collection date, and sample collection time, all of which will be recorded on the chain-of-custody and the sample bottle label. Note that sample collection date and sample collection time may not be present for trip blanks for VOC analysis because these may originate at the laboratory, nor for field duplicate samples so that the laboratory cannot readily identify the parent sample of the duplicate (*i.e.,* it will be a "blind" duplicate). The field technician is responsible for recording the sampling location for field duplicates in the field notes.

B.3.1 Sample Identification

Soil, sediment, surface water, and groundwater samples will be named as documented in the RI/FS FSP. Field blanks, rinsate blanks, trip blanks, and field duplicates will be named FBLKyyq##, RBLKyyq##, and TBLKyyq##, respectively, where "yyq##" represents the following:

- "yy"equals the last two digits of the calendar year (*e.g.,* for 2019, yy = "19"),
- "q"equals the calendar quarter (*i.e.,* for January through March q = "1", for April through June q = "2", etc.), and
- "##" is the sequential number of the type of blank within the calendar quarter. For example, the third trip blank collected in the calendar quarter would have ## = "03".

Field duplicate samples will be named DUyyq## where "yyq##" has the same definition as described above.

B.3.2 Sample Custody

The field technician performing sample collection activities will be responsible for sample custody in the field. The laboratory sample custodian and analysts will be responsible for custody of the sample at the laboratory.

Samples are considered to be under custody under the following conditions:

- The sample is in a person's possession
- The sample is in that person's view after being in his or her possession
- The sample was in that person's possession and then placed in a secure location
- The sample is in a designated and identified secure area

Prior to collecting samples in the field, the field technicians will obtain the sample containers necessary for the field operation. Field technicians will label each sample container collected, filling in the appropriate information in waterproof ink. The field technician is responsible for

collecting the samples and for logging the samples into a field notebook or field form. The field technician will complete and verify the chain-of-custody form (Figure 3). A copy of the chain-of-custody will be placed in the project files and the original will accompany the shipped samples. A work order (Figure 2) or sample analysis request form will be prepared by the project hydrogeologist and be verified by another staff member. The work order will accompany the samples, or precede delivery of the samples, to the laboratory.

The sample receiving department at the laboratory will receive the sample shipments and verify that shipment contents match the chain-of-custody form. The sample receiving department should also verify that the samples are received in acceptable condition for analysis (*e.g.,* no containers are broken or leaking, sample temperature is between 0 to 6°C). Samples will be logged into the Laboratory Information Management System (LIMS). The sample receiving department or an automated LIMS will then be responsible to notify appropriate analysts that samples have been received for analysis according to the laboratory's operating procedures. The sample receiving department should notify the project hydrogeologist or the TRC PM promptly if there are any discrepancies between the shipment contents and the chain-of-custody, or if samples were received in a condition unacceptable for analysis. Discrepancies between the samples received, sample container labels, the chain-of-custody and the work order will be resolved before the sample is released into the laboratory for analysis. Discrepancies will be documented on a sample receipt/login form or its equivalent. The sample receipt/login form or its equivalent will be included in the lab report. If appropriate, a description of the discrepancy will be noted in the Laboratory Report Narrative.

The laboratory is responsible for maintaining custody and integrity of the samples, extracts, and digestates. The samples, extracts, and digestates can be disposed of 30 days after the final report has been issued unless the laboratory is specifically requested by TRC to hold these items for a longer period. The laboratory is responsible for disposing unused sample volume. Maximum sample holding times from collection to preparation and/or analysis are listed in Table 4.

If photographs are taken to document field observations, the field documentation will reflect the following information:

- Date and time the photograph was taken
- Name of the person taking the photograph
- Photograph number or digital file name (Note: Field documentation may need to be augmented when photos are received or archived from camera.)
- Location of the photograph on the site (this can also be documented on a site map)
- The compass direction faced when the photograph was taken
- An explanation/narrative of the photograph

B.4 Analytical Methods

The laboratory performing each analysis is presented in Table 4. The laboratory is responsible for properly performing the analyses and the quality of the data that it generates. Laboratory data validation details are provided in Section D.1

Achievable Reporting Limits (RLs)/Quantitation Limits (QLs) and Method Detection Limits (MDLs) are presented in Table 5.

Laboratory analytical results are typically available within 3 weeks from the date of sample receipt at the laboratory.

Field analytical instruments may vary with time as instruments are replaced or upgraded. TRC anticipates using either a Horiba U-53 or *In-Situ* smarTROLL instrument to measure pH, SC, temperature, DO, and ORP. TRC anticipates using either a Horiba U-53 instrument or a Hach Model 2100P meter to measure turbidity.

The laboratory is responsible for obtaining and maintaining the following instruments and supporting equipment:

ANALYTE(S)	TYPE OF ANALYTICAL INSTRUMENT
VOCs	Gas Chromatograph – Mass Spectrometer (GC/MS) with Purge and Trap Unit
SVOCs	Gas Chromatograph – Mass Spectrometer (GC/MS)
Chlorinated Pesticides	GC
PCB Aroclors	GC
Metals except mercury	Inductively Coupled Plasma (ICP) – Atomic Emission Spectrometer (AES) or ICP/MS
Mercury	Cold Vapor Atomic Absorption (CVAA)
TOC, DOC, TSS, Other	Instruments used for Analysis

Table 5
Analytes, SOP Reference, and Quantitation Limits

ANALYTE OR ANALYTICAL FRACTION	ANALYTICAL METHOD REFERENCE	ACHIEVABLE MDL [1]	ACHIEVABLE QL [1]
VOCs, SVOCs, Chlorinated Pesticides, PCB Aroclors, and Metals, TOC, TSS, DOC	See Appendix A		
Field pH Measurement	SESDPROC-100-R4, TRC SOP RMD011 R0 (aka ECR011 R0), and User Manual for Horiba U-53, *In-Situ* smarTROLL, or comparable instrument	NA	NA
Field Specific Conductance Measurement	SESDPROC-101-R6, TRC SOP RMD011 R0 (aka ECR011 R0), and User Manual for Horiba U-53, *In-Situ* smarTROLL, or comparable instrument	NA	10 uS/cm
Field Temperature Measurement	SESDPROC-102-R4, TRC SOP RMD011 R0 (aka ECR011 R0), and User Manual for Horiba U-53, *In-Situ* smarTROLL, or comparable instrument	NA	NA
Field Turbidity Measurement	SESDPROC-103-R4, TRC SOP RMD011 R0 (aka ECR011 R0), and Hach Model 2100P, *Portable Turbidimeter Instrument and Procedure Manual* or User Manual for Horiba U-53 or comparable instrument	NA	1 NTU
Field Measurement of DO	SESDPROC-106-R4, TRC SOP RMD011 R0 (aka ECR011 R0), and User Manual for Horiba U-53, *In-Situ* smarTROLL, or comparable instrument	NA	0.1 mg/L
Field Measurement of ORP	SESDPROC-113-R2, TRC SOP RMD011 R0 (aka ECR011 R0), and User Manual for Horiba U-53, *In-Situ* smarTROLL, or comparable instrument	NA	NA

(1) Laboratory MDLs and EQL may vary with time as the most recent laboratory performance data is used to update these limits.
NA Not Applicable/Not Available

Field technicians will contact the appropriate manufacturer and/or TRC technical expert(s) if problems are encountered with field analytical equipment.

Unused groundwater sample aliquots used for field analyses will be combined with well purge water and then disposed as discussed above. Hazardous solutions and waste materials will be disposed with investigation derived waste materials as described above.

The laboratory is responsible for disposing unused sample volume that they have received.

B.5 Quality Control

Most QC calculations (*e.g.,* organic surrogate recoveries, LCS/LCSD recoveries and RPDs, MS/MSD recoveries and RPDs, and laboratory duplicate RPDs) are performed by the laboratory and included in the QC results section of typical laboratory reports. Because the laboratory will not know the parent sample for blind field duplicates, the appropriate RPD calculation(s) for field duplicates will be performed by the data validator. RPD calculations are appropriate when an analyte is detected in both the parent sample and the field duplicate. RPD is defined as follows:

$$\text{RPD} = \frac{|\text{Parent Concentration} - \text{Field Duplicate Concentration}|}{(\text{Parent Concentration} + \text{Field Duplicate Concentration})/2} \times 100\%$$

The EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review and the EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review do not specify requirements or guidance for analyte recovery RPDs between parent sample and field duplicates. Professional judgment of the data validator will be used to assess the RPDs and to assign a "J" validation flag to appropriate samples indicating the analytical results are estimated if the RPD is deemed unusually high.

Completeness is a percentage measure of the number of acceptable analyses completed out of the number of analyses desired. It is calculated as follows:

$$\text{Completed Analyses} = \frac{\text{Number of analyses meeting QC requirements}}{\text{Total number of analyses in the analytical program}} \times 100\%$$

Analyses not meeting the QC limits of an analytical method will be qualified during data validation as described elsewhere in this QAPP. Analytical results that are considered unusable (*i.e.,* data that have received an "R" validation flag) will be reviewed by a chemist, the project hydrogeologist and the QA officer to determine if a sampling procedure, sampling location or analytical procedure needs to be modified. The outcome of this review will determine if corrective action is necessary. Any corrective action considered necessary will be documented in the project files.

Field QC samples applicable to this project for soil, sediment, surface water, and groundwater matrices are described in Table 6. Laboratory QC samples for soil, sediment, surface water, and groundwater matrices are described in Table 7.

B.6 Instrument/Equipment Testing, Inspection, and Maintenance

The instrument/equipment testing, inspection and maintenance procedures described in Table 8 will be performed to maximize efficiency and data quality, as well as to minimize downtime, in the field and laboratory and while working at the Burlington Industries Cheraw site.

Laboratory instruments will be maintained by the laboratory. Maintenance records will be maintained by the laboratory and will be available for review if requested by investigation staff or the Highland representative.

Sampling equipment and analytical instruments will be stored in secure locations protected from the elements.

Significant maintenance performed on field equipment and field instruments shall be documented in the field notebook or field form.

Spare parts needed for instrument or equipment maintenance and repairs will be stored in the field vehicle or in on-site storage locations, if available. Replacement parts for some equipment may be available at hardware stores. Specialty or costly replacement parts are obtained from suppliers on an as-needed basis.

Table 6
Field Quality Control Samples for Groundwater and Surface Water Matrices

FIELD QC APPLIES TO	FREQUENCY/ NUMBER	METHOD/SOP QC ACCEPTANCE LIMITS	CORRECTIVE ACTION (CA)	PERSON(S) RESPONSIBLE FOR CA	DQI	MEASUREMENT QUALITY OBJECTIVES
Rinsate Blanks: VOCs, SVOCs, Chlorinated Pesticides, PCBs, and Metals	1 per sampling event if field decontamination occurs	Target analytes should not be detected in the rinsate blank. The source of contamination should be promptly investigated and mitigated.	Investigate cause and review proper decontamination procedures with field technicians.	Data Validator, QA Officer, Field Technicians	Detected concentration	No detections above the method QL.
Field Blanks: VOCs, SVOCs, Chlorinated Pesticides, PCBs, and Metals	1 per sampling event	Target analytes should not be detected in the field blank. The source of contamination should be promptly investigated and mitigated.	Contact bottle supplier to verify bottle and preservative cleanliness; review sampling protocols with field technicians.	Data Validator, QA Officer, Field Technicians, Bottle Supplier	Detected concentration	No detections above the method QL.
Trip Blanks: VOCs	1 per cooler containing VOC samples	Target analytes should not be detected in the field blank. The source of contamination should be promptly investigated and mitigated if it is not a random event.	Keep potential contamination sources away from bottle and equipment storage locations and transport vehicles.	Data Validator, QA Officer, Field Technicians	Detected concentration	No detections above 10X the method QL.
Cooler Temperature:	Each cooler with sample containers requiring refrigeration.	0 to 6°C	Fill cooler with ice; review cooler packing procedures with field technicians; pack fewer sample bottles per cooler, especially during hot weather.	Data Validator, QA Officer, Field Technicians	Temperature of samples upon receipt at the laboratory	0.5 to 6°C

Table 6
Field Quality Control Samples for Groundwater and Surface Water Matrices

FIELD QC APPLIES TO	FREQUENCY/ NUMBER	METHOD/SOP QC ACCEPTANCE LIMITS	CORRECTIVE ACTION (CA)	PERSON(S) RESPONSIBLE FOR CA	DQI	MEASUREMENT QUALITY OBJECTIVES
Field Duplicate: VOCs, SVOCs, Chlorinated Pesticides, PCBs, and Metals	1 per 20 field samples per medium.	Professional judgment of data validator.	Review sampling protocols with field technicians; apply data validation flags	Data Validator, QA Officer, Field Technicians	Analyte RPD	Guidelines are RPD <= 25% for aqueous samples and RPD <= 50% for solid samples.
Extra Sample Volume for Laboratory MS (no spiking to occur in the field): VOCs, SVOCs, Chlorinated Pesticides, PCBs, and Metals	1 per 20 field samples per medium.	Two extra sets of sample volume for aqueous and soil VOCs, aqueous SVOCs, aqueous pesticides, and aqueous PCBs. In effect, triple the usual number of samples containers is desired when collecting sample volume for the laboratory to perform a site-specific MS/MSD analysis.	NA	Data Validator, QA Officer, Field Technicians	Analyte recovery and RPD	Method and laboratory specific MS/MSD recoveries and RPD QC limits provided in the laboratory report

Table 7
Laboratory Quality Control Samples for Groundwater and Surface Water Matrices

LABORATORY QC	FREQUENCY/ NUMBER	METHOD/SOP QC ACCEPTANCE LIMITS	CORRECTIVE ACTION (CA)	PERSON(S) RESPONSIBLE FOR CA	DQI	MEASUREMENT QUALITY OBJECTIVES
Method Blank: VOCs, SVOCs, Chlorinated Pesticides, PCBs, and Metals	1 per laboratory analytical batch.	In conformance with analytical methods, laboratory SOP, and *USEPA Contract Laboratory Program National Functional Guidelines for Organic (or Inorganic) Data Review*	Clean glassware; clean instrument; reanalyze samples; apply data validation flags.	Laboratory QA Officer, Analyst, Data Validator	Detected concentration	No detections above acceptable concentration.
Reagent Blank: VOCs, SVOCs, Chlorinated Pesticides, PCBs, and Metals	In conformance with analytical methods and laboratory SOP.	In conformance with analytical methods and laboratory SOP; monitored by laboratory as applicable.	Use fresh, certified reagents.	Laboratory QA Officer, Analyst	Detected concentration	No detections above acceptable concentration.
Instrument Blank: VOCs, SVOCs, Chlorinated Pesticides, PCBs, and Metals	In conformance with analytical methods and laboratory SOP.	In conformance with analytical methods and laboratory SOP; monitored by laboratory as applicable.	Clean instrument; reanalyze samples.	Laboratory QA Officer, Analyst	Detected concentration	No detections above acceptable concentration.
Calibration Check Standard: VOCs, SVOCs, Chlorinated Pesticides, PCBs, and Metals	At least daily when analysis performed and in conformance with analytical methods and laboratory SOP.	In conformance with analytical methods and laboratory SOP; monitored by laboratory.	Recalibrate instrument; use fresh, certified primary and secondary calibration materials.	Laboratory QA Officer, Analyst	%RSD and %D or other acceptable statistical measure of variation	All initial and continuing calibrations acceptable; analytical method may allow for one or more reported analytes to fail %D criteria if they are not detected in samples associated with the calibration check standard and the required instrument sensitivity is achieved.

Table 7
Laboratory Quality Control Samples for Groundwater and Surface Water Matrices

LABORATORY QC	FREQUENCY/ NUMBER	METHOD/SOP QC ACCEPTANCE LIMITS	CORRECTIVE ACTION (CA)	PERSON(S) RESPONSIBLE FOR CA	DQI	MEASUREMENT QUALITY OBJECTIVES
Laboratory MS: VOCs, SVOCs, Chlorinated Pesticides, PCBs, and Metals	1 per 20 samples per medium using site-specific sample	Recovery limits updated periodically by laboratory; included on laboratory report.	Reanalyze MS; use fresh, certified spiking materials; repeat sample preparation and reanalyze samples; apply data validation flags.	Laboratory QA Officer, Analyst, Data Validator	% Recovery	Recovery within QC Limits.
Laboratory MS Duplicate: VOCs, SVOCs, Chlorinated Pesticides, PCBs, and Metals	1 per 20 samples per medium using site-specific sample	Recovery limits and maximum RPD Limit updated periodically by laboratory; included on laboratory report.	Reanalyze MS/MSD; use fresh, certified spiking materials; repeat sample preparation and reanalyze samples; apply data validation flags.	Laboratory QA Officer, Analyst, Data Validator	% Recovery and RPD	Recovery and RPD within QC Limits.
LCS: VOCs, SVOCs, Chlorinated Pesticides, PCBs, and Metals	1 per laboratory analytical batch.	Recovery limits updated periodically by laboratory; included on laboratory report.	Reanalyze LCS; use fresh, certified spiking materials; repeat sample preparation and reanalyze samples; apply data validation flags.	Laboratory QA Officer, Analyst, Data Validator	% Recovery	Recovery within QC Limits.

Table 9
Equipment and Instrument Calibration

EQUIPMENT/ INSTRUMENT	PROCEDURE	FREQUENCY OF CALIBRATION AND/OR CALIBRATION VERIFICATION	ACCEPTANCE CRITERIA	CORRECTIVE ACTION (CA)	PERSON RESPONSIBLE FOR CA	SOP REFERENCE
Laboratory Instruments: GC-MS for VOCs and SVOCs; GC for pesticides and PCBs; ICP-AES or ICP-MS for metals; AA for mercury	Initial Calibration (ICAL) and Continuing Calibration Verification (CCV)	Daily when analyzing samples, after major maintenance and additionally as required by analytical method and/or SOP	As described in the respective analytical method and Laboratory SOP	Repair or maintain instrument, use fresh calibration materials, new calibration	Laboratory Analyst; Laboratory QA Officer	Respective Laboratory SOP
Field pH meter	ICAL or CCV	Daily before use when analyzing samples; CCV may also occur mid-day and end of day	pH of buffered calibration solutions should be with +/- 0.1 pH unit of true value	Perform meter and probe maintenance; recalibrate; use another instrument and/or sensor while having the malfunctioning equipment repaired	Field Technician or vendor	See Table 5 of this QAPP
Field SC meter	ICAL or CCV	Daily when analyzing samples	+/- 5% of True Value	Use fresh, certified calibration material; obtain new conductivity cell; use another instrument and/or sensor while having the malfunctioning equipment repaired	Field Technician or vendor	See Table 5 of this QAPP
Field DO meter	ICAL or CCV	Daily when analyzing samples	+/- 5% of value under water saturated air conditions compensated for temperature, elevation, and barometric pressure.	Perform instrument and sensor maintenance; use another instrument and/or sensor while having the malfunctioning equipment repaired	Field Technician or vendor	See Table 5 of this QAPP

Table 9
Equipment and Instrument Calibration

EQUIPMENT/ INSTRUMENT	PROCEDURE	FREQUENCY OF CALIBRATION AND/OR CALIBRATION VERIFICATION	ACCEPTANCE CRITERIA	CORRECTIVE ACTION (CA)	PERSON RESPONSIBLE FOR CA	SOP REFERENCE
Field ORP meter	ICAL or CCV	Daily when analyzing samples	+/- 5% of True Value	Perform instrument and sensor maintenance; use another instrument and/or sensor while having the malfunctioning equipment repaired	Field Technician or vendor	See Table 5 of this QAPP
Thermistors (electronic temperature sensors) on field instruments	CCV	Annually	+/- 0.5 °C of NIST certified thermometer.	Use temperature correction or replace sensor.	Field Technician or vendor	See Table 5 of this QAPP
Field Turbidimeter	ICAL or CCV	Daily when analyzing samples	+/- 5% of True Value	Clean glass sample container; use another instrument and/or sensor while having the malfunctioning equipment repaired	Field Technician or vendor	See Table 5 of this QAPP

Table 10
Consumables and Supplies

CRITICAL SUPPLIES/ CONSUMABLES	INSPECTION/ ACCEPTANCE SPECIFICATIONS	ACCEPTANCE CRITERIA	TESTING METHOD	FREQUENCY	RESPONSIBLE INDIVIDUAL	HANDLING/STORAGE CONDITIONS
12 Volt battery for Geopump	Operational	Charged; holds a charge; terminals clean	Battery charger indicator lights	As needed	Field Technician	Avoid impacts that might damage battery housing; avoid spills of sulfuric acid
120 Volt AC generator	Operational	Sufficient oil in engine, no spilled fuel or fuel leaks	Test run	Before sampling event	Field Technician	Store generator and fuel separate from sampling equipment and sample bottles; secure generator and fuel during transport
Clean sample containers	Container free of target analytes	Obtained from laboratory or direct from vendor; if from vendor, then accompanied by certified analyses	Pre-tested before delivery for use	All bottles	Laboratory providing bottles or, if containers obtained directly from vendor, then vendor to perform analyses and Field Technician to verify certificate of analysis	Store in locations free of contaminating substances (*i.e.*, away from solvents and other chemicals)
Teflon® tubing or polyethylene tubing	New tubing or tubing dedicated to sampling location	NA	NA	Each well, each sampling event	Field Technician	Keep in plastic bag away from dust and dirt.
Silastic tubing	New tubing	NA	NA	Each well, each sampling event	Field Technician	Keep in plastic bag away from dust and dirt.
Filters	Unused filter; check pore size before use	0.45 micron pore size	NA	All filters	Field Technician	Keep in manufacturer's sealed pouch until used.
Bailers	New, free of target analytes or decontaminated at TRC's cleaning facility	NA	NA	All bailers	Field Technician	Keep in sealed plastic until used.

Table 10
Consumables and Supplies

CRITICAL SUPPLIES/ CONSUMABLES	INSPECTION/ ACCEPTANCE SPECIFICATIONS	ACCEPTANCE CRITERIA	TESTING METHOD	FREQUENCY	RESPONSIBLE INDIVIDUAL	HANDLING/STORAGE CONDITIONS
Scoops, spoons, mixing bowls, or similar equipment (stainless steel, aluminum, or glass)	Cleansed per equipment decontamination SOP even if new	NA	NA	All equipment, each use	Field Technician	Wrap in aluminum foul after decontamination/cleaning .
Shovel, soil push tube, auger buckets and handles, or similar equipment	Cleansed per equipment decontamination SOP even if new	NA	NA	All equipment, each use	Field Technician	Wrap in aluminum foul after decontamination/cleaning .
Ponar Dredge or similar equipment for sediment sampling	Cleansed per equipment decontamination SOP	NA	NA	All equipment, each use	Field Technician	Wrap in aluminum foul after decontamination/cleaning

Attachment 2

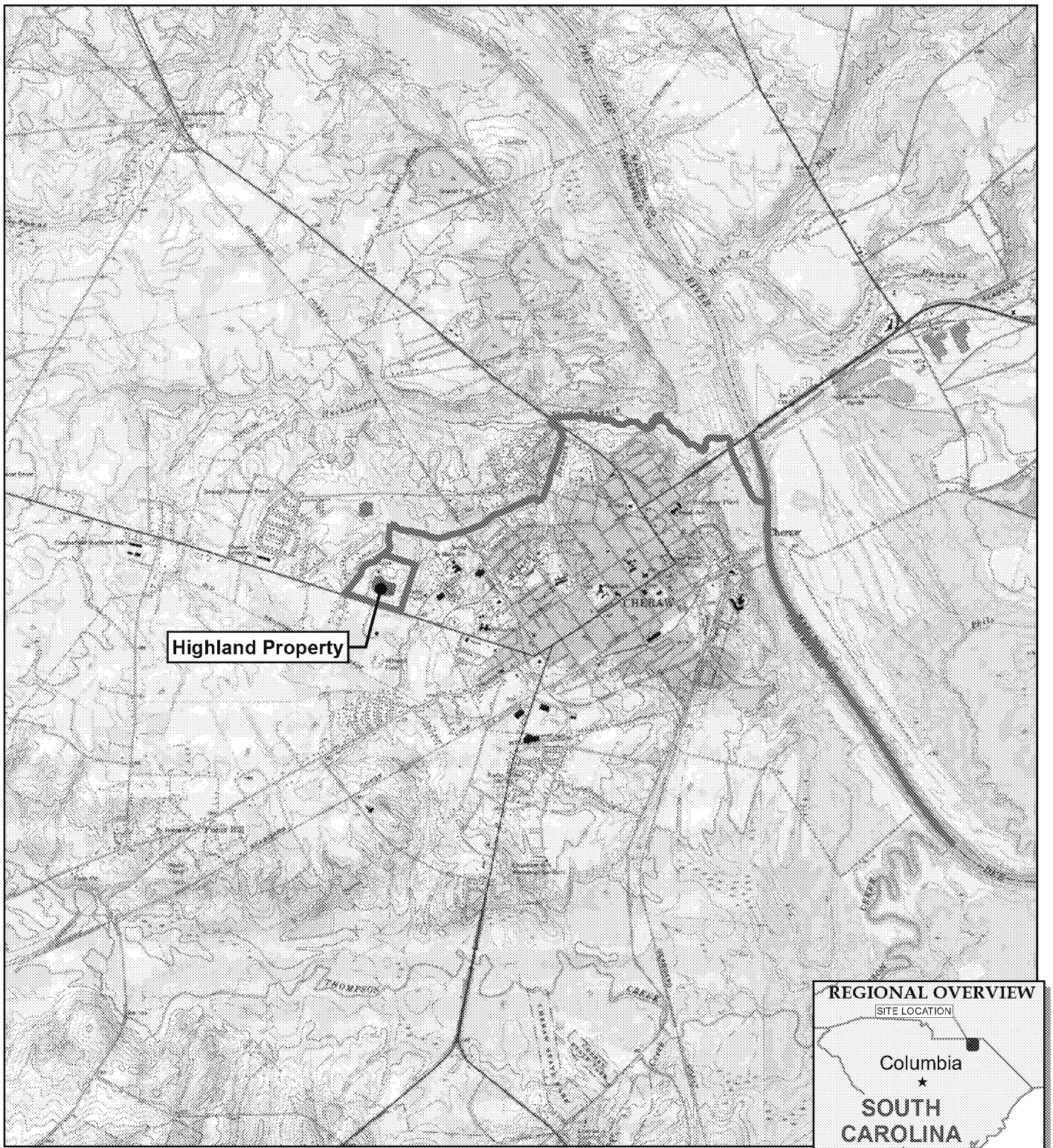
Figures

Excerpt from PRP FSP

Figure 1-1 Location of Operable Unit 2
Figure 1-2 Layout of Operable Unit 2
Figure 3-1 Proposed Surface Soil Sample Locations – Highland Property
Figure 3-2 Proposed Sample Locations – Unoccupied Properties
Figure 3-3 Proposed Sample Locations – Town Lot
Figure 3-4 Proposed Sample Stations – Unnamed Tributary to Wilson Branch
Figure 3-5 Proposed Sample Stations – Wilson Branch
Figure 3-6 Proposed Sample Stations – Huckleberry Branch, Pee Dee River, and Former Cheraw Sewer Discharge Drainage Feature
Figure 3-7 Proposed Temporary Monitoring Wells – Highland Property
Figure 3-8 Proposed Sample Stations – Ponds
Figure 3-9 Proposed Sample Stations – Former Cheraw Sewer Discharge Drainage Feature
Figure 3-10 Proposed Geophysical Transects to Investigate Pipe – Highland Property

Excerpt from PRP Workplan

Figure 4-1 Preliminary Risk/Exposure Schematic of CSM
Figure 5-1 Background Sediment and Soil Samples



BASE MAP FROM USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE SERIES.

N

1 " = 1 MILES
1:52,800

0 0.5 1 Miles

LEGEND

Extent of Operable Unit 2

TRC

50 International Drive, Suite 150
Patewood Plaza Three
Greenville, SC 29615
Phone: 864.281.0030

TRC - GIS

PROJECT:

HIGHLAND INDUSTRIES
(BURLINGTON INDUSTRIES CHERAW SUPERFUND SITE)

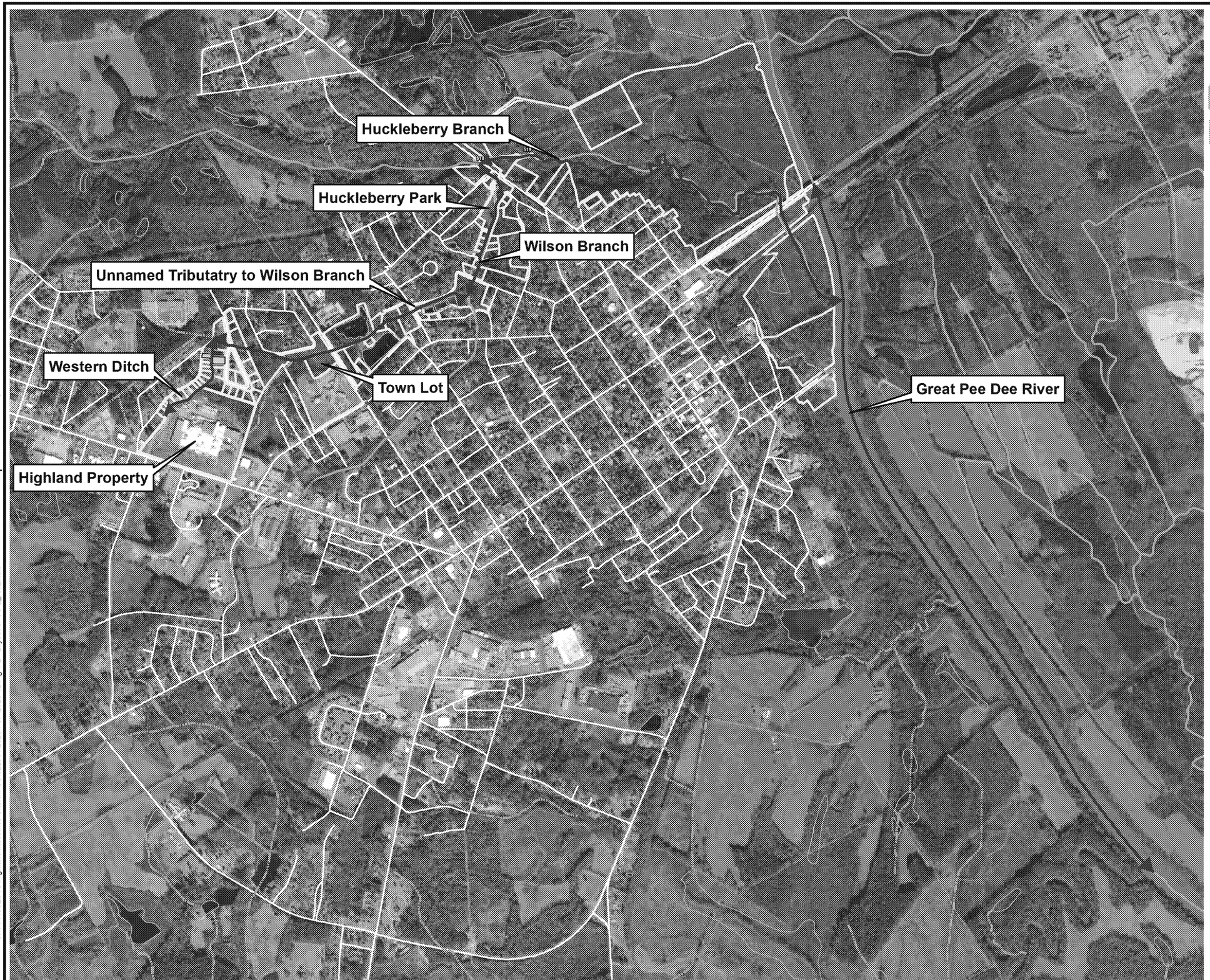
TITLE:

LOCATION OF OPERABLE UNIT 2

DRAWN BY:	R WIXON
CHECKED BY:	D MADISON
APPROVED BY:	H MORRIS
DATE:	APRIL 2020
PROJ. NO.:	322554.0000.0000
FILE:	Fig 1-1 - Location of OU-2.mxd

FIGURE 1-1

S:\1-PROJECTS\Highland Industries\Cheraw SC\322554\2020\FSP\Fig 1-1 - Location of OU-2.mxd -- Saved By: RWIXON on 4/22/2020, 14:28:49 PM



LEGEND

- Sediment Sample (SC DHEC)
- Soil Sample (SC DHEC)
- Parcel of Interest (Approximate)
- Unoccupied Property Requiring Sampling (Parcels 258 014 003 020 and 258 014 004 011)
- Stream (Approximate)
- Intermittent Stream or Drainage Ditch (Approximate)
- Sections of waterways included in OU-2

NOTES

Aerial Photograph Source: ESRI World Imagery.

0 1,500 3,000 Feet

1 " = 1,750 '

1:21,000

PROJECT

HIGHLAND INDUSTRIES (BURLINGTON INDUSTRIES CHERAW SUPERFUND SITE)

TITLE

LAYOUT OF OPERABLE UNIT 2

DRAWN BY:	R WIXON	PROJ. NO:	322554.0000.0000
CHECKED BY:	D MADISON		
APPROVED BY:	H MORRIS		**FIGURE 1-2**
DATE:	DECEMBER 2020		

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Greenville, SC 29615
Phone: 864.281.0030
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FILE NO: Fig 1-2 - Layout of OU-2_rev2.mxd

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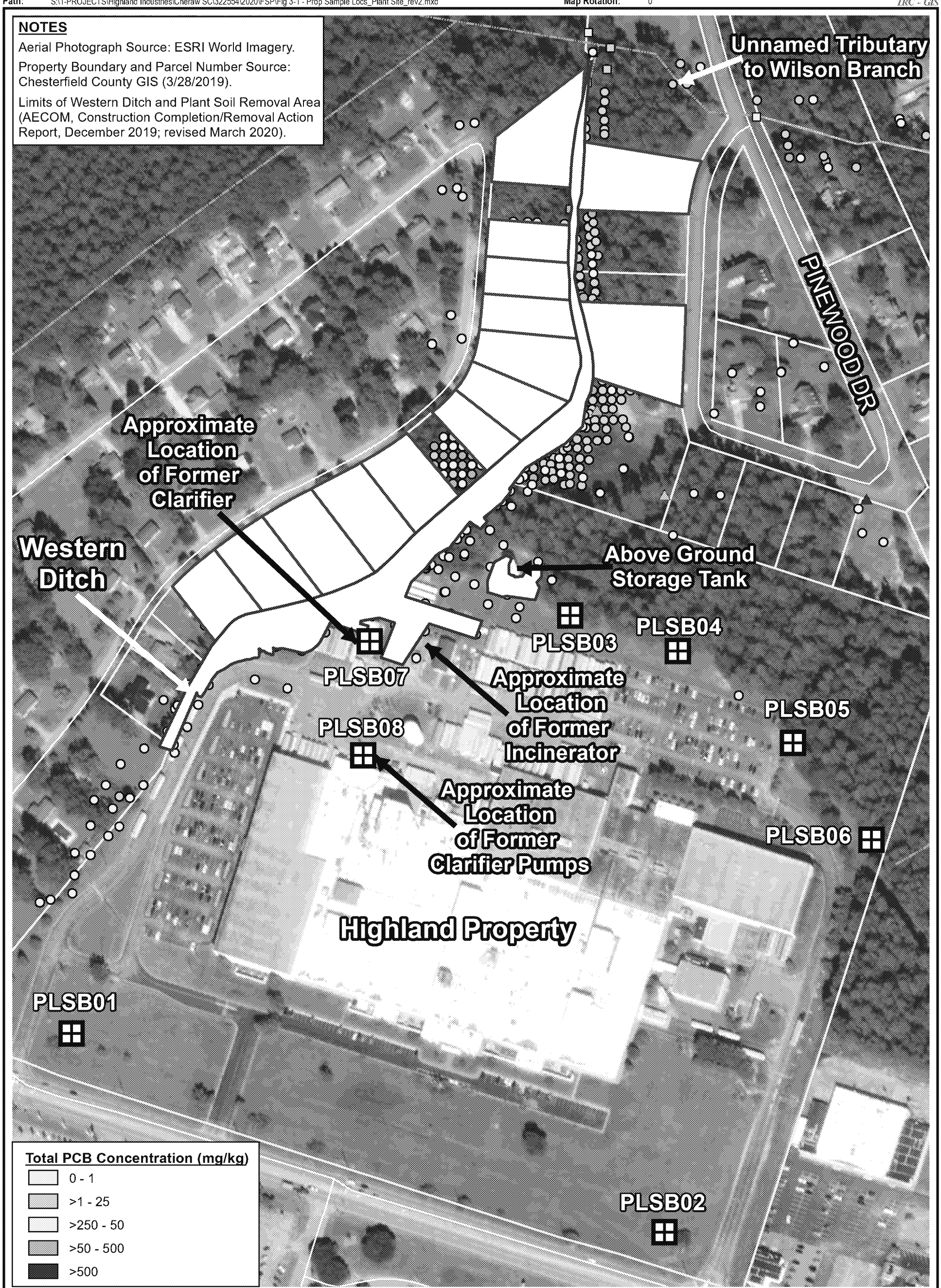
Map Rotation: 0

TRC -- GIS



LEGEND

- Proposed Soil Sample Location
- Sediment Sample (SC DHEC and AECOM)
- Soil Sample (SC DHEC and AECOM)
- Sample Described as Waste
- Parcel of Interest (Approximate)
- Western Ditch and Plant Soil Removal Area (Approximate)
- Parcel with Soil Removal Completed
- Intermittent Stream or Drainage Ditch (Approximate)

0 70 140 FEET
1 " = 200 '
1:2,400

N

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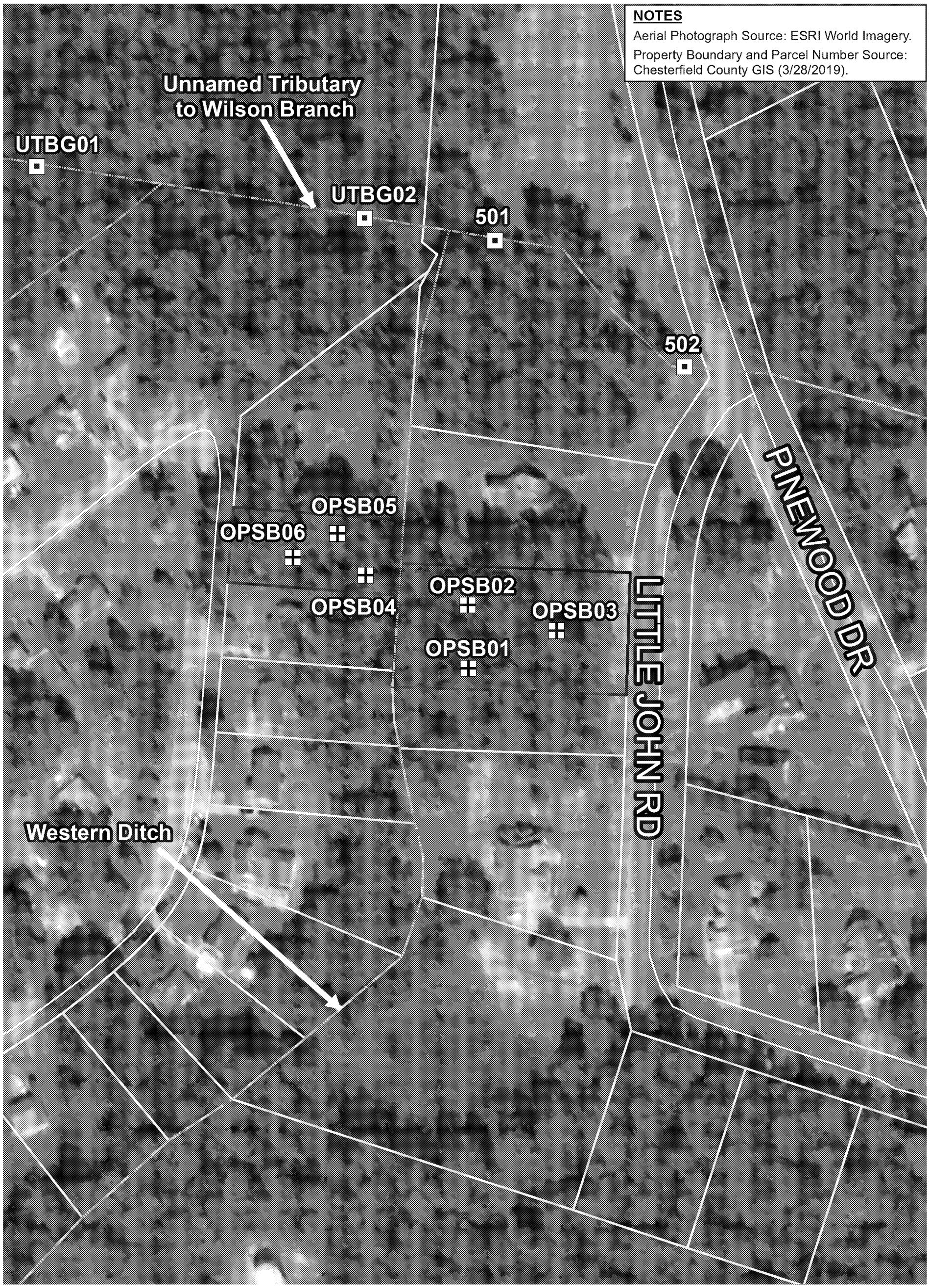
PROJECT:
HIGHLAND INDUSTRIES
(BURLINGTON INDUSTRIES CHERAW SUPERFUND SITE)

TITLE:
PROPOSED SOIL SAMPLE LOCATIONS
(HIGHLAND PROPERTY)

DRAWN BY:	R WIXON
CHECKED BY:	D MADISON
APPROVED BY:	H MORRIS
DATE:	APRIL 2020
PROJ. NO.:	322554.0000.0000
FILE:	Fig 3-1 - Prop Sample Locs_Plant Site_rev2.mxd

FIGURE 3-1



LEGEND

- Proposed Soil Sample Location
- Proposed Stream Sample Stations
- Intermittent Stream or Drainage Ditch (Approximate)
- Parcel of Interest (Approximate)
- Unoccupied Parcel Requiring Sampling

0 30 60 FEET
1 " = 100 '
1:1,200

N

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PROJECT:
HIGHLAND INDUSTRIES
(BURLINGTON INDUSTRIES CHERAW SUPERFUND SITE)

TITLE:
PROPOSED SAMPLE LOCATIONS
(UNOCCUPIED PROPERTIES)

DRAWN BY:	R WIXON
CHECKED BY:	D MADISON
APPROVED BY:	H MORRIS
DATE:	APRIL 2020
PROJ. NO.:	322554.0000.0000
FILE:	Fig 3-2 - Prop Sample Locs_Vacant Lots_rev1.mxd

FIGURE 3-2

LEGEND

- Proposed Soil Sample Locations
- Proposed Stream Sample Stations
- Sediment Sample (SC DHEC and AECOM)
- Soil Sample (SC DHEC and AECOM)
- Parcel of Interest (Approximate)
- Intermittent Stream or Drainage Ditch (Approximate)

Total PCB Concentration (mg/kg)

- 0 - 1
- >1 - 25
- >250 - 50
- >50 - 500
- >500

NOTES

Aerial Photograph Source: ESRI World Imagery.

Property Boundary and Parcel Number Source: Chesterfield County GIS (3/28/2019).

N

0 90 180 Feet

1 " = 100 '

1:1,200

PROJECT:

HIGHLAND INDUSTRIES (BURLINGTON INDUSTRIES CHERAW SUPERFUND SITE)

TITLE:

PROPOSED SAMPLE LOCATIONS (TOWN LOT)

DRAWN BY:	R WIXON	PROJ. NO:	322554.0000.0000
CHECKED BY:	D MADISON		
APPROVED BY:	H MORRIS		**FIGURE 3-3**
DATE:	APRIL 2020		

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FILE NO.: Fig 3-3 - Prop Samp Stations_Town Lot_rev1.mxd

Plot Date: 4/22/2020, 13:44:10 PM by RWIXON -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\Highland Industries\Cheraw SC\322554\2020\FSP\Fig 3-3 - Prop Samp Stations_Town Lot_rev1.mxd

Coordinate System: NAD 1983 StatePlane South Carolina FIPS 3900 Feet (Foot US)
Map Rotation: 0

TRC -- GIS

LEGEND

- Proposed Stream Sample Station
- Sediment Sample (SC DHEC and AECOM)
- Soil Sample (SC DHEC and AECOM)
- Soil Sample Described as Waste (SC DHEC)
- Parcel of Interest (Approximate)
- Western Ditch and Plant Soil Removal Area (Approximate)
- Parcel with Soil Removal Completed
- Stream (Approximate)
- Intermittent Stream or Drainage Ditch (Approximate)

Total PCB Concentration (mg/kg)

- 0 - 1
- >1 - 25
- >250 - 50
- >50 - 500
- >500

NOTES

Aerial Photograph Source: ESRI World Imagery.

Property Boundary and Parcel Number Source: Chesterfield County GIS (3/28/2019).

Limits of Western Ditch and Plant Soil Removal Area (AECOM, Construction Completion/Removal Action Report, December 2019; revised March 2020).

0 410 820 Feet

1 " = 450 '

1:5,400

PROJECT:

HIGHLAND INDUSTRIES (BURLINGTON INDUSTRIES CHERAW SUPERFUND SITE)

TITLE:

PROPOSED SAMPLE STATIONS (UNNAMED TRIBUTARY TO WILSON BRANCH)

DRAWN BY:	R WIXON	PROJ. NO:	322554.0000.0000
CHECKED BY:	D MADISON		
APPROVED BY:	H MORRIS		**FIGURE 3-4**
DATE:	APRIL 2020		

TRC

50 International Drive, Suite 150
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Phone: 864.281.0030
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FILE NO.: Fig 3-4 - Prop Samp Stations_Unnamed Tributary_rev1.mxd

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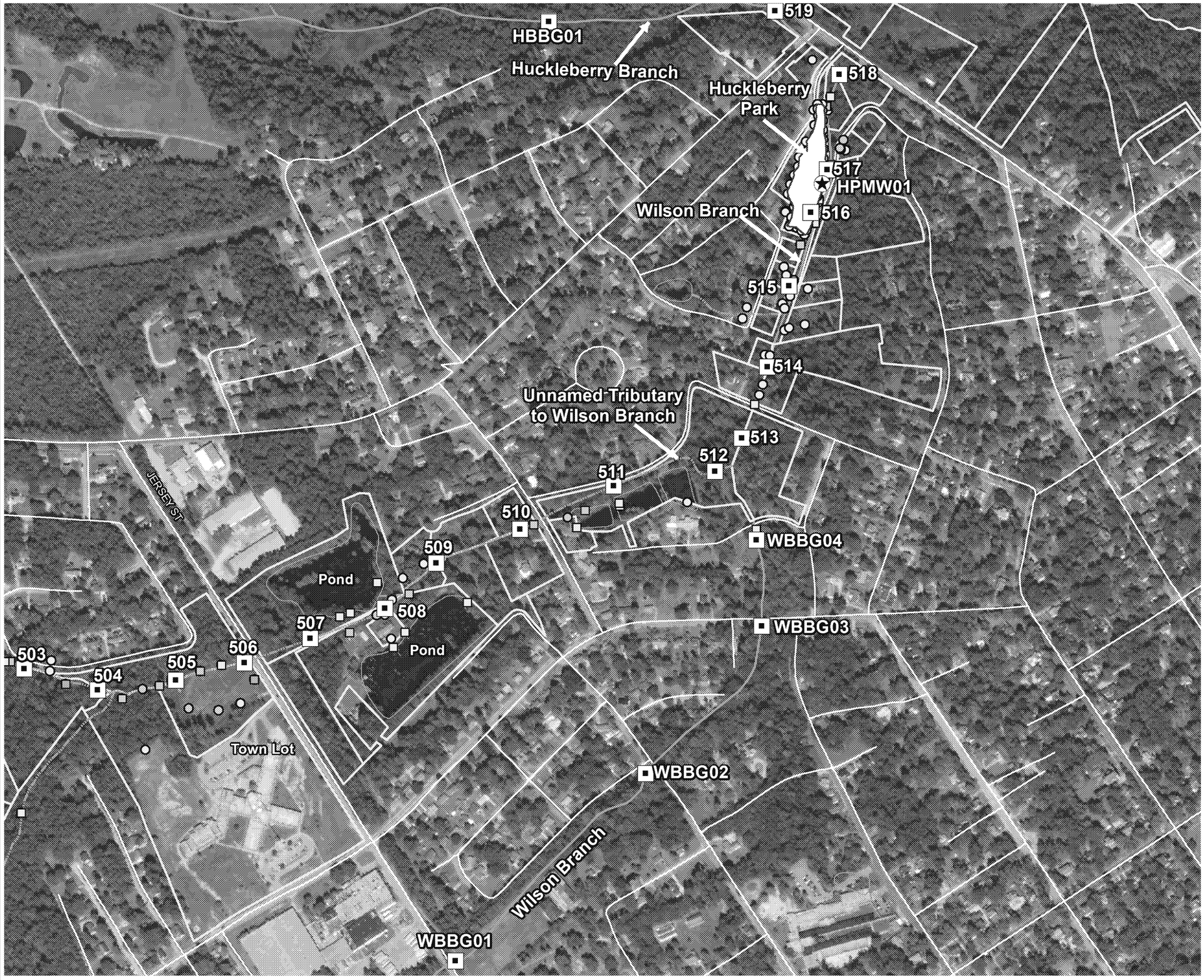
Coordinate System: NAD 1983 StatePlane South Carolina FIPS 3900 Feet (Foot US)
Map Rotation: 0

TRC -- GIS



LEGEND

- Proposed Stream Sample Stations
- Proposed Temporary Monitoring Well Location
- Sediment Sample (SC DHEC and AECOM)
- Soil Sample (SC DHEC and AECOM)
- Parcel of Interest (Approximate)
- Huckleberry Park Soil Removal Area (Approximate)
- Stream (Approximate)
- Intermittent Stream or Drainage Ditch (Approximate)

Total PCB Concentration (mg/kg)

- 0 - 1
- >1 - 25
- >250 - 50
- >50 - 500
- >500

NOTES

Aerial Photograph Source: ESRI World Imagery.

Property Boundary and Parcel Number Source: Chesterfield County GIS (3/28/2019).

Limits of Huckleberry Park Soil Removal Area (AECOM, Construction Completion/Removal Action Report, December 2019; revised March 2020).

N

0 450 900 Feet

1" = 500'
1:6,000

PROJECT
HIGHLAND INDUSTRIES
(BURLINGTON INDUSTRIES CHERAW SUPERFUND SITE)

TITLE
PROPOSED SAMPLE STATIONS
(WILSON BRANCH)

DRAWN BY:	R WIXON	PROJ. NO:	322554.0000.0000
CHECKED BY:	D MADISON		
APPROVED BY:	H MORRIS		FIGURE 3-5
DATE:	APRIL 2020		

TRC

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FILE NO: Fig 3-5 - Prop Samp Stations_Wilson Branch_rev1.mxd

Plot Date: 4/22/2020, 14:15:47 PM by RWIXON -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\Highland Industries\Cheraw SC\322554\2020\FSP\Fig 3-5 - Prop Samp Stations_Wilson Branch_rev1.mxd

Coordinate System: NAD 1983 StatePlane South Carolina FIPS 3900 Feet (Foot US)
Map Rotation: 0

TRC -- GIS

LEGEND

- Proposed Stream Sample Stations
- Proposed Stream Sample Stations (Pee Dee River)
- Sediment Sample (SC DHEC and AECOM)
- Soil Sample (SC DHEC and AECOM)
- Parcel of Interest (Approximate)
- Huckleberry Park Soil Removal Area (Approximate)
- Stream (Approximate)
- Intermittent Stream or Drainage Ditch (Approximate)

Total PCB Concentration (mg/kg)

- 0 - 1
- >1 - 25
- >25 - 50
- >50 - 500
- >500

NOTES

Aerial Photograph Source: ESRI World Imagery.

Property Boundary and Parcel Number Source: Chesterfield County GIS (3/28/2019).

Limits of Huckleberry Park Soil Removal Area (AECOM, Construction Completion/Removal Action Report, December 2019; revised March 2020).

N

0 590 1,180 Feet

1" = 650 '

1:7,800

PROJECT

HIGHLAND INDUSTRIES (BURLINGTON INDUSTRIES CHERAW SUPERFUND SITE)

TITLE

PROPOSED SAMPLE STATIONS (HUCKLEBERRY BRANCH, PEE DEE RIVER, AND FORMER CHERAW SEWER DISCHARGE DRAINAGE FEATURE)

DRAWN BY	R WIXON	PROJ NO	322554.0000.0000
CHECKED BY	D MADISON		**FIGURE 3-6**
APPROVED BY	H MORRIS		
DATE	DECEMBER 2020		

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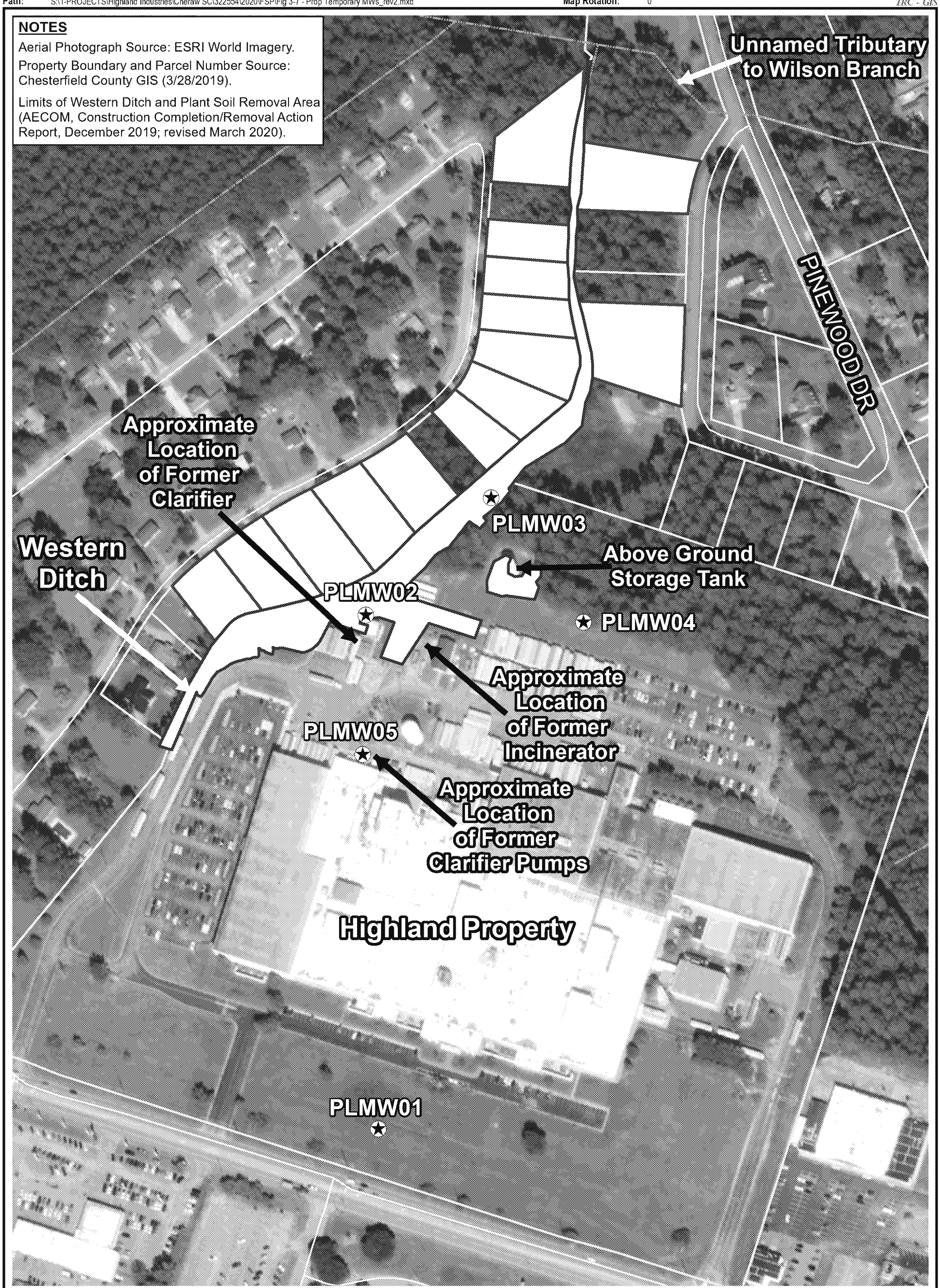
FILE NO. Fig 3-06 - Prop Samp Stations_Huckleberry Branch_Pee Dee River_rev1.mxd

Plot Date: 12/14/2020, 09:02:44 AM by RWIXON -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\Highland Industries\Cheraw SC\322554\2020\FSP\2020-12\Fig 3-06 - Prop Samp Stations_Huckleberry Branch_Pee Dee River_rev1.mxd
Coordinate System: NAD 1983 StatePlane South Carolina FIPS 3900 Feet (Foot US)
Map Rotation: 0
TRC -- GIS



LEGEND

- Proposed Temporary Monitoring Well Location
- Intermittent Stream or Drainage Ditch (Approximate)
- Western Ditch and Plant Soil Removal Area (Approximate)
- Parcel of Interest (Approximate)
- Parcel with Soil Removal Completed

0 70 140 FEET
1 " = 200 '
1:2,400

N

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PROJECT:
HIGHLAND INDUSTRIES
(BURLINGTON INDUSTRIES CHERAW SUPERFUND SITE)

TITLE:
PROPOSED TEMPORARY MONITORING WELLS
(HIGHLAND PROPERTY)

DRAWN BY:	R WIXON
CHECKED BY:	D MADISON
APPROVED BY:	H MORRIS
DATE:	APRIL 2020
PROJ. NO.:	322554.0000.0000
FILE:	Fig 3-7 - Prop Temporary MWs_rev2.mxd

FIGURE 3-7

LEGEND

- Proposed Pond Sample Stations
- Proposed Soil Sample Stations
- Proposed Stream Sample Stations
- Sediment Sample (SC DHEC and AECOM)
- Soil Sample (SC DHEC and AECOM)
- Parcel of Interest (Approximate)
- Stream (Approximate)
- Intermittent Stream or Drainage Ditch (Approximate)

Total PCB Concentration (mg/kg)

- 0 - 1
- >1 - 25
- >250 - 50
- >50 - 500
- >500

NOTES

Aerial Photograph Source: ESRI World Imagery.

Property Boundary and Parcel Number Source: Chesterfield County GIS (3/28/2019).

N

0 180 360 Feet

1 " = 200 '

1:2,400

PROJECT:

HIGHLAND INDUSTRIES (BURLINGTON INDUSTRIES CHERAW SUPERFUND SITE)

TITLE:

PROPOSED SAMPLE STATIONS (PONDS)

DRAWN BY:	R WIXON	PROJ. NO.	322554.0000.0000
CHECKED BY:	D MADISON		
APPROVED BY:	H MORRIS		**FIGURE 3-8**
DATE:	APRIL 2020		

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FILE NO: Fig 3-8 - Prop Samp Stations_Ponds_rev2.mxd

Plot Date: 4/22/2020, 10:56:29 AM by RWIXON -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\Highland Industries\Cheraw SC\322554\2020\FSP\Fig 3-8 - Prop Samp Stations_Ponds_rev2.mxd

Coordinate System: NAD 1983 StatePlane South Carolina FIPS 3900 Feet (Foot US)
Map Rotation: 0

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LEGEND

- Proposed Stream Sample Stations
- Proposed Stream Sample Stations (Pee Dee River)
- Sediment Sample (SC DHEC and AECOM)
- Soil Sample (SC DHEC and AECOM)
- Parcel of Interest (Approximate)
- Stream (Approximate)
- Intermittent Stream or Drainage Ditch (Approximate)

Total PCB Concentration (mg/kg)

- 0 - 1
- >1 - 25
- >25 - 50
- >50 - 500
- >500

NOTES

Aerial Photograph Source: Google Earth Pro (Acquisition Date: 2/18/2017).

Property Boundary and Parcel Number Source: Chesterfield County GIS (3/28/2019).

N

0 100 200 Feet

1" = 120'
1:1,440

PROJECT:
HIGHLAND INDUSTRIES
(BURLINGTON INDUSTRIES CHERAW SUPERFUND SITE)

TITLE:
PROPOSED SAMPLE STATIONS
(FORMER CHERAW SEWER DISCHARGE DRAINAGE FEATURE)

DRAWN BY:	R WIXON	PROJ. NO:	322554.0000.0000
CHECKED BY:	D MADISON		
APPROVED BY:	H MORRIS		FIGURE 3-9
DATE:	DECEMBER 2020		

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FILE NO: Fig 3-09 - Prop Samp Stations_Former Cheraw Sewer Discharge.mxd

Plot Date: 12/14/2020, 10:05:36 AM by RWIXON -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\Highland Industries\Cheraw SC\322554\2020\FSP\2020-12\Fig 3-09 - Prop Samp Stations_Former Cheraw Sewer Discharge.mxd
Coordinate System: NAD 1983 StatePlane South Carolina FIPS 3900 Feet (Foot US)
Map Rotation: 0
TRC -- GIS

NOTES

Aerial Photograph Source: ESRI World Imagery.

Property Boundary and Parcel Number Source: Chesterfield County GIS (3/28/2019).

Limits of Western Ditch and Plant Soil Removal Area (AECOM, Construction Completion/Removal Action Report, December 2019; revised March 2020).

LEGEND

- Intermittent Stream or Drainage Ditch (Approximate)
- Western Ditch and Plant Soil Removal Area (Approximate)
- Parcel of Interest (Approximate)

0 50 100 FEET
1 " = 100 '
1:1,200

N

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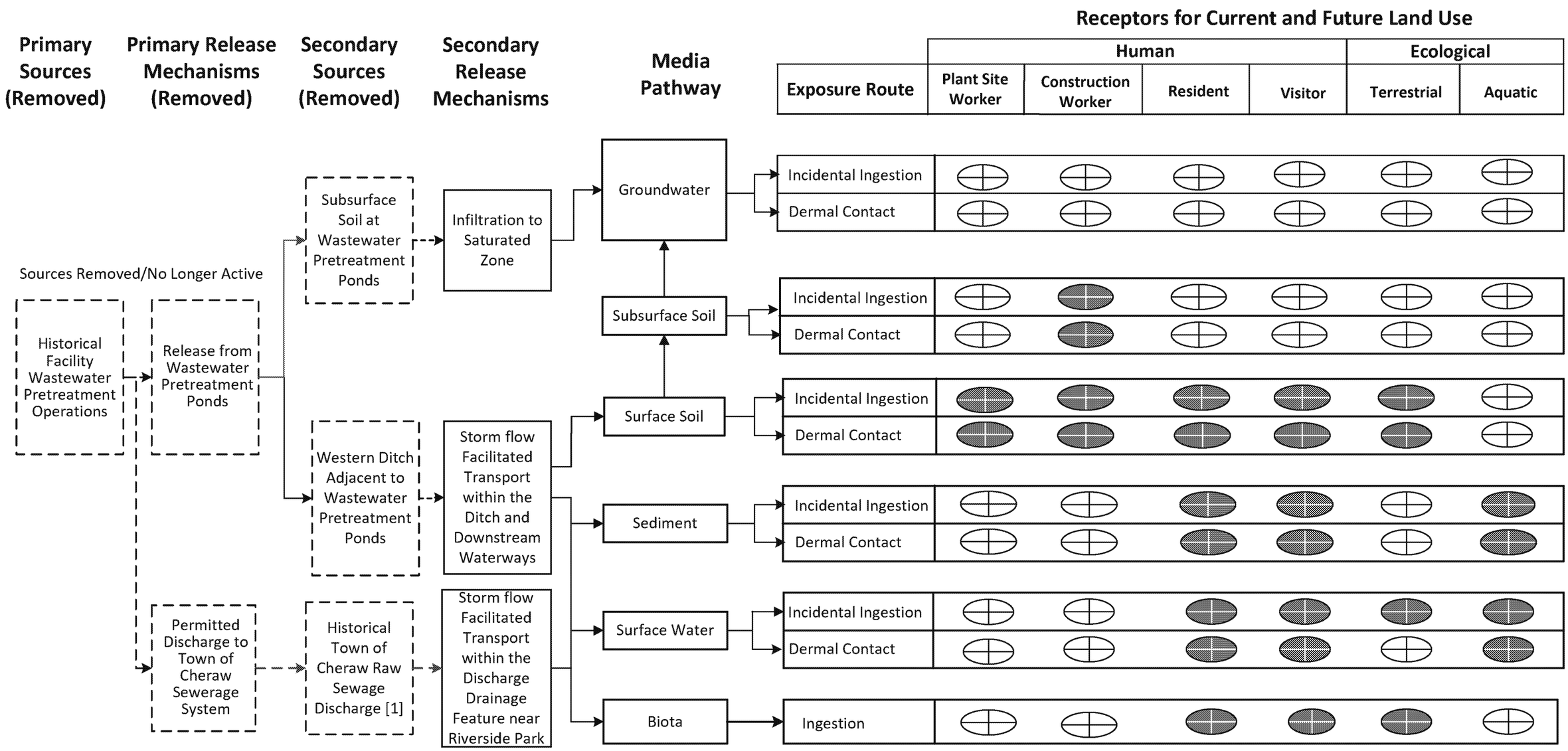
PROJECT:
HIGHLAND INDUSTRIES (BURLINGTON INDUSTRIES CHERAW SUPERFUND SITE)

TITLE:
PROPOSED GEOPHYSICAL TRANSECTS TO INVESTIGATE PIPE (HIGHLAND PROPERTY)

DRAWN BY:	R WIXON
CHECKED BY:	D MADISON
APPROVED BY:	H MORRIS
DATE:	DECEMBER 2020
PROJ. NO.:	322554.0000.0000
FILE: Fig 3-10 - Prop Geophys Transects_Pipe Invest.mxd	

FIGURE 3-10



Pathway incomplete

Pathway potentially complete

NOTES:

Dashed lines and boxes indicate sources were removed and exposure route no longer exists.

[1] This is a multiparty sewer outfall.

BURLINGTON INDUSTRIES CHERAW SUPERFUND SITE OPERABLE UNIT 2
CHERAW, SC

PRELIMINARY RISK/EXPOSURE SCHEMATIC OF CSM

DRAWN BY: JEP	FIGURE NO: 4-1	
CHECKED BY: DOM		DATE: APRIL 2020
APPROVED BY: HHM		Revised: DECEMBER 2020

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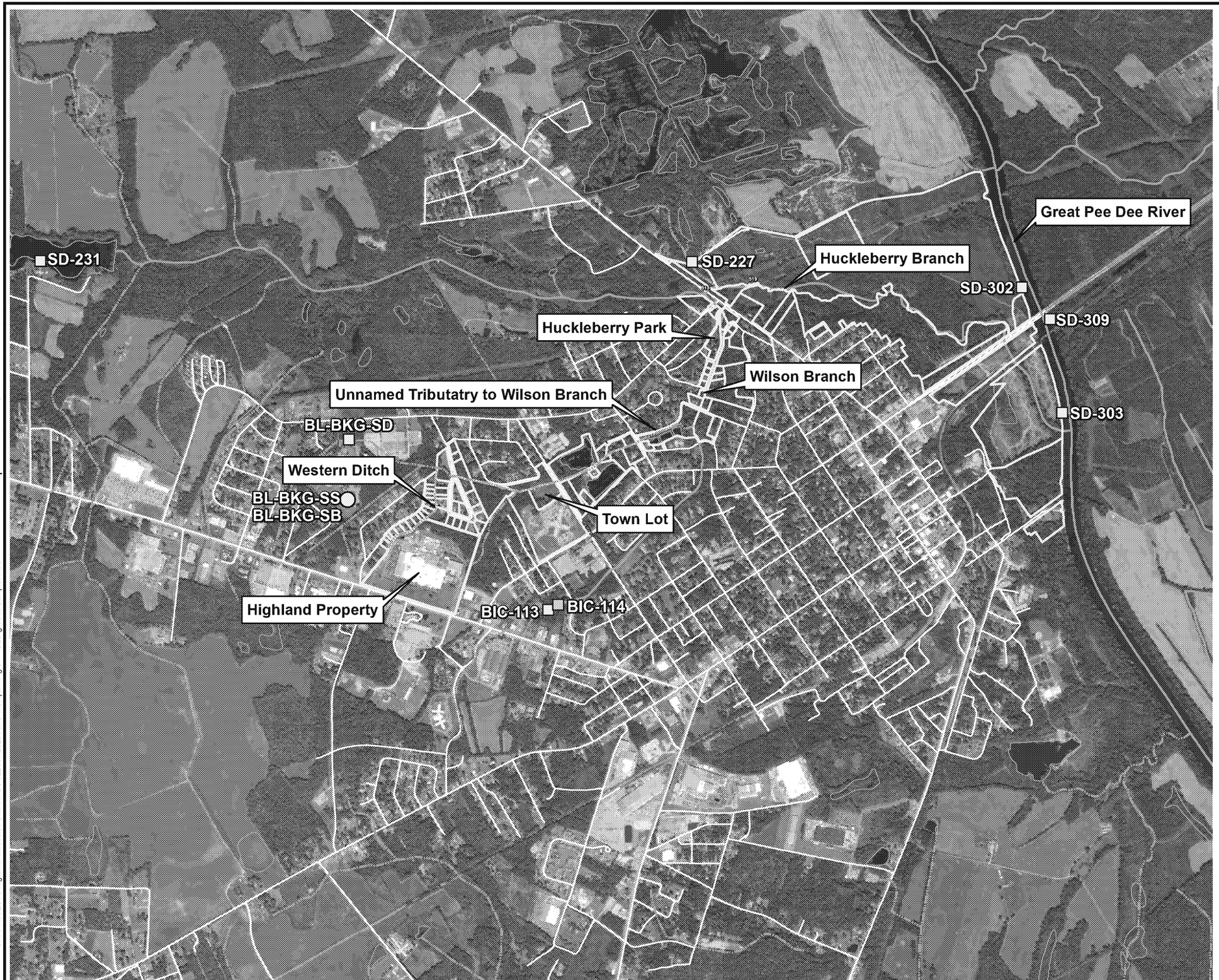
Fax: 864-281-0288

P:\client\Highland\...TRC Deliverables\TRC RI-FS Work Plan Documents.vsd



LEGEND

- Sediment Sample (SC DHEC)
- Soil Sample (SC DHEC)
- Parcel of Interest (Approximate)
- Stream (Approximate)
- Intermittent Stream or Drainage Ditch (Approximate)

Total PCB Concentration (mg/kg)

- 0 - 1
- >1 - 25

NOTES

Aerial Photograph Source: ESRI World Imagery.

N

0 1,500 3,000 Feet

1 " = 1,750 '

1:21,000

PROJECT

HIGHLAND INDUSTRIES (BURLINGTON INDUSTRIES CHERAW SUPERFUND SITE)

TITLE

BACKGROUND SEDIMENT AND SOIL SAMPLES

DRAWN BY:	R WIXON	PROJ. NO.	322554.0000.0000
CHECKED BY:	D MADISON		
APPROVED BY:	H MORRIS		**FIGURE 5-1**
DATE:	APRIL 2020		

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FILE NO.: Fig 5-1 - Background Samples.mxd

Plot Date: 4/24/2020, 12:00:18 PM by RWIXON -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\Highland Industries\Cheraw SC\322554\2020\RIFS Workplan\Fig 5-1 - Background Samples.mxd

Coordinate System: NAD 1983 StatePlane South Carolina FIPS 3900 Feet (Foot US)
Map Rotation: 0

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Attachment 3

Laboratory Analytes Reporting Limits and Method Detection Limits (Appendix A from TRC QAPP)

CDM Smith

Appendix A
Laboratory Analytes, Reporting Limits (RLs), and Method Detection Limits (MDLs)

Appendix A

Analysis Group	Method Description	Method Code	Prep Method	
PCBs Only-Soil	Polychlorinated Biphenyls (PCBs) by Gas Chromatography	8082A	3660B/3665A/3541	
Analyte Description	**CAS Number**	**RL**	**MDL**	**Units**
PCB-1016	12674-11-2	0.0167	0.00542	mg/Kg
PCB-1221	11104-28-2	0.0167	0.00590	mg/Kg
PCB-1232	11141-16-5	0.0167	0.00406	mg/Kg
PCB-1242	53469-21-9	0.0167	0.00244	mg/Kg
PCB-1248	12672-29-6	0.0167	0.00400	mg/Kg
PCB-1254	11097-69-1	0.0167	0.00500	mg/Kg
PCB-1260	11096-82-5	0.0167	0.00474	mg/Kg
Tetrachloro-m-xylene (Surr)	877-09-8			mg/Kg
DCB Decachlorobiphenyl (Surr)	2051-24-3			mg/Kg

Analysis Group	Method Description	Method Code	Prep Method	
PCBs Only-Soil	Percent Moisture	Moisture		
Analyte Description	**CAS Number**	**RL**	**MDL**	**Units**
Percent Moisture	STL00177	0.100		%
Percent Solids	STL00234	0.100		%

Analysis Group	Method Description	Method Code	Prep Method
PCBs Only-Sediment Low Level	Polychlorinated Biphenyls (PCBs) (GC)	8082A_LL	3660B/3665A/3541_LL

PCB-1016	12674-11-2	0.000417	0.000135	mg/Kg
PCB-1221	11104-28-2	0.000417	0.000148	mg/Kg
PCB-1232	11141-16-5	0.000417	0.000102	mg/Kg
PCB-1242	53469-21-9	0.000417	0.0000610	mg/Kg
PCB-1248	12672-29-6	0.000417	0.000101	mg/Kg
PCB-1254	11097-69-1	0.000417	0.000125	mg/Kg
PCB-1260	11096-82-5	0.000417	0.000119	mg/Kg
DCB Decachlorobiphenyl (Surr)	2051-24-3			mg/Kg
Tetrachloro-m-xylene (Surr)	877-09-8			mg/Kg

Analysis Group	Method Description	Method Code	Prep Method	
PCBs Only-Sediment Low Level	Percent Moisture	Moisture		
Analyte Description	**CAS Number**	**RL**	**MDL**	**Units**
Percent Moisture	STL00177	0.100		%
Percent Solids	STL00234	0.100		%

Analysis Group	Method Description	Method Code	Prep Method	
PCBs Only-Water	Polychlorinated Biphenyls (PCBs) by Gas Chromatography	8082A	3510C_LVI	
Analyte Description	**CAS Number**	**RL**	**MDL**	**Units**
PCB-1016	12674-11-2	0.400	0.190	ug/L
PCB-1221	11104-28-2	0.400	0.229	ug/L
PCB-1232	11141-16-5	0.400	0.208	ug/L
PCB-1242	53469-21-9	0.400	0.365	ug/L
PCB-1248	12672-29-6	0.400	0.120	ug/L
PCB-1254	11097-69-1	0.400	0.381	ug/L
PCB-1260	11096-82-5	0.400	0.157	ug/L
Tetrachloro-m-xylene (Surr)	877-09-8			ug/L
DCB Decachlorobiphenyl (Surr)	2051-24-3			ug/L

Analysis Group	Method Description	Method Code	Prep Method	
TAL/TCL Soil	Volatile Organic Compounds (GC/MS)	8260B	5035FP_Calc	
Analyte Description	**CAS Number**	**RL**	**MDL**	**Units**
1,1,1-Trichloroethane	71-55-6	0.00500	0.00251	mg/Kg
1,1,2,2-Tetrachloroethane	79-34-5	0.00500	0.00298	mg/Kg
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	0.00500	0.00191	mg/Kg
1,1,2-Trichloroethane	79-00-5	0.00500	0.00240	mg/Kg
1,1-Dichloroethane	75-34-3	0.00500	0.00181	mg/Kg
1,1-Dichloroethene	75-35-4	0.00500	0.00285	mg/Kg
1,2,4-Trichlorobenzene	120-82-1	0.00500	0.00372	mg/Kg
1,2-Dibromo-3-Chloropropane	96-12-8	0.00500	0.00307	mg/Kg
1,2-Dichlorobenzene	95-50-1	0.00500	0.00200	mg/Kg
1,2-Dichloroethane	107-06-2	0.00500	0.00145	mg/Kg
1,2-Dichloropropane	78-87-5	0.00500	0.00245	mg/Kg
1,3-Dichlorobenzene	541-73-1	0.00500	0.00159	mg/Kg
1,4-Dichlorobenzene	106-46-7	0.00500	0.00102	mg/Kg
2-Butanone (MEK)	78-93-3	0.00500	0.00290	mg/Kg
2-Hexanone	591-78-6	0.00500	0.00419	mg/Kg
4-Methyl-2-pentanone (MIBK)	108-10-1	0.00500	0.00186	mg/Kg
Acetone	67-64-1	0.0200	0.00315	mg/Kg
Benzene	71-43-2	0.00500	0.00196	mg/Kg
Bromoform	75-25-2	0.00500	0.00261	mg/Kg
Bromomethane	74-83-9	0.00500	0.00450	mg/Kg
Carbon disulfide	75-15-0	0.00500	0.00301	mg/Kg
Carbon tetrachloride	56-23-5	0.00500	0.00332	mg/Kg
Chlorobenzene	108-90-7	0.00500	0.00157	mg/Kg
Chlorodibromomethane	124-48-1	0.00500	0.00241	mg/Kg
Chloroform	67-66-3	0.00500	0.00211	mg/Kg
Chloromethane	74-87-3	0.00500	0.00385	mg/Kg
Chloroethane	75-00-3	0.00500	0.00259	mg/Kg
cis-1,2-Dichloroethene	156-59-2	0.00500	0.00157	mg/Kg
cis-1,3-Dichloropropene	10061-01-5	0.00500	0.00160	mg/Kg
Cyclohexane	110-82-7	0.00500	0.00122	mg/Kg
Dichlorobromomethane	75-27-4	0.00500	0.00236	mg/Kg
Dichlorodifluoromethane	75-71-8	0.00500	0.00292	mg/Kg
Ethylbenzene	100-41-4	0.00500	0.00215	mg/Kg
1,2-Dibromoethane	106-93-4	0.00500	0.00273	mg/Kg
Isopropylbenzene	98-82-8	0.00500	0.00232	mg/Kg
Methyl acetate	79-20-9	0.0250	0.00590	mg/Kg
Methyl tert-butyl ether	1634-04-4	0.00500	0.00368	mg/Kg
Methylcyclohexane	108-87-2	0.00500	0.00210	mg/Kg
Methylene Chloride	75-09-2	0.00500	0.00385	mg/Kg
m-Xylene & p-Xylene	179601-23-1	0.00500	0.00187	mg/Kg

o-Xylene	95-47-6	0.00500	0.00244	mg/Kg
Styrene	100-42-5	0.00500	0.00133	mg/Kg
Tetrachloroethene	127-18-4	0.00500	0.00200	mg/Kg
Toluene	108-88-3	0.00500	0.00169	mg/Kg
trans-1,2-Dichloroethene	156-60-5	0.00500	0.00254	mg/Kg
trans-1,3-Dichloropropene	10061-02-6	0.00500	0.00173	mg/Kg
Trichloroethene	79-01-6	0.00500	0.00150	mg/Kg
Trichlorofluoromethane	75-69-4	0.00500	0.00146	mg/Kg
Xylenes, Total	1330-20-7	0.0100	0.00431	mg/Kg
Vinyl chloride	75-01-4	0.00500	0.00367	mg/Kg
1,2-Dichloroethane-d4 (Surr)	17060-07-0			mg/Kg
4-Bromofluorobenzene (Surr)	460-00-4			mg/Kg
Dibromofluoromethane (Surr)	1868-53-7			mg/Kg
Toluene-d8 (Surr)	2037-26-5			mg/Kg

Analysis Group	Method Description	Method Code	Prep Method	
TAL/TCL Soil	Volatile Organic Compounds (GC/MS)	8260B	5035FM_Calc	
Analyte Description	**CAS Number**	**RL**	**MDL**	**Units**
1,1,1-Trichloroethane	71-55-6	0.250	0.126	mg/Kg
1,1,2,2-Tetrachloroethane	79-34-5	0.250	0.149	mg/Kg
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	0.250	0.0955	mg/Kg
1,1,2-Trichloroethane	79-00-5	0.250	0.120	mg/Kg
1,1-Dichloroethane	75-34-3	0.250	0.0905	mg/Kg
1,1-Dichloroethene	75-35-4	0.250	0.143	mg/Kg
1,2,4-Trichlorobenzene	120-82-1	0.250	0.186	mg/Kg
1,2-Dibromo-3-Chloropropane	96-12-8	0.250	0.154	mg/Kg
1,2-Dichlorobenzene	95-50-1	0.250	0.100	mg/Kg
1,2-Dichloroethane	107-06-2	0.250	0.0726	mg/Kg
1,2-Dichloropropane	78-87-5	0.250	0.123	mg/Kg
1,3-Dichlorobenzene	541-73-1	0.250	0.0797	mg/Kg
1,4-Dichlorobenzene	106-46-7	0.250	0.0510	mg/Kg
2-Butanone (MEK)	78-93-3	0.250	0.145	mg/Kg
2-Hexanone	591-78-6	0.250	0.210	mg/Kg
4-Methyl-2-pentanone (MIBK)	108-10-1	0.250	0.0928	mg/Kg
Acetone	67-64-1	1.00	0.158	mg/Kg
Benzene	71-43-2	0.250	0.0981	mg/Kg
Bromoform	75-25-2	0.250	0.131	mg/Kg
Bromomethane	74-83-9	0.250	0.225	mg/Kg
Carbon disulfide	75-15-0	0.250	0.151	mg/Kg
Carbon tetrachloride	56-23-5	0.250	0.166	mg/Kg
Chlorobenzene	108-90-7	0.250	0.0787	mg/Kg
Chlorodibromomethane	124-48-1	0.250	0.120	mg/Kg
Chloroform	67-66-3	0.250	0.106	mg/Kg
Chloromethane	74-87-3	0.250	0.193	mg/Kg
Chloroethane	75-00-3	0.250	0.129	mg/Kg
cis-1,2-Dichloroethene	156-59-2	0.250	0.0787	mg/Kg
cis-1,3-Dichloropropene	10061-01-5	0.250	0.0799	mg/Kg
Cyclohexane	110-82-7	0.250	0.0611	mg/Kg
Dichlorobromomethane	75-27-4	0.250	0.118	mg/Kg
Dichlorodifluoromethane	75-71-8	0.250	0.146	mg/Kg
Ethylbenzene	100-41-4	0.250	0.108	mg/Kg
1,2-Dibromoethane	106-93-4	0.250	0.137	mg/Kg
Isopropylbenzene	98-82-8	0.250	0.116	mg/Kg
Methyl acetate	79-20-9	1.25	0.295	mg/Kg
Methyl tert-butyl ether	1634-04-4	0.250	0.184	mg/Kg
Methylcyclohexane	108-87-2	0.250	0.105	mg/Kg
Methylene Chloride	75-09-2	0.250	0.193	mg/Kg
m-Xylene & p-Xylene	179601-23-1	0.250	0.0937	mg/Kg

o-Xylene	95-47-6	0.250	0.122	mg/Kg
Styrene	100-42-5	0.250	0.0666	mg/Kg
Tetrachloroethene	127-18-4	0.250	0.100	mg/Kg
Toluene	108-88-3	0.250	0.0843	mg/Kg
trans-1,2-Dichloroethene	156-60-5	0.250	0.127	mg/Kg
trans-1,3-Dichloropropene	10061-02-6	0.250	0.0864	mg/Kg
Trichloroethene	79-01-6	0.250	0.0751	mg/Kg
Trichlorofluoromethane	75-69-4	0.250	0.0728	mg/Kg
Xylenes, Total	1330-20-7	0.500	0.215	mg/Kg
Vinyl chloride	75-01-4	0.250	0.184	mg/Kg
1,2-Dichloroethane-d4 (Surr)	17060-07-0			mg/Kg
4-Bromofluorobenzene (Surr)	460-00-4			mg/Kg
Dibromofluoromethane (Surr)	1868-53-7			mg/Kg
Toluene-d8 (Surr)	2037-26-5			mg/Kg

Analysis Group	Method Description	Method Code	Prep Method	
TAL/TCL Soil	Semivolatile Organic Compounds (GC/MS)	8270D	3541	
Analyte Description	**CAS Number**	**RL**	**MDL**	**Units**
Acenaphthene	83-32-9	0.0670	0.0192	mg/Kg
Acenaphthylene	208-96-8	0.0670	0.0146	mg/Kg
Anthracene	120-12-7	0.0670	0.0173	mg/Kg
Benzo[a]anthracene	56-55-3	0.0670	0.0126	mg/Kg
Dimethyl phthalate	131-11-3	0.330	0.0121	mg/Kg
Benzo[a]pyrene	50-32-8	0.0670	0.0145	mg/Kg
Benzo[b]fluoranthene	205-99-2	0.0670	0.0164	mg/Kg
Benzo[g,h,i]perylene	191-24-2	0.0670	0.0144	mg/Kg
Benzo[k]fluoranthene	207-08-9	0.0670	0.0200	mg/Kg
Bis(2-ethylhexyl) phthalate	117-81-7	3.30	0.355	mg/Kg
2,2'-oxybis[1-chloropropane]	108-60-1	0.0670	0.0247	mg/Kg
4-Bromophenyl phenyl ether	101-55-3	0.330	0.0233	mg/Kg
Butyl benzyl phthalate	85-68-7	0.330	0.229	mg/Kg
Carbazole	86-74-8	0.0670	0.0156	mg/Kg
4-Chloroaniline	106-47-8	0.330	0.0111	mg/Kg
2-Chloronaphthalene	91-58-7	0.0670	0.0153	mg/Kg
4-Chlorophenyl phenyl ether	7005-72-3	0.330	0.0202	mg/Kg
Chrysene	218-01-9	0.0670	0.0131	mg/Kg
Dibenz(a,h)anthracene	53-70-3	0.0670	0.0149	mg/Kg
Dibenzofuran	132-64-9	0.330	0.0146	mg/Kg
Di-n-butyl phthalate	84-74-2	0.330	0.146	mg/Kg
3,3'-Dichlorobenzidine	91-94-1	0.330	0.311	mg/Kg
Diethyl phthalate	84-66-2	0.330	0.117	mg/Kg
2,4-Dinitrotoluene	121-14-2	0.330	0.0166	mg/Kg
2,6-Dinitrotoluene	606-20-2	0.330	0.0206	mg/Kg
Di-n-octyl phthalate	117-84-0	0.330	0.194	mg/Kg
Fluoranthene	206-44-0	0.0670	0.0176	mg/Kg
Fluorene	86-73-7	0.0670	0.0131	mg/Kg
Hexachlorobenzene	118-74-1	0.0670	0.0239	mg/Kg
Hexachlorobutadiene	87-68-3	0.0670	0.0195	mg/Kg
Hexachlorocyclopentadiene	77-47-4	0.330	0.0341	mg/Kg
Hexachloroethane	67-72-1	0.330	0.0172	mg/Kg
Indeno[1,2,3-cd]pyrene	193-39-5	0.0670	0.0135	mg/Kg
Isophorone	78-59-1	0.330	0.0170	mg/Kg
2-Methylnaphthalene	91-57-6	0.0670	0.0160	mg/Kg
Naphthalene	91-20-3	0.0670	0.0130	mg/Kg
2-Nitroaniline	88-74-4	1.70	0.152	mg/Kg
3-Nitroaniline	99-09-2	1.70	0.0848	mg/Kg
4-Nitroaniline	100-01-6	1.70	0.0162	mg/Kg
4-Nitrophenol	100-02-7	1.70	0.234	mg/Kg

Nitrobenzene	98-95-3	0.670	0.122	mg/Kg
N-Nitrosodi-n-propylamine	621-64-7	0.0670	0.0226	mg/Kg
N-Nitrosodiphenylamine	86-30-6	0.330	0.111	mg/Kg
Phenanthrene	85-01-8	0.0670	0.0179	mg/Kg
Pyrene	129-00-0	0.0670	0.0158	mg/Kg
4-Chloro-3-methylphenol	59-50-7	0.330	0.0157	mg/Kg
2-Chlorophenol	95-57-8	0.330	0.0155	mg/Kg
2-Methylphenol	95-48-7	0.330	0.0956	mg/Kg
Methylphenol, 3 & 4	106-44-5	0.330	0.0979	mg/Kg
2,4-Dichlorophenol	120-83-2	0.0670	0.0257	mg/Kg
2,4-Dimethylphenol	105-67-9	0.330	0.0207	mg/Kg
2,4-Dinitrophenol	51-28-5	3.30	0.897	mg/Kg
4,6-Dinitro-2-methylphenol	534-52-1	1.70	0.575	mg/Kg
2-Nitrophenol	88-75-5	0.330	0.0531	mg/Kg
Pentachlorophenol	87-86-5	1.70	0.536	mg/Kg
Phenol	108-95-2	0.330	0.101	mg/Kg
2,4,5-Trichlorophenol	95-95-4	0.330	0.0238	mg/Kg
2,4,6-Trichlorophenol	88-06-2	0.330	0.0183	mg/Kg
Acetophenone	98-86-2	0.670	0.0181	mg/Kg
Atrazine	1912-24-9	0.670	0.146	mg/Kg
Benzaldehyde	100-52-7	0.670	0.0414	mg/Kg
1,1'-Biphenyl	92-52-4	0.330	0.0140	mg/Kg
Caprolactam	105-60-2	1.70	0.217	mg/Kg
Bis(2-chloroethoxy)methane	111-91-1	0.330	0.0159	mg/Kg
Bis(2-chloroethyl)ether	111-44-4	0.0670	0.0121	mg/Kg
Nitrobenzene-d5 (Surr)	4165-60-0			mg/Kg
Phenol-d5 (Surr)	4165-62-2			mg/Kg
2-Fluorobiphenyl	321-60-8			mg/Kg
2,4,6-Tribromophenol (Surr)	118-79-6			mg/Kg
2-Fluorophenol (Surr)	367-12-4			mg/Kg
Terphenyl-d14 (Surr)	1718-51-0			mg/Kg

Analysis Group	Method Description	Method Code	Prep Method	
TAL/TCL Soil	Organochlorine Pesticides (GC)	8081B	3541	
Analyte Description	**CAS Number**	**RL**	**MDL**	**Units**
Aldrin	309-00-2	0.00170	0.000518	mg/Kg
alpha-BHC	319-84-6	0.00170	0.000410	mg/Kg
beta-BHC	319-85-7	0.00170	0.000458	mg/Kg
delta-BHC	319-86-8	0.00170	0.000528	mg/Kg
gamma-BHC (Lindane)	58-89-9	0.00170	0.000570	mg/Kg
cis-Chlordane	5103-71-9	0.00170	0.000418	mg/Kg
trans-Chlordane	5103-74-2	0.00170	0.000388	mg/Kg
4,4'-DDD	72-54-8	0.00170	0.000714	mg/Kg
4,4'-DDE	72-55-9	0.00170	0.000340	mg/Kg
4,4'-DDT	50-29-3	0.00170	0.000656	mg/Kg
Dieldrin	60-57-1	0.00170	0.000418	mg/Kg
Endosulfan I	959-98-8	0.00170	0.000452	mg/Kg
Endosulfan II	33213-65-9	0.00170	0.000368	mg/Kg
Endosulfan sulfate	1031-07-8	0.00170	0.000434	mg/Kg
Endrin	72-20-8	0.00170	0.000650	mg/Kg
Endrin aldehyde	7421-93-4	0.00170	0.000596	mg/Kg
Endrin ketone	53494-70-5	0.00170	0.000596	mg/Kg
Heptachlor	76-44-8	0.00170	0.000522	mg/Kg
Heptachlor epoxide	1024-57-3	0.00170	0.000426	mg/Kg
Methoxychlor	72-43-5	0.00170	0.000650	mg/Kg
Toxaphene	8001-35-2	0.0670	0.0452	mg/Kg
Tetrachloro-m-xylene	877-09-8			mg/Kg
DCB Decachlorobiphenyl (Surr)	2051-24-3			mg/Kg

Analysis Group	Method Description	Method Code	Prep Method	
TAL/TCL Soil	Polychlorinated Biphenyls (PCBs) by Gas Chromatography	8082A	3660B/3665A/3541	
Analyte Description	**CAS Number**	**RL**	**MDL**	**Units**
PCB-1016	12674-11-2	0.0167	0.00542	mg/Kg
PCB-1221	11104-28-2	0.0167	0.00590	mg/Kg
PCB-1232	11141-16-5	0.0167	0.00406	mg/Kg
PCB-1242	53469-21-9	0.0167	0.00244	mg/Kg
PCB-1248	12672-29-6	0.0167	0.00400	mg/Kg
PCB-1254	11097-69-1	0.0167	0.00500	mg/Kg
PCB-1260	11096-82-5	0.0167	0.00474	mg/Kg
Tetrachloro-m-xylene (Surr)	877-09-8			mg/Kg
DCB Decachlorobiphenyl (Surr)	2051-24-3			mg/Kg

Analysis Group	Method Description	Method Code	Prep Method	
TAL/TCL Soil	Metals (ICP/MS)	6020B	3050B	
Analyte Description	**CAS Number**	**RL**	**MDL**	**Units**
Silver	7440-22-4	0.100	0.0270	mg/Kg
Aluminum	7429-90-5	3.00	1.68	mg/Kg
Arsenic	7440-38-2	0.100	0.0260	mg/Kg
Barium	7440-39-3	1.00	0.128	mg/Kg
Beryllium	7440-41-7	0.100	0.00750	mg/Kg
Calcium	7440-70-2	50.0	8.95	mg/Kg
Cadmium	7440-43-9	0.100	0.0170	mg/Kg
Cobalt	7440-48-4	0.0500	0.00830	mg/Kg
Chromium	7440-47-3	0.200	0.0830	mg/Kg
Copper	7440-50-8	0.200	0.113	mg/Kg
Iron	7439-89-6	5.00	2.46	mg/Kg
Potassium	7440-09-7	50.0	25.4	mg/Kg
Magnesium	7439-95-4	50.0	15.7	mg/Kg
Manganese	7439-96-5	0.500	0.229	mg/Kg
Sodium	7440-23-5	50.0	18.8	mg/Kg
Nickel	7440-02-0	0.100	0.0610	mg/Kg
Lead	7439-92-1	0.100	0.0350	mg/Kg
Antimony	7440-36-0	0.200	0.0620	mg/Kg
Selenium	7782-49-2	0.500	0.122	mg/Kg
Thallium	7440-28-0	0.100	0.0250	mg/Kg
Vanadium	7440-62-2	0.100	0.0640	mg/Kg
Zinc	7440-66-6	0.500	0.334	mg/Kg

Analysis Group	Method Description	Method Code	Prep Method	
TAL/TCL Soil	Mercury (CVAA)	7471B	7471B_Prep	
Analyte Description	**CAS Number**	**RL**	**MDL**	**Units**
Mercury	7439-97-6	0.0330	0.0143	mg/Kg

Analysis Group	Method Description	Method Code	Prep Method	
TAL/TCL Soil	Percent Moisture	Moisture		
Analyte Description	**CAS Number**	**RL**	**MDL**	**Units**
Percent Moisture	STL00177	0.100		%
Percent Solids	STL00234	0.100		%

Analysis Group	Method Description	Method Code	Prep Method	
TAL/TCL Water	Volatile Organic Compounds (GC/MS)	8260B	5030B	
Analyte Description	**CAS Number**	**RL**	**MDL**	**Units**
1,1,1-Trichloroethane	71-55-6	5.00	2.51	ug/L
1,1,2,2-Tetrachloroethane	79-34-5	5.00	2.98	ug/L
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	5.00	1.91	ug/L
1,1,2-Trichloroethane	79-00-5	5.00	2.40	ug/L
1,1-Dichloroethane	75-34-3	5.00	1.81	ug/L
1,1-Dichloroethene	75-35-4	5.00	2.85	ug/L
1,2,4-Trichlorobenzene	120-82-1	5.00	3.72	ug/L
1,2-Dibromo-3-Chloropropane	96-12-8	5.00	3.07	ug/L
1,2-Dichlorobenzene	95-50-1	5.00	2.00	ug/L
1,2-Dichloroethane	107-06-2	5.00	1.45	ug/L
1,2-Dichloropropane	78-87-5	5.00	2.45	ug/L
1,3-Dichlorobenzene	541-73-1	5.00	1.59	ug/L
1,4-Dichlorobenzene	106-46-7	5.00	1.02	ug/L
2-Butanone (MEK)	78-93-3	5.00	2.90	ug/L
2-Hexanone	591-78-6	5.00	4.19	ug/L
4-Methyl-2-pentanone (MIBK)	108-10-1	5.00	1.86	ug/L
Acetone	67-64-1	20.0	3.15	ug/L
Benzene	71-43-2	5.00	1.96	ug/L
Bromoform	75-25-2	5.00	2.61	ug/L
Bromomethane	74-83-9	5.00	4.50	ug/L
Carbon disulfide	75-15-0	5.00	3.01	ug/L
Carbon tetrachloride	56-23-5	5.00	3.32	ug/L
Chlorobenzene	108-90-7	5.00	1.57	ug/L
Chlorodibromomethane	124-48-1	5.00	2.41	ug/L
Chloroform	67-66-3	5.00	2.11	ug/L
Chloromethane	74-87-3	5.00	3.85	ug/L
Chloroethane	75-00-3	5.00	2.59	ug/L
cis-1,2-Dichloroethene	156-59-2	5.00	1.57	ug/L
cis-1,3-Dichloropropene	10061-01-5	5.00	1.60	ug/L
Cyclohexane	110-82-7	5.00	1.22	ug/L
Dichlorobromomethane	75-27-4	5.00	2.36	ug/L
Dichlorodifluoromethane	75-71-8	5.00	2.92	ug/L
Ethylbenzene	100-41-4	5.00	2.15	ug/L
1,2-Dibromoethane	106-93-4	5.00	2.73	ug/L
Isopropylbenzene	98-82-8	5.00	2.32	ug/L
Methyl acetate	79-20-9	25.0	5.90	ug/L
Methyl tert-butyl ether	1634-04-4	5.00	3.68	ug/L
Methylcyclohexane	108-87-2	5.00	2.10	ug/L
Methylene Chloride	75-09-2	5.00	3.85	ug/L
m-Xylene & p-Xylene	179601-23-1	5.00	1.87	ug/L

Attachment 4

CDM Smith Technical Standard Operating Procedures and EPA Region 4 Operating Procedures

CDM Smith

Packaging and Shipping Environmental Samples	SOP 2-1 Revision: 7 Date: August 2020

Approved: Ernest Ashley **Technical Review:** Mary Lou Fox

1.0 Objective

The objective of this technical standard operating procedure (SOP) is to outline requirements for packaging and shipping environmental samples. Additionally, Sections 2.0 through 7.0 outline requirements for packaging and shipping regulated environmental samples under the U.S. Department of Transportation (USDOT) Hazardous Materials Regulations, the International Air Transportation Association (IATA), and International Civil Aviation Organization (ICAO) Dangerous Goods Regulations for shipment by air and applies only to domestic shipments. This SOP does not cover requirements for packaging and shipping equipment (including data loggers and self-contained breathing apparatus [SCBAs] or bulk chemicals that are regulated under the DOT, IATA, and ICAO.

1.1 Packaging and Shipping of All Samples

This SOP applies to packaging and shipping all environmental samples. If the sample is preserved or radioactive, the following sections may also be applicable and therefore, should be reviewed for additional requirements.

Section 2.0 - Packaging and Shipping Samples Preserved with Methanol
Section 3.0 - Packaging and Shipping Samples Preserved with Sodium Hydroxide
Section 4.0 - Packaging and Shipping Samples Preserved with Hydrochloric Acid
Section 5.0 - Packaging and Shipping Samples Preserved with Nitric Acid
Section 6.0 - Packaging and Shipping Samples Preserved with Sulfuric Acid
Section 7.0 - Packaging and Shipping Limited-Quantity Radioactive Samples

Note: This SOP does not address shipment of hazardous materials. Shipping of hazardous materials are strictly prohibited unless you have received training that meets CDM Smith, DOT, and IATA requirements. Check with CDM Smith University for training courses.

1.2 Background

1.2.1 Definitions

Note: Definitions are often promulgated or codified in state or local statutes, regulations, or ordinances and can vary between regulatory agencies. Definitions should be verified against the definitions provided by agencies regulating the work when applicable.

Environmental Sample - An aliquot of air, water, plant material, sediment, or soil that represents the contaminant levels on a site. Samples of potential contaminant sources, like tanks, lagoons, or non-aqueous phase liquids are normally not considered "environmental" for this purpose. This procedure applies only to environmental samples that contain less than reportable quantities for any foreseeable hazardous constituents, according to DOT regulations promulgated in 49 CFR - Part 172.101 Appendix A.

Custody Seal - A custody seal is a narrow adhesive-backed seal that is applied to individual sample containers and/or the container (i.e., cooler) before shipping offsite. Custody seals indicate that sample integrity has not been compromised during transport from the field to the analytical laboratory.

Inside Container - The container (normally made of glass or plastic) that actually contacts the shipped material. Its purpose is to keep the sample from mixing with the ambient environment.

Outside Container - The container (normally made of metal or plastic) that the transporter contacts. Its purpose is to protect the inside container.

Secondary Containment - The outside container provides secondary containment if the inside container breaks (i.e., plastic overpackaging if liquid sample is collected in glass).

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Allowed Quantity - Allowed quantities, below which USDOT, IATA, ICAO regulations do not apply, limit the mass or volume of a hazardous material in the inside and outside containers. Allowed quantity limits are very low and most regulated shipments are made under excepted or limited quantities (see descriptions below).

Excepted Quantity – Excepted quantity is the maximum amount of a hazardous material below which there are specific labeling or packaging exceptions.

Limited Quantity - Limited quantity is the maximum amount of a hazardous material below which there are specific labeling or packaging exceptions. The limited quantity will be a higher amount than the excepted quantity for a given substance.

Performance Testing - Performance testing refers to required testing of outer packaging, such as drop and stacking tests.

Qualified Shipper - A qualified shipper is a person who has been adequately trained to perform the functions of shipping hazardous materials. Required trainings include Hazardous Materials Shipping (HAZ 003) for ground shipping of hazardous materials and Hazardous Transportation/Shipping Air (IATA THZ 203) and hold resulting training certificates not more than three years old.

1.2.2 Associated Procedures

- SOP 1-2, *Sample Custody*

1.2.3 Discussion

Proper packaging and shipping is necessary to ensure the protection of the integrity of environmental samples shipped for analysis. These shipments are potentially subject to regulations published by DOT, IATA, or ICAO. Failure to abide by these rules places both CDM Smith and the individual employee at risk of serious fines. The analytical holding times for the samples must not be exceeded. The samples shall be packed in time to be shipped for overnight delivery. Prior arrangements with the laboratory should be made before sending samples for weekend delivery.

1.3 Required Equipment

- Coolers with return address of the appropriate CDM Smith office
- Heavy-duty plastic garbage bags (contractor bags, 3.0 millimeter thickness)
- Plastic zip-type bags, small and large
- Clear tape
- Nylon reinforced strapping tape
- Duct tape
- Kitty litter/pine bedding (or an equivalent nonflammable material that is inert and absorbent)*
- Bubble wrap (optional)
- Ice
- Custody seals
- Completed chain-of-custody record or contract laboratory program (CLP) custody records, if applicable
- Completed bill of lading
- "This End Up" and other directional arrow labels

*Check for any client-specific or laboratory requirements related to the use of absorbent packaging materials.

1.4 Packaging Environmental Samples

The following steps are required when packing sample bottles and jars for shipment:

1. Verify the samples undergoing shipment meet the definition of "environmental sample" and are not a hazardous material as defined by USDOT. Professional judgment and/or consultation with qualified persons such as the appropriate health and safety coordinator or the health and safety manager shall be observed.

2. Select a sturdy cooler in good condition. Tape any interior opening in the cooler (drain plug) from the inside to ensure control of interior contents. Ensure the handles used for carrying the cooler are in good condition. Also, tape the drain plug from the inside and outside of the cooler. Line the cooler with a large heavy-duty plastic garbage bag.

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3. Be sure the caps on all bottles are tightly sealed and will not leak; check to see that labels and chain-of-custody records are completed properly (SOP 1-2, Sample Custody).

4. Place all bottles in separate and appropriately sized plastic zip-top bags and close the bags. Up to three volatile organic analyte (VOA) vials may be packed in one bag. Binding the vials together with a rubber band on the outside of the bag or separating them so that they do not contact each other will reduce the risk of breakage. VOA vials may be packaged in foam containers designed for packaging them as well. Bottles may be wrapped in bubble wrap. Optionally, place three to six VOA vials in a quart metal can and then fill the can with kitty litter/pine bedding or equivalent. Note: Include trip blanks in coolers containing VOA samples.
5. Place 2 to 4 inches of an absorbent material into a cooler that has been lined with a garbage bag, and then place the bottles and cans in the bag with sufficient space to allow for the addition of packing material between the bottles and cans. It is preferable to place sample bottles and jars (especially glass) into the cooler vertically. Glass containers are less likely to break when packed vertically rather than horizontally, and sample bottles are less likely to leak when upright in the cooler.

6. While placing sample containers into the cooler, conduct an inventory of the contents of the shipping cooler against the chain-of-custody record. The chain-of-custody with the cooler shall reflect only those samples within the cooler.

7. Put ice in large plastic zip-top bags (double bagging the zip-tops is preferred) and properly seal. Place the ice bags on top of and/or between the samples. Several bags of ice are required (dependent on outdoor temperature, staging time, etc.) to maintain the cooler temperature at approximately 4° $\pm$ 2° Celsius (C) if the analytical method requires cooling. Large volumes of soil samples may require an interim cooling step to ensure that the shipping ice will be sufficient for the samples to reach the laboratory in satisfactory condition. Fill all remaining space between the bottles or cans with packing material. Securely fasten the top of the large garbage bag with fiber or duct tape.

8. When approved by the client/ laboratory, an alternate method of packing ice to keep sample cold during shipment is to line the cooler with a contractor bag and then put a layer of ice in the bottom of the bag. Place an inner contractor bag inside the outer contractor bag and the ice layer and place samples inside the inner bag. If a temperature blank is being used, place the temperature blank inside the inner bag with the samples. Then pour ice between the inner and outer contractor bags around the inner bag containing the samples. When all samples and a temperature blank, if applicable, are in the inner bag, twist the inner bag closed, tape the twisted closure, and place a custody seal around the taped closure. Cover the custody seal with clear tape. The custody seal around the inner bag closure maintains the custody seal for the samples, should the cooler open for any reason during shipment. Twist the outer bag closed and seal it with tape, as well.

9. Place the completed chain-of-custody record or the CLP traffic report form (if applicable) for the laboratory into a plastic zip-top bag, seal the bag, tape the bag to the inner side of the cooler lid, and close the cooler.

10. Secure the cooler lid with nylon reinforced strapping tape by wrapping each end of the cooler a minimum of two times. Attach completed chain-of-custody seals across the opening of the cooler on opposite sides. The custody seals should be affixed to the cooler with half of the seal on the strapping tape, so that the cooler cannot be opened without breaking the seal. Complete two more wraps around with fiber tape and place clear tape over the custody seals.

11. Mark the shipping container lid with a **"THIS END UP"** and appropriate upward position arrow labels. These upward position arrows should also be affixed to the cooler. Place a label containing the name and address of the shipper (CDM Smith) to the outside of the container. Labels used in the shipment of hazardous materials (such as Cargo Only Aircraft, Flammable Solids, etc.) are not permitted on the outside of containers used to transport environmental samples and should not be used. The name and address of the laboratory shall be placed on the container. When shipping by common courier, the bill of lading shall be completed and attached to the lid of the shipping container.

12. Per- and polyfluoroalkyl substances (PFAS) samples (collected in high density polyethylene containers), once they are securely closed and labeled, are to be shipped as "other environmental samples" with water ice to chill the samples below 6° Celsius. A PFAS sample container should not be opened after being sealed following collection. If, for any reason, the container is opened at this

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point, great care should be taken to avoid cross-contamination as materials allowed for the shipment of the sealed containers may be sources of PFAS.

2.0 Packaging and Shipping Samples Preserved with Methanol

2.1 Containers

1. The maximum volume of methanol in a sample container is 30 milliliters (ml) per sample vial and 500 mls total for the cooler for shipment as an excepted quantity.

2. The sample container should not be full of methanol.

2.2 Responsibility

To legally ship a dangerous good such as methanol, applicable training is required. It is the responsibility of the qualified shipper to:

1. Ensure that the samples undergoing shipment contain no other contaminant that meets the definition of "hazardous material" as defined by the USDOT.

2. Determine the amount of preservative in each sample so that accurate determination of quantities can be made.

   Note: Responsibilities may vary from site to site. Therefore, all field team member responsibilities shall be defined in the field plan or site-/project-specific quality assurance project plan (QAPP).

2.3 Additional Required Equipment

The following equipment is needed in addition to the required equipment listed in Section 1.3:

1. Inner packing (may consist of glass or plastic jars)

2. Outer packaging (for excepted or limited quantities) should be an insulated cooler that has passed the ICAO drop test and is in good condition.

3. Survey documentation (if shipping from Department of Energy [DOE] or radiological sites)

4. "Dangerous Goods" labels completed appropriately for methanol for excepted quantities, or appropriate hazard class labels (i.e. flammable liquid") for limited quantities

5. Orientation labels

6. Consignor/consignee labels

2.4 Packaging Samples Preserved with Methanol

The following steps are required when packaging excepted or limited-quantity sample shipments:

1. Tape any interior opening in the cooler (drain plug) from the inside to ensure control of interior contents. Also, tape the drain plug from the outside of the cooler.

   All sample containers will be properly labeled and the label protected with waterproof tape before sampling. No taping of labels should be done for VOC samples that are collected with EPA method 5035 in pre-weighed vials, as the mass of the soil sample is obtained by the difference between the received sample weight (soil + methanol + vial) and the weight of the vial and methanol that was pre-weighed. At a minimum the label should contain:

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- Project name
- Project number
- Date and time of sample collection
- Sample location
- Sample identification number
- Collector's initials
- Preservative (note amount of preservative used in miscellaneous section of the chain-of-custody form)

2. Wrap each container (40-ml VOA vials) in bubble wrap (secure with waterproof tape) to prevent breakage.

3. Place the bubble-wrapped container into a 3.0-mil zip-type bag, removing trapped air.

4. Place wrapped containers inside a polyethylene bottle filled with an absorbent; seal the bottle. (Maximum of four VOA vials will fit inside a 500-ml wide-mouth polyethylene bottle.)

5. Total volume of methanol per shipping container should not exceed 500 ml.

6. Line the bottom of the cooler with absorbent material to absorb any leakage that may occur.

7. Line the cooler with a contractor grade garbage bag.

8. Pack the samples, with bottles placed upright, appropriately inside the garbage bag to prevent movement during shipment.

9. Place a sufficient amount of double-bagged ice around the samples to maintain the required temperature during shipment.

10. Seal the garbage bag by tying or taping.

11. The maximum weight of the cooler shall not exceed 30 kg (66 lbs) for any excepted or limited-quantity shipment of dangerous goods.

12. Secure the chain-of-custody form (placed inside a zip-type bag) to the interior of the cooler lid.

13. If the shipment is from a DOE or other facility, place the results of the radiation screen and cooler/sample survey with the chain-of-custody.

14. Wrap strapping tape or duct tape around both ends of the cooler and around the cooler lid.

15. Affix custody seals to opposite sides of the cooler lid. Cover the custody seals with clear waterproof tape.

16. For a limited quantity, mark the outside of the cooler with the proper shipping name of the contents, corresponding UN number, and LTD. QTY. (as shown below).

    Methanol Mixture
    UN1230
    LTD. QTY.

17. **For an excepted quantity, there must be a "dangerous goods in excepted quantities" label on the cooler. The label must have the hazard class for methanol on it below the "E". Methanol is flammable (class 3).**

18. Place a label on the top or front of the cooler with the company name, contact name, phone number, full street address, and state with zip code for both shipper and recipient.

19. Affix a "flammable liquid" label to the outside of the cooler for limited quantities.

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20. Affix package orientation labels on two opposite sides of the cooler.

21. Secure the marking and labels to the surface of the cooler with clear waterproof tape to prevent accidental removal during shipment. An example of cooler labeling/marking locations is shown below in Figure 1.

    Note: No marking or labeling can be obscured by strapping or duct tape.

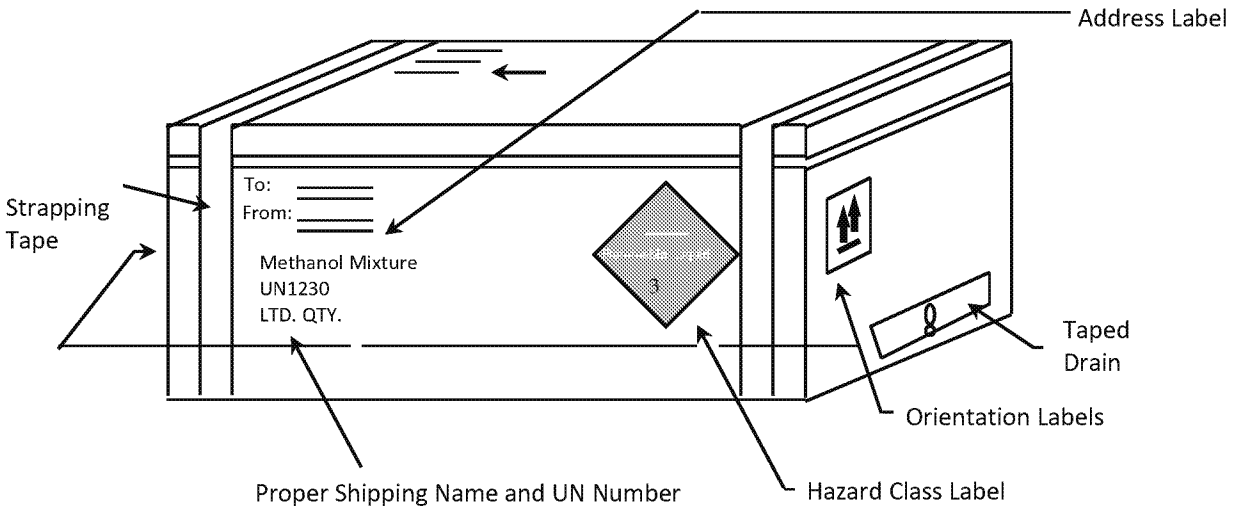
    Note: Place inner packaging of dangerous goods into the designated cooler for shipment. Other nonregulated environmental samples may be added to the cooler for shipment.

22. When shipping from a DOE facility, the cooler will be surveyed by a qualified radiation control technician to ensure that radiation flux on exterior surfaces does not exceed 0.5 millirem/hour (mrem/h) on all sides. This survey will be documented and the results reviewed by the qualified shipper.

23. Complete the Dangerous Goods and Hazardous Materials Inspection Checklist for Shipping Excepted/Limited-Quantity (Appendix A).

24. Complete a Dangerous Goods airbill.

Figure 1
Example of Cooler Label/Marking Locations for Limited Quantities



3.0 Packaging and Shipping Samples Preserved with Sodium Hydroxide

3.1 Containers

The inner packaging container (and amount of preservative) that may be used for these shipments includes:

Excepted Quantities of Sodium Hydroxide Preservatives

Preservative		*Desired in Final Sample*		*Quantity of Preservative (ml) for Specified Container*				
		pH	**Conc.**	**40 ml**	**125 ml**	**250 ml**	**500 ml**	**1 L**
NaOH	30%	>12	0.08%	'--	.25	0.5	1	2

20 drops = 1 ml

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3.2 Responsibility

It is the responsibility of the qualified shipper to determine the amount of preservative in each sample so that accurate determination of quantities can be made.

Note: Responsibilities may vary from site to site. Therefore, all field team member responsibilities shall be defined in the field plan or site-/project-specific QAPP.

3.3 Additional Required Equipment

The following equipment is needed in addition to the required equipment listed in Section 1.3:

- Outer packaging (for limited quantities) should be an insulated cooler that has passed the ICAO drop test and is in good condition.
- Inner packings may consist of glass or plastic jars no larger than 1 pint.
- Survey documentation (if shipping from DOE or radiological sites)
- Class 8 corrosive labels
- Orientation labels
- Consignor/consignee labels

3.4 Packaging Samples Preserved with Sodium Hydroxide

Samples containing sodium hydroxide (NaOH) as a preservative that exceed the excepted concentration of 0.08 percent (2 ml of a 30 percent NaOH solution per liter) may be shipped as a limited quantity per packing instruction Y819 of the IATA/ICAO Dangerous Goods Regulations.

The following steps are required when packaging limited-quantity samples shipments:

1. Tape any interior opening in the cooler (drain plug) from the inside to ensure control of interior contents. Also, tape the drain plug from the outside of the cooler.

2. All sample containers will be properly labeled and the label protected with waterproof tape before sampling.

   At a minimum the label should contain:

   - Project name
   - Project number
   - Date and time of sample collection
   - Sample location
   - Sample identification number
   - Collector's initials
   - Preservative (note amount of preservative used in miscellaneous section of the chain-of-custody form)

3. If the containers are breakable; wrap each container in bubble wrap (secure with waterproof tape) to prevent breakage.

4. Place the bubble-wrapped container into a 3.0-mil zip-type bag, removing trapped air.

5. Place glass containers inside a polyethylene bottle filled with an absorbent; seal the bottle.

6. The total volume of sample in each cooler should not exceed 1 liter.

7. Place sufficient amount of an absorbent in the bottom of the cooler to absorb any leakage that may occur.

8. Line the cooler with a contractor grade garbage bag .

9. Pack the samples, with bottles placed upright, appropriately inside the garbage bag to prevent movement during shipment.

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10. Place sufficient amount of double-bagged ice around the samples to maintain the required temperature during shipment.

11. Seal the garbage bag by tying or taping.

12. The maximum weight of the cooler shall not exceed 30 kg (66 lbs) for any limited-quantity shipment of dangerous goods.

13. Secure the chain-of-custody form (placed inside a zip-type bag) to the interior of the cooler lid.

14. If the shipment is from a DOE or other radiological facility, place the results of the radiation screen and cooler/sample survey with the chain-of-custody.

15. Wrap strapping tape or duct tape around both ends of the cooler and around the cooler lid.

16. Affix custody seals to opposite sides of the cooler lid. Cover the custody seals with clear waterproof tape.

17. Mark the outside of the cooler with the proper shipping name of the contents, corresponding UN number, and LTD. QTY. (as shown below).

    Sodium Hydroxide Solution
    UN1824
    LTD. QTY.

18. Place a label on the front of the cooler with the company name, contact name, phone number, full street address, and state with zip code for both shipper and recipient.

19. Affix a "corrosive" label to the outside of the cooler.

20. Affix package orientation labels on two opposite sides of the cooler.

21. Secure the marking and labels to the surface of the cooler with clear waterproof tape to prevent accidental removal during shipment. An example of cooler labeling/marking locations is shown above in Figure 1.

    Note: **Samples meeting the allowed concentration of 0.08 percent NaOH by weight may be shipped as nonregulated or nonhazardous following the procedure in Section 1.4.**

    Note: No marking or labeling can be obscured by strapping or duct tape.

    Note: Place the inner packaging of dangerous goods into the designated cooler for shipment. Other nonregulated environmental samples may be added to the cooler for shipment.

22. When shipping from a DOE facility, the cooler will be surveyed by a qualified radiation control technician to ensure that radiation flux on exterior surfaces does not exceed 0.5 mrem/h on all sides. This survey will be documented and the results reviewed by the qualified shipper.

23. Complete the Dangerous Goods and Hazardous Materials Inspection Checklist for Shipping Limited-Quantity (Appendix A).

24. Complete a Dangerous Goods Air Bill.

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4.0 Packaging and Shipping Samples Preserved with Hydrochloric Acid

4.1 Containers

The inner packaging container (and amount of preservative) that may be used for these shipments includes:

Excepted Quantities of Hydrochloric Acid Preservatives

Preservative		*Desired in Final Sample*		*Quantity of Preservative (ml) for Specified Container*		
		pH	**Conc.**	**40 ml**	**125 ml**	**250 ml**
HCl	2N	<2	0.04%	.2	.5	1

20 drops = 1 ml

4.2 Responsibility

It is the responsibility of the qualified shipper to:

1. Determine the samples undergoing shipment contain no other contaminant that meets the definition of hazardous material as defined by DOT.

2. Determine the amount of preservative in each sample so that accurate determination of quantities can be made.

Note: Responsibilities may vary from site to site; therefore, all field team member responsibilities shall be defined in the field plan or site-/project-specific QAPP.

4.3 Additional Required Equipment

The following equipment is needed in addition to the required equipment listed in Section 1.3.

- Inner packing may consist of glass or plastic jars no larger than 1 pint.
- Outer packaging (for limited quantities) should be an insulated cooler that has passed the ICAO drop test.
- Survey documentation (if shipping from DOE or radiological sites)
- Class 8 corrosive labels
- Orientation labels
- Consignor/consignee labels

4.4 Packaging Samples Preserved with Hydrochloric Acid

The following steps are to be followed when packaging limited-quantity sample shipments:

1. Tape any interior opening in the cooler (drain plug) from the inside to ensure control of interior contents. Also, tape the drain plug from the outside of the cooler.

2. All sample containers will be properly labeled and the label protected with waterproof tape before sampling.

   At a minimum the label should contain:

   - Project name
   - Project number
   - Date and time of sample collection
   - Sample location
   - Sample identification number
   - Collector's initials
   - Preservative (note amount of preservative used in miscellaneous section of the chain-of-custody form)

3. Wrap each container (40-ml VOA vials) in bubble wrap (secure with waterproof tape) to prevent breakage.

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4. Place the bubble-wrapped container into a 3.0-mil zip-type bag, removing trapped air.
5. Place wrapped containers inside a polyethylene bottle filled with an absorbent; seal the bottle. (No more than four VOA vials will fit inside a 500-ml, wide-mouth polyethylene bottle.)
6. Total volume of sample inside each cooler should not exceed 1 liter.
7. Line the bottom of the cooler with sufficient absorbent material to absorb any leakage that may occur.
8. Line the cooler with a contractor-grade garbage bag.
9. Pack the samples, with bottle placed upright, appropriately inside the garbage bag to prevent movement during shipment.
10. Place sufficient amount of double-bagged ice around the samples to maintain the required temperature during shipment.
11. Seal the garbage bag by tying or taping.
12. The maximum weight of the cooler shall not exceed 30 kg (66 lbs) for any limited-quantity shipment of dangerous goods.
13. Secure the chain-of-custody form (placed inside a zip-type bag) to the interior of the cooler lid.
14. If the shipment is from a DOE or other radiological facility, place the results of the radiation screen and cooler/sample survey with the chain-of-custody.
15. Wrap strapping tape or duct tape around both ends of the cooler and around the cooler lid.
16. Affix custody seals to opposite sides of the cooler lid. Cover the custody seals with clear waterproof tape.
17. Mark the outside of the cooler with the proper shipping name of the contents, corresponding UN number, and LTD. QTY. (as shown below) .

    Hydrochloric Acid Solution
    UN1789
    LTD. QTY.

18. Place a label on the front of the cooler with the company name, contact name, phone number, full street address, and state with zip code for both shipper and recipient.
19. Affix a "corrosive" label to the outside of the cooler.
20. Affix package orientation labels on two opposite sides of the cooler.
21. Secure the marking and labels to the surface of the cooler with clear waterproof tape to prevent accidental removal during shipment. An example of cooler labeling/marking locations is shown in Figure 1.

    Note: **Samples containing less than the allowed concentration of 0.04 percent HCl by weight will be shipped as nonregulated or nonhazardous following the procedure in Section 1.4.**

    Note: No marking or labeling can be obscured by strapping or duct tape.

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Note: Place the inner packaging of dangerous goods inside the designated cooler for shipment. Other nonregulated environmental samples may be added to the cooler for shipment.

22. When shipping from a DOE facility, the cooler is to be surveyed by a qualified radiation control technician to ensure that radiation flux on exterior surfaces does not exceed 0.5 mrem/h on all sides. This survey should be documented, and the results reviewed by the qualified shipper.

23. Complete the Dangerous Goods and Hazardous Materials Inspection Checklist for Shipping Excepted/Limited-Quantity (Appendix A).

24. Complete a Dangerous Goods airbill.

5.0 Packaging and Shipping Samples Preserved with Nitric Acid

5.1 Containers

The inner packaging container (and amount of preservative) that may be used for these shipments includes:

Excepted Quantities of Nitric Acid Preservatives

Preservative		*Desired in Final Sample*		*Quantity of Preservative (ml) for Specified Container*				
		pH	**Conc.**	**40 ml**	**125 ml**	**250 ml**	**500 ml**	**1 L**
HNO_3	6N	<2	0.15%		2	4	5	8

5 drops = 1 mg/L

5.2 Responsibility

It is the responsibility of the qualified shipper to:

1. Determine the samples undergoing shipment contain no other contaminant that meets the definition of hazardous material as defined by DOT.

2. Determine the amount of preservative in each sample so that accurate determination of quantities can be made.

Note: Responsibilities may vary from site to site; therefore, all field team member responsibilities shall be defined in the field plan or site-/project-specific QAPP.

5.3 Additional Required Equipment

The following equipment is needed in addition to the required equipment listed in Section 1.3:

- Inner packings may consist of glass or plastic jars no larger than 100 ml.
- Outer packaging (for limited quantities) should be an insulated cooler that has passed the ICAO drop test.
- Survey documentation (if shipping from DOE or radiological sites)
- Class 8 corrosive labels
- Orientation labels
- Consignor/consignee labels

5.4 Packaging Samples Preserved with Nitric Acid

Samples containing nitric acid (HNO_3)as a preservative that exceed the excepted concentration of 0.15 percent HNO_3 will be shipped as a limited quantity per packing instruction Y807 of the IATA/ICAO Dangerous Goods Regulations.

The following steps are to be followed when packaging limited-quantity sample shipments:

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1. Tape any interior opening in the cooler (drain plug) from the inside to ensure control of interior contents. Also, tape the drain plug from the outside of the cooler.

2. All sample containers will be properly labeled and the label protected with waterproof tape before sampling.

   At a minimum the label should contain:
   - Project name
   - Project number
   - Date and time of sample collection
   - Sample location
   - Sample identification number
   - Collector's initials
   - Preservative (note amount of preservative used in miscellaneous section of the chain-of-custody form

3. If the containers are breakable; wrap each container in bubble wrap (secure with waterproof tape) to prevent breakage.

4. Place the bubble-wrapped container into a 3.0-mil zip-type bag, removing trapped air.

5. Place glass containers inside a polyethylene bottle filled with an absorbent; seal the bottle.

6. Line the bottom of the cooler with sufficient absorbent material to absorb any leakage that may occur.

7. Line the cooler with a contractor grade garbage.

8. Pack the samples, with bottles placed upright, appropriately inside the garbage bag to prevent movement during shipment.

9. Place sufficient amount of double-bagged ice around the samples to maintain the required temperature during shipment.

10. Seal the garbage bag by tying or taping.

11. The maximum volume of preserved solution in the cooler should not exceed 500 ml.

12. The maximum weight of the cooler shall not exceed 30 kg (66 lbs) for any limited-quantity shipment of dangerous goods.

13. Secure the chain-of-custody form (placed inside a zip-type bag) to the interior of the cooler lid.

14. If the shipment is from a DOE or other radiological facility, place the results of the radiation screen and cooler/sample survey with the chain-of-custody.

15. Wrap strapping tape or duct tape around both ends of the cooler and around the cooler lid.

16. Affix custody seals to opposite sides of the cooler lid. Cover the custody seals with clear waterproof tape.

17. Mark the outside of the cooler with the proper shipping name of the contents, corresponding UN number, and LTD. QTY. (as shown below) for limited quantities.

    Nitric Acid Solution (with less than 20 percent)
    UN2031
    Ltd. Qty.

18. Place a label on the front of the cooler with the company name, contact name, phone number, full street address, and state with zip code for both shipper and recipient.

19. Affix a "corrosive" label to the outside of the cooler.

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20. Affix package orientation labels on two opposite sides of the cooler.

21. Secure the marking and labels to the surface of the cooler with clear waterproof tape to prevent accidental removal during shipment. An example of cooler labeling/marking locations is shown above in Figure 1.

    Note: **Samples meeting the allowed concentration of 0.15 percent HNO3 by weight will be shipped as nonregulated or nonhazardous following the procedure in Section 1.4.**

    Note: No marking or labeling can be obscured by strapping or duct tape.

    Note: **Place** the inner packaging of dangerous goods inside the designated cooler for shipment. Other nonregulated environmental samples may be added to the cooler for shipment.

22. When shipping from a DOE facility, the cooler will be surveyed by a qualified radiation control technician to ensure that radiation flux on exterior surfaces does not exceed 0.5 mrem/h on all sides. This survey will be documented and the results reviewed by the qualified shipper.

23. Complete the Dangerous Goods and Hazardous Materials Inspection Checklist for Shipping Limited-Quantity (Appendix A).

24. Complete a Dangerous Goods airbill.

6.0 Packaging and Shipping Samples Preserved with Sulfuric Acid

6.1 Containers

The inner packaging container (and amount of preservative) that may be used for these shipments includes:

Excepted Quantities of Sulfuric Acid Preservatives

Preservative		*Desired in Final Sample*		*Quantity of Preservative (ml) for Specified Container*				
		pH	**Conc.**	**40 ml**	**125 ml**	**250 ml**	**500 ml**	**1 L**
H_2SO_4	37N	<2	0.35%	.1	.25	0.5	1	2

5 drops = 1 ml

6.2 Responsibility

It is the responsibility of the qualified shipper to:

1. Ensure the samples undergoing shipment contain no other contaminant that meets the definition of hazardous material as defined by the DOT.

2. Determine the amount of preservative in each sample so that accurate determination of quantities can be made.

Note: Responsibilities may vary from site to site. Therefore, all field team member responsibilities shall be defined in the field plan or site-/project-specific QAPP.

6.3 Additional Required Equipment

The following equipment is needed in addition to the required equipment listed in Section 1.3:

- Inner packings may consist of glass or plastic jars no larger than 100 ml.
- Outer packaging (for limited quantities) should be an insulated cooler that has passed the ICAO drop test.
- Survey documentation (if shipping from DOE or other radiological sites)

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- Class 8 corrosive labels
- Orientation labels
- Consignor/consignee labels

6.4 Packaging of Samples Preserved with Sulfuric Acid

Samples containing sulfuric acid (H_2SO_4) as a preservative that exceed the excepted concentration of 0.35 percent will be shipped as a limited quantity per packing instruction Y809 of the IATA/ICAO Dangerous Goods Regulations.

The following steps are required when packaging limited-quantity samples shipments:

1. Tape any interior opening in the cooler (drain plug) from the inside to ensure control of interior contents. Also, tape the drain plug from the outside of the cooler.

2. All sample containers will be properly labeled and the label protected with waterproof tape before sampling.

   At a minimum the label should contain:

   - Project name
   - Project number
   - Date and time of sample collection
   - Sample location
   - Sample identification number
   - Collector's initials
   - Preservative (note amount of preservative used in miscellaneous section of the chain-of-custody form)

3. Wrap each glass container in bubble wrap (secure with waterproof tape) to prevent breakage.

4. Place the bubble-wrapped container into a 3.0-mil zip-type bag, removing trapped air.

5. Place glass containers inside a polyethylene bottle filled with an absorbent; seal the bottle.

6. Line the bottom of the cooler with sufficient absorbent material, or other approved material, to absorb any leakage that may occur.

7. Line the cooler with a contractor grade garbage bag cooler.

8. Pack the samples appropriately inside the garbage bag (bottles placed upright) to prevent movement during shipment.

9. Place sufficient amount of double-bagged ice around the samples to maintain the required temperature during shipment.

10. Seal the garbage bag by tying or taping.

11. The maximum volume of preserved solution in the cooler should not exceed 500 ml.

12. The maximum weight of the cooler shall not exceed 30 kg (66 lbs) for any limited-quantity shipment of dangerous goods.

13. Secure the chain-of-custody form (placed inside a zip-type bag) to the interior of the cooler lid.

14. If the shipment is from a DOE or other radiological facility, place the results of the radiation screen and cooler/sample survey with the chain-of-custody.

15. Wrap strapping tape or duct tape around both ends of the cooler and around the cooler lid.

16. Affix custody seals to opposite sides of the cooler lid. Cover the custody seals with clear waterproof tape.

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17. Mark the outside of the cooler with the proper shipping name of the contents, corresponding UN number, and LTD. QTY. (as shown below).

    Sulfuric Acid Solution
    UN2796
    LTD. QTY.

18. Place a label on the front of the cooler with the company name, contact name, phone number, full street address, and state with zip code for both shipper and recipient.

19. Affix a "corrosive" label to the outside of the cooler.

20. Affix package orientation labels on two opposite sides of the cooler.

21. Secure the marking and labels to the surface of the cooler with clear waterproof tape to prevent accidental removal during shipment. An example of cooler labeling/marking locations is shown in Figure 1.

    Note: **Samples containing less than the allowed concentration of 0.35 percent H_2SO_4 by weight will be shipped as nonregulated or nonhazardous in accordance with the procedure described in Section 1.4.**

    Note: No marking or labeling can be obscured by strapping or duct tape.

    Note: **Place** the inner packaging of dangerous goods into the designated cooler for shipment. Other nonregulated environmental samples may be added to the cooler for shipment.

22. When shipping from a DOE facility, the cooler will be surveyed by a qualified radiation control technician to ensure that radiation flux on exterior surfaces does not exceed 0.5 mrem/h on all sides. This survey will be documented and the results reviewed by the qualified shipper.

23. Complete the Dangerous Goods and Hazardous Materials Inspection Checklist for Shipping Limited-Quantity (Appendix A).

24. Complete a Dangerous Goods airbill.

7.0 Packaging and Shipping Limited-Quantity Radioactive Samples

7.1 Containers

The inner packaging containers that may be used for these shipments include:

1. Any size sample container

7.2 Description/Responsibilities

The qualified shipper should ensure that the samples undergoing shipment contain no other contaminant that meets the definition of hazardous material as defined by the DOT.

The qualified shipper will ship all samples that meet the Class 7 definition of radioactive materials and meet the activity requirements specified in Table 4 and 7 of 49 CFR 173.425, as Radioactive Materials in Limited Quantity. The qualified shipper should verify that all packages and contents meet the requirements of 49 CFR 173.421, *Limited Quantities of Radioactive Materials*.

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Packaging used for shipping is required to meet the general requirements for packaging and packages specified in 49 CFR 173.24 and the general design requirements provided in 173.410. These standards state that a package must be capable of withstanding the effects of any acceleration, vibration, or vibration resonance that may arise under normal transport conditions, without any deterioration in the effectiveness of the closing devices on the various receptacles or in the integrity of the package as a whole and without loosening or unintentionally releasing the nuts, bolts, or other securing devices, even after repeated use.

If the shipment is from a DOE facility, radiological screenings will be completed on all samples taken. The qualified shipper should review the results of each screening (alpha, beta, and gamma speciation). Samples will not be shipped offsite until the radiological screening has been performed.

The total activity for each package will not exceed the relevant limits listed in Table 4 and 7 of 49 CFR 173.425. The A_2 value of the material will be calculated based on all radionuclides found during previous investigations (if any) in the area from which the samples are derived. The A_2 values to be used will be the most restrictive of all potential radionuclides as listed in 49 CFR 173.435.

The radiation level at any point on the external surface of the package bearing the sample(s) will not exceed 0.005 millisievert per hour (mSv/h) (0.5 mrem/hour). These will be verified by dose and activity monitoring before shipment of the package.

The removable radioactive surface contamination on the external surface of the package will not exceed the limits specified in 49 CFR 173.443(a). CDM Smith will apply the DOE-established free release criteria for removable surface contamination of less than 20 disintegrations per minute (dpm)/100 cm^2 (alpha) and 1,000 dpm/100 cm^2 (beta/gamma). It shall be noted that these values are more conservative than the DOT requirements for removable surface contamination.

The qualified shipper should verify that the outside of the inner packaging is marked "Radioactive."

The qualified shipper should verify that the excepted packages prepared for shipment under the provisions of 49 CFR 173.421 have a notice enclosed, or shown on the outside of the package, that reads, **"This package conforms to the conditions and limitations specified in 49 CFR 173.421 for radioactive material, excepted package-limited quantity of material, UN2910."**

> ***Note:*** Responsibilities may vary from site to site; therefore, all field team member responsibilities shall be defined in the field plan or site-/project-specific QAPP.

7.3 Additional Required Equipment

The following equipment is needed in addition to the required equipment listed in Section 1.3:

- Survey documentation/radiation screening results (if shipping from DOE or radiological sites)
- Orientation labels
- Excepted quantities label
- Consignor/consignee labels

7.4 Packaging of Limited-Quantity Radioactive Samples

The following steps are required when packaging limited-quantity sample shipments:

1. The cooler is to be surveyed by a qualified radiation control technician to ensure that radiation flux on exterior surfaces does not exceed 0.5 mrem/h on all sides. This survey will be documented and the results reviewed by the qualified shipper.

2. Tape any interior opening in the cooler (drain plug) from the inside to ensure control of interior contents. Also, tape the drain plug from the outside of the cooler.

3. All sample containers will be properly labeled and the label protected with waterproof tape before sampling. At a minimum the label should contain:

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- Project name
- Project number
- Date and time of sample collection
- Sample location
- Sample identification number
- Collector's initials

4. If the containers are breakable; wrap each container in bubble wrap (secure with waterproof tape) to prevent breakage.

5. Line the bottom of the cooler with sufficient absorbent material, or other approved packaging material, to absorb any leakage that may occur.

6. Line the cooler with a contractor grade garbage bag .

7. Pack the samples, with bottles placed upright, appropriately inside the garbage bag to prevent movement during shipment.

8. If required, place a sufficient amount of double-bagged ice around the samples to maintain the required temperature during shipment.

9. Seal the garbage bag by tying or taping.

10. Place a label marked "radioactive" on the outside of the sealed bag.

11. Enclose a notice that includes the name of the consignor or consignee and the following statement: ***"This package conforms to the conditions and limitations specified in 49 CFR 173.421 for radioactive material, excepted package-limited quantity of material, UN2910."***

12. Note that both the DOT and IATA apply different limits to the quantity in the inside packing and in the outside packing.

13. The maximum weight of the package shall not exceed 30 kg (66 lbs) for any limited-quantity shipment of dangerous goods.

14. Secure the chain-of-custody form (placed inside a zip-type bag) to the interior of the cooler lid.

15. If the shipment is from a DOE or other radiological facility, place the results of the radiation screen and cooler/sample survey with the chain-of-custody.

16. If a cooler is used, wrap strapping tape or duct tape around both ends of the cooler and around the cooler lid.

17. Affix custody seals to opposite sides of the cooler lid. Cover the custody seals with clear waterproof tape.

18. Place a label on the front of the cooler with the company name, contact name, phone number, full street address, and state with zip code, for both shipper and recipient.

19. Affix package orientation labels on two opposite sides of the cooler/package.

20. Affix a completed "excepted quantities" label to the side of the cooler/package.

21. Secure any marking and labels to the surface of the cooler with clear waterproof tape to prevent accidental removal during shipment. An example of the cooler labeling/marking is shown below in Figure 2.

    Note: No marking or labeling can be obscured by strapping or duct tape.

22. Complete the Shipment Quality Assurance Checklist (Appendix B).

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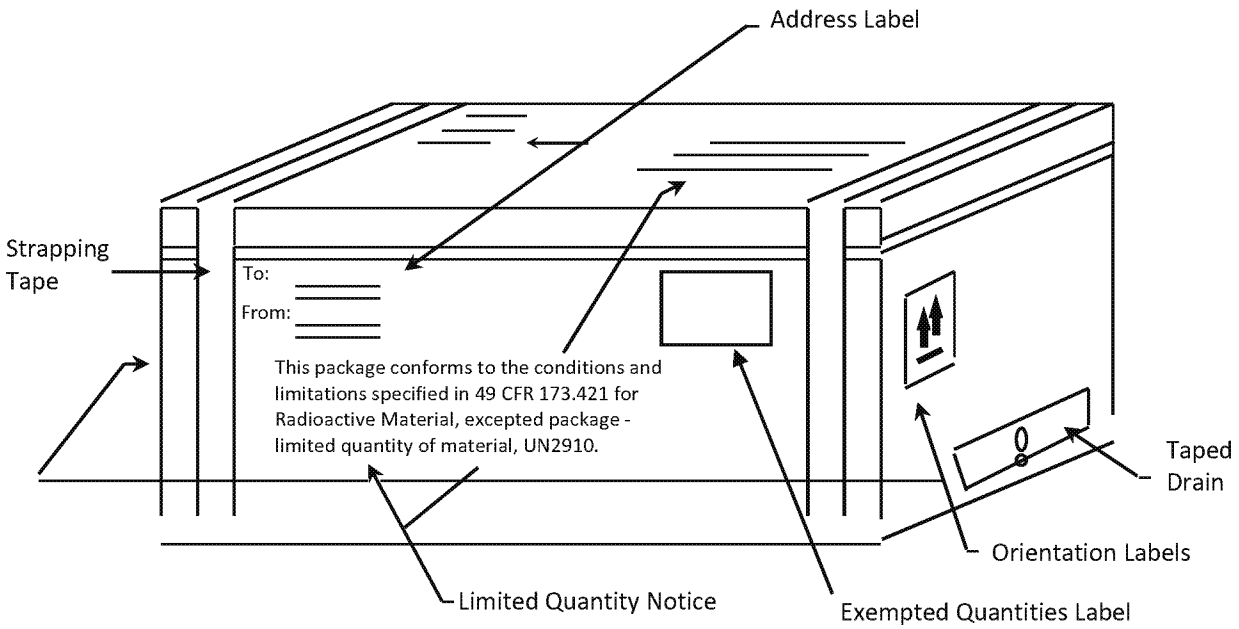
Note: Except as provided in 49 CFR 173.426, the package will not contain more than 15 grams of ^{235}U.

Note: A declaration of dangerous goods is not required.

Figure 2
Radioactive Material – Limited-Quantity Cooler Marking Example



8.0 References

U.S. Environmental Protection Agency. May 2015, or current revision. Region 4. The Field Branches Quality System and Technical Procedures, Packing, Marking, Labeling, and Shipping of Environmental and Waste Samples SESDPROC-209-R3. February.

_____. 2013. Region 4. The Field Branches Quality System and Technical Procedures, Sample and Evidence Management SESDPROC-005-R2. January.

_____. 2007 or current revision. *Sampler's Guide, Contract Laboratory Program, Guidance for Field Samplers*, EPA-540-R-07-06.

Title 49 Code of Federal Regulations, Department of Transportation. 2015 or current revision. *Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements*, 49 CFR 172.

Title 49 Code of Federal Regulations, Department of Transportation. 2015 or current revision. *Shippers - General Requirements for Shipments and Packaging*, 49 CFR 173.

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Appendix A

Dangerous Goods and Hazardous Materials Inspection Checklist for Shipping Excepted or Limited-Quantity

Sample Packaging

Yes	No	N/A	
☐	☐	☐	The VOA vials are wrapped in bubble wrap and placed inside a zip-type bag.
☐	☐	☐	The VOA vials are placed inside a polyethylene bottle, filled with an absorbent, and tightly sealed.
☐	☐	☐	The drain plug is taped inside and outside to ensure control of interior contents.
☐	☐	☐	The samples have been placed inside garbage bags with sufficient bags of ice to preserve samples at 4°C.
☐	☐	☐	The cooler weighs less than the 66-pound limit for limited-quantity shipment.
☐	☐	☐	The garbage bag has been sealed with tape (or tied) to prevent movement during shipment.
☐	☐	☐	The chain-of-custody has been secured to the interior of the cooler lid.
☐	☐	☐	The cooler lid and sides have been taped to ensure a seal.
☐	☐	☐	The custody seals have been placed on both the front and back hinges of the cooler, using waterproof tape.

Air Waybill Completion

Yes	No	N/A	
☐	☐	☐	Section 1 has the shipper's name, company, and address; the account number, date, internal billing reference number; and the telephone number where the shipper can be reached.
☐	☐	☐	Section 2 has the recipient's name and company along with a telephone number where they can be reached.
☐	☐	☐	Section 3 has the **Bill Sender** box checked.
☐	☐	☐	Section 4 has the **Standard Overnight** box checked.
☐	☐	☐	Section 5 has the **Deliver Weekday** box checked.
☐	☐	☐	Section 6 has the number of packages and their weights filled out. Was the total of all packages and their weights figured up and added at the bottom of Section 6?
☐	☐	☐	Under the **Transport Details** box, the **Cargo Aircraft Only** box is obliterated, leaving only the **Passenger and Cargo Aircraft** box.
☐	☐	☐	Under the **Shipment Type**, the **Radioactive** box is obliterated, leaving only the **Non-Radioactive** box.
☐	☐	☐	Under the **Nature and Quantity of Dangerous Goods** box, the **Proper Shipping Name, Class or Division, UN or ID No., Packing Group, Subsidiary Risk, Quantity and Type of Packing, Packing Instructions, and Authorization** have been filled out for the type of chemical being sent.
☐	☐	☐	The **Name, Place and Date, Signature, and Emergency Telephone Number** appears at the bottom of the FedEx airbill.
☐	☐	☐	The statement "In accordance with IATA/ICAO" appears in the **Additional Handling Information** box.
☐	☐	☐	The **Emergency Contact Information** at the bottom of the FedEx airbill lists someone who can truly respond any time of the day or night.

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Proper Shipping Name	*Class or Division*	*UN or ID No.*	*Packing Group*	*Sub Risk*	*Quantity*	*Packing Instruction*	*Authorization*
Hydrochloric Acid Solution	8	UN1789	II		1 plastic box × 0.5 L	Y809	Ltd. Qty.
Nitric Acid Solution (with less than 20%)	8	UN2031	II		1 plastic box × 0.5 L	Y807	Ltd. Qty.
Sodium Hydroxide Solution	8	UN1824	II		1 plastic box × 0.5 L	Y809	Ltd. Qty.
Sulfuric Acid Solution	8	UN2796	II		1 plastic box × 0.5 L	Y809	Ltd. Qty.
Methanol	3	UN1230	II		1 plastic box × 1 L	Y305	Ltd. Qty.

Sample Cooler Labeling

Yes	**No**	**N/A**	
☐	☐	☐	The proper **shipping name, UN number**, and **Ltd. Qty.** appears on the shipping container (limited quantity shipments).
☐	☐	☐	The corresponding **hazard labels** or **dangerous goods in excepted quantity label** are affixed on the shipping container; the labels are not obscured by tape.
☐	☐	☐	The **name and address of the shipper and receiver** appear on the top and side of the shipping container.
☐	☐	☐	The **air waybill** is attached to the top of the shipping container.
☐	☐	☐	**Up arrows** have been attached to opposite sides of the shipping container.
☐	☐	☐	Packaging tape does not obscure markings or labeling.

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Appendix B

Shipment Quality Assurance Checklist

Date: _____ Shipper: _____ Destination: _____

Item(s) Description: _____

Radionuclide(s): _____

Radiological Survey Results: surface _____mrem/hr 1 meter _____

Instrument Used: Mfgr: _____ Model: _____

S/N: _____ Cal Date: _____

Limited-Quantity or Instrument and Article

Yes	No		
___	___	1.	Strong tight package (package that will not leak material during conditions normally incidental to transportation).
___	___	2.	Radiation levels at any point on the external surface of package less than or equal to 0.5 mrem/hr.
___	___	3.	Removable surface contamination less than 20 dpm/100 cm^2 (alpha) and 1,000 dpm/100 cm^2 (beta/gamma).
___	___	4.	Outside inner package bears the marking "Radioactive."
___	___	5.	Package contains less than 15 grams of ^{235}U (check yes if ^{235}U not present).
___	___	6.	Notice enclosed within or on the package that includes the consignor or consignee and the statement, **"This package conforms to the conditions and limitations specified in 49 CFR 173.421 for radioactive material, excepted package-limited quantity of material, UN2910."**
___	___	7.	Activity less than that specified in 49 CFR 173.425. Permissible package limit: Package Quantity:
___	___	8.	On all air shipments, the statement **Radioactive Material, excepted package-limited quantity of material** shall be noted on the air waybill.

Qualified Shipper: _____ Signature: _____

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Field Logbook Content and Control	SOP 4-1 Revision: 9 Date: August 2020

Approved: Ernest Ashley **Technical Review:** Catherine Love

1.0 Objective

The objective of this technical standard operating procedure (SOP) is to set criteria for field logbook content entry and form. Field logbooks are an essential tool to document field activities for historical and legal purposes.

2.0 Background

2.1 Definitions

Note: Definitions are often promulgated or codified in state or local statutes, regulations, or ordinances and can vary between regulatory agencies. Definitions should be verified against the definitions provided by agencies regulating the work when applicable.

Biota - The flora and fauna of a region

Magnetic Declination Corrections - Compass adjustments to correct for the angle between magnetic north and geographical meridians

2.2 Discussion

Information recorded in field logbooks includes field team names; observations; data; calculations; date and time; weather; and a description of the data collection activity, methods, instruments, and results. Additionally, the logbook may contain record of deviations from plans. It may also hold descriptions of wastes, biota, geologic material, and site features, including sketches, maps, drawings, or photographic or videographic logs, as appropriate.

3.0 General Responsibilities

Project Manager (PM) - The PM is responsible for overall project management. They may be brought into decisions regarding data management.

Field Team Leader (FTL) - The FTL is responsible for ensuring that data entry format and content are in accordance with this procedure.

Site Personnel - All CDM Smith employees who make entries in field logbooks during onsite activities are required to read this procedure before engaging in this activity. The FTL will assign field logbooks to site personnel who will be responsible for their care and maintenance. Site personnel will return field logbooks to the records file at the end of the assignment.

Data Manager (DM) - For projects using cloud base field data collection tools, the DM is responsible ensuring that a copy of the initial data collected is stored as an official record in un-editable file. The DM is responsible for regularly backing up all data generated during electronic field collection, including tabular and spatial data and photographs.

Note: Responsibilities may vary from site to site. Therefore, all field team member responsibilities should be defined in the field plan or site-/project-specific quality assurance project plan (QAPP).

4.0 Required Equipment

- Site-specific plans
- Field logbook
- Indelible black or blue ink pen
- Ruler or similar scale

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5.0 Procedures

5.1 Preparation

In addition to this SOP, site personnel responsible for maintaining logbooks should be familiar with all procedures applicable to the field activity being performed. These procedures should be consulted as necessary to obtain specific information about equipment and supplies, health and safety, sample collection, packaging, decontamination, and documentation requirements. These procedures should be available electronically or located at the field office or vehicle for easy reference.

Field logbooks shall be bound with lined, consecutively numbered pages. All pages should be numbered before initial use of the logbook. Before use in the field, each logbook will be marked with a specific document control number issued by the document control administrator, if required by the contract quality implementation plan (QIP). Not all contracts require document control numbers. The following information shall be recorded on the cover of the logbook:

- Field logbook document control number (if applicable)
- Activity (if the logbook is to be activity-specific), site name, and location
- Name of CDM Smith contact and phone number(s) (typically the project manager)
- Start date of entries
- End date of entries
- In specific cases, special logbooks may be required (e.g., waterproof paper for stormwater monitoring).

The first few (approximately three) pages of the logbook will be reserved for a table of contents (TOC). Mark the first page with the heading and enter the following:

Table of Contents

Date/Description	Pages
(Start Date)/Reserved for TOC	1-3

The table of contents remaining pages will be designated as such with "TOC" written on the top center of each page. The table of contents should be completed as activities are completed and before placing the logbook in the records file.

5.2 Operation

Follow these requirements when using a logbook:

- Record work, observations, quantities of materials, calculations, drawings, and related information directly in the logbook. If data collection forms are specified by an activity-specific plan, this information does not need to be duplicated in the logbook. However, the logbook should reference any forms used to record site information.
- Do not start a new page until the previous one is full or has been marked with a single diagonal line so that additional entries cannot be made. Use both sides of each page.
- Do not erase or blot out any entry at any time. Indicate any deletion by a single line through the material to be deleted. Initial and date each deletion. Take care to not obliterate what was written previously.
- Do not remove any pages from the book.
- All entries should be clearly written and legible.

Specific requirements for field logbook entries include:

- Initial and date each page
- Sign and date the final page of entries for each day
- Initial and date all changes
- Multiple authors should sign out the logbook by inserting the following:
  Above notes authored by:
  - (Sign name)
  - (Print name)

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- (Date)
- A new author should sign and print his/her name before additional entries are made.
- Draw a diagonal line through the remainder of the final page at the end of the day.
- Record the following information on a daily basis:
  - Date and time
  - Name of individual making entry
  - Names of field team and other persons onsite
  - Description of activity being conducted, including station or location (i.e., well, boring, sampling location number) if appropriate
  - Weather conditions (i.e., temperature, cloud cover, precipitation, wind direction, and speed) and other pertinent data
  - Level of personal protection used
  - Serial numbers of instruments
  - Equipment calibration information
  - Serial/tracking numbers on documentation (e.g., carrier air bills)

An observation's time (written in military/24-hour units) should go before the entry. The time should be recorded frequently and at the point of events or measurements that are critical to the activity being logged. Record all measurements made and samples collected unless they are documented by automatic methods (e.g., data logger), a field data collection tool, or on a separate form required by an operating procedure. In these cases, the logbook should reference the automatic data record or form. Site personnel collecting data with cloud-base field data collection tools are responsible for sending data to the cloud database as data is collected or when cellular or wi-fi service becomes available. If the tool is working in off-line editing, then data should be uploaded or synced at the end of the work day.

At each station where a sample is collected or an observation or measurement made, a detailed description of the location of the station is required. Use a compass (include a reference to magnetic declination corrections), scale, or nearby survey markers, as appropriate. A sketch of station location may be warranted. All maps or sketches made in the logbook should have descriptions of the features shown and a direction indicator. It is preferred that maps and sketches be oriented so that north is toward the top of the page. Maps, sketches, figures, or data that will not fit on a logbook page should be referenced and attached to the logbook to prevent separation.

Other events and observations that should be recorded include:

- Changes in weather that impact field activities
- Deviations from procedures outlined in any governing documents. Record the reason for any noted deviation.
- Problems, downtime, or delays
- Upgrade or downgrade of personal protection equipment
- Visitors to the site

5.3 Post-Operation

To guard against loss of data as a result of damage or disappearance of logbooks, completed pages shall be periodically photocopied or scanned (weekly, at a minimum) and forwarded to the field or project office. Other field records shall be photocopied or scanned and submitted regularly and as promptly as possible to the office. Information from a data logger shall be exported daily onto external storage device (e.g. a flash drive or external drive) and saved to ProjectWise on a daily basis if possible (weekly, at a minimum).

At the conclusion of each activity or phase of site work, the individual responsible for the logbook will ensure that all entries have been appropriately signed and dated and that corrections were made properly (single lines drawn through incorrect information, then initialed and dated). The completed logbook shall be submitted to the records file.

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For cloud-based field data collection tools, all data (backups, raw inspection data) will be saved daily to the ProjectWise directory. Alternative timed uploads can be set to weekly data uploads at a minimum, if agreed upon by the DM and PM.
Field data collection tools should be designed so that a copy of the originally captured data is exported daily and saved on ProjectWise. This data serves as the official record and should not be altered or edited. Developers of the field tools should understand retention policies of their cloud platform and ensure that final data is stored on ProjectWise to meet project data retention requirements.

All data collection methods should follow the records control procedures specified in the site-specific plan.

6.0 Restrictions/Limitations

Field logbooks constitute the official record of onsite technical work, investigations, and data collection activities. Their use, control, and ownership are restricted to activities pertaining to specific field operations carried out by CDM Smith personnel and their subcontractors. They are documents that may be used in court to indicate dates, personnel, procedures, and techniques employed during site activities. Entries made in these logbooks should be factual, clear, precise, and objective. Field logbooks, and entries within, are not to be used for personal use.

Consider the evolving regulatory standards for per- and polyfluoroalkyl substances (PFAS) when implementing SOP 4-1 for specific sites. Also consider them when developing project planning documents such as: work plans, sampling and analysis plans, quality assurance project plans, data management plans, accident prevention plans, health and safety plans, and laboratory statements of work used to guide the collection of samples for PFAS analysis.

A consideration of the PFAS-specific sampling requirements is needed during the planning phase because cross-contamination is a prominent concern for data quality, particularly with PFAS action levels in the low parts per trillion (ppt) range. This means that the development of project data quality objectives (DQOs), and selection of action levels, reporting limits are all impacted with the inclusion of sampling for PFAS analysist.

Before implementing SOP 4-1 associated with collection of samples for PFAS analysis, it is important to review current regulatory standards to determine whether site- or project-specific changes to SOP 4-1 should be included in project planning documents to align with the latest regulatory standards and sampling guidance. CDM Smith Regulatory Updates, including specific state and federal regulatory limits, can be located on the PFAS InfoCenter: https://cdmsmith.libguides.com/PFAS_InfoCenter

When conducting PFAS sampling, field staff should avoid cross contamination which can occur with use of items in the field, such as sticky notes, waterproof field books, and aluminum foil. Staff will need to avoid use of markers, if possible, during sampling use only regular ink pens. If needed, write over regular ink with marker after the sample containers are sealed. For a current list of materials to avoid, staff should refer to appropriate sampling technical operating procedures and project requirements.

7.0 References

EPA. 2013. Region 4. The Field Branches Quality System and Technical Procedures, Sample and Evidence Management SESDPROC-005-R2. January.

_____. 2013. Region 4. The Field Branches Quality System and Technical Procedures, Logbooks. SESDPROC-010-R5. May.

_____. 2007. Contract Laboratory Program Guidance for Field Samplers. Office of Superfund Remediation and Technology Innovation. OSWER 9240.0-44. EPA 540-R-07-06. July.

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Photographic Documentation of Field Activities	SOP 4-2 Revision: 10 Date: August 2020

Approved: Ernest Ashley **Technical Review:** Catherine Love

1.0 Objective

The purpose of this technical standard operating procedure (SOP) is to provide standard guidelines and methods for photographic documentation, which include digital photography and recordings of field activities and site features (geologic formations, core sections, lithologic samples, water samples, general site layout, etc.). This SOP is intended for circumstances when formal photographic documentation is required. Based on project requirements, it may not be applicable for all photographic activities.

2.0 Background

2.1 Definitions

Note: Definitions are often promulgated or codified in state or local statutes, regulations, or ordinances and can vary between regulatory agencies. Definitions should be verified against the definitions provided by agencies regulating the work when applicable.

Photographer - The camera operator of digital photography or recordings, whose primary function in this SOP is to produce documentary or data-oriented visual media

Identifier Component - Visual components used within a photograph, such as visual slates, reference markers, and pointers

Standard Reference Marker - A reference marker used to indicate a feature size in the photograph. It should be a standard length of measure, such as a ruler, meter stick, etc. In limited instances, if a ruled marker is not available or its use is not feasible, it can be a common object of known size placed within the visual field and used for scale.

Slates - Blank white index cards, marker boards, or paper used to present information pertaining to the subject/procedure being photographed. Letters and numbers on the slate will be bold and written with black indelible marking pens.

Arrows and Pointers - Markers/pointers used to indicate and/or draw attention to a special feature within the photograph

Camera - A standalone digital camera or a camera that is embedded in a smart phone or tablet

Contrasting Backgrounds - Backdrops used to lay soil samples, cores, or other objects on for clearer viewing and to delineate features.

Date Stamp - A built-in feature that will record the date and time directly on a digital image or recording

Field Tool Application - An application that runs on a smart phone or tablet. The application's purpose is to collect a specific set of information, which may include the ability to take and document photographs. Data collection with the field tool is stored in the field tool application database. The field tool application can be designed to capture information typically stored in the project logbook, however the tool cannot completely replace the log book.

Photographic Documentation - Any information collected in a logbook or in a field tool application that is required to describe the photograph. Documentation might include the file name of the photo, photo sequence, photographer, date and time, a description of the photo, or the direction the picture was taken.

Site Photo Map - A sketch of the site that marks where photographs were taken

2.2 Associated Procedures

- SOP 4-1, *Field Logbook Content and Control*

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2.3 Discussion

Digital photographs and recordings made during field investigations are used as an aid in documenting and describing site features, sample collection activities, equipment used, and possible lithologic interpretation. This SOP is designed to illustrate the format and desired placement of identifier components, such as visual slates, standard reference markers, and pointers. How to use a photographic logbook and standardized entry procedures are also outlined. These procedures and guidelines will minimize potential ambiguities that may arise when viewing the images or recordings and ensure the representative nature of the photographic documentation.

3.0 General Responsibilities

Project Manager - The project manager (PM) will ensure the logbook and photographs fulfill contract requirements and is distributed appropriately. They will also provide guidance on site-specific photography requirements.

Field Team Leader - The field team leader (FTL) is responsible for ensuring that the format and content of photographic documentation are in accordance with this procedure. The FTL is responsible for directing the photographer to specific situations, site features, or operations that the photographer will be responsible for documenting. The FTL is responsible for making sure the photographer understands and follows data management process for logging, documenting, and backing up the photographic files. If a field tool application is being used to take photographs, the FTL is responsible for working with the data manager to ensure the application collects the proper metadata data about the photographs and that the photographs are being stored and backed up properly.

Data Manager - The data manager (DM) is responsible for ensuring that the field application tool collects and stores the proper photographic documentation about the photographs. The DM is also in charge of verifying that photographic files and documentation have been downloaded from the field tool application and stored in the project file.

Photographer - The photographer shall seek direction from the FTL and regularly discuss the visual documentation requirements and schedule. The photographer is responsible for maintaining a logbook per Sections 5.1, 5.2.4, and 5.3.1 of this SOP. The photographer's responsibilities will be defined in the project sampling plan.

Note: Responsibilities may vary from site to site. Therefore, all field team member responsibilities shall be defined in the field plan or site/quality assurance project plan (QAPP). Some clients and/or client facilities have specific restrictions on photography (e.g., some do not allow photographs to show secure or sensitive buildings). Obtain permission to use a camera on these facilities in advance. The photographer may need to review the photo record with responsible site personnel.

4.0 Required Equipment

A general list of equipment that may be used:

- Smart phone or tablet with camera or digital camera and appropriate storage media
- Extra battery pack and charging cord for smart phone or tablet
- Extra batteries for camera
- Digital video camera and appropriate storage media (e.g., SD card)
- Logbook
- field tool application
- Indelible black or blue ink pen
- Standard reference markers (e.g. ruler)
- Slates or marker boards
- Arrows or pointers
- Contrasting backgrounds

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5.0 Procedures

5.1 Documentation

Documentation requirements for digital photographs and recordings should be specified in the site-specific plan. Otherwise, a commercially available, bound logbook will be used to log and document photographic activities. Alternatively, the project may develop a field tool application designed to run on a smart phone or tablet to take pictures and document the photographic activities. Review SOP 4-1, *Field Logbook Content and Control* and prepare all supplies needed for logbook entries.

Note: A separate photographic logbook is not required. A portion of the field logbook may be designated as the photographic log and documentation section.

Field Health and Safety Considerations

There are no hazards that an individual will be exposed to specific to photographic documentation. However, site-specific hazards may arise depending on the location or operation. The photographer should be aware of site-specific terrain to avoid tripping hazards. Personal protective equipment used in this operation will be site-specific and dictated through requirements set by the site safety officer, site health and safety plan, and/or prescribed by the CDM Smith Corporate Health and Safety Program. The photographer should contact the site safety officer for health and safety orientation before commencing field activities. Read, and sign the acknowledgement of, the site health and safety plan before entering the site.

The photographer should be aware of any potential physical hazards while photographing the subject (e.g., traffic, low overhead hazard, edge of excavation).

5.2 Operation

5.2.1 General Photographic Activities in the Field

The following sections provide general guidelines that should be followed to visually document field activities and site features using digital still and video cameras. General suggestions the photographer should consider when performing activities under this SOP are as follows:

- The photographer should be prepared to make a variety of shots, from close-up to wide-angle. Many shots will be repetitive in nature or format, especially close-up site feature photographs. Consider designing a system, camera settings, or technique that will provide a reliable repetition of performance. Not any special enhancement techniques in the log book or field tool application.
- Digital cameras have multiple photographic quality settings. A camera that produces higher resolution (quality) photographs has a higher number of pixels and will store a fewer number of photographs per digital storage medium. Determine project photo resolution requirements before implementing field work.
- If using a smart phone or tablet camera with a field tool application, consider that the device will need cellular service or WiFi to upload photos and documentation to the field tool application database. If using a smart phone or tablet camera that is not associated with a field tool application, the photographer shall develop a procedure for how the photographs will be extracted from the device and correlated with the photographic documentation in the log book.
- No preference of digital storage medium for a digital camera is specified. The photographer has discretion.
- Regardless of the type of camera, the photograph needs to be stored in a location that receives regular backups such as ProjectWise, OneDrive or Teams. For staff in the field without access to a regularly backed-up storage location, email can provide a temporary backup location until a more permanent location can be accessed.
- For projects dealing with confidential information or criminal investigation, the photographer should look at client-specific requirements for chain of custody procedures.

5.2.2 General Guidelines for Still Photography

Caption Information

Unless otherwise specified in a site-specific plan, all still photographs will have a full caption added after the images are downloaded on a photo log sheet. The caption should contain the following information:

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- Photograph sequence number
- Date and time
- Photographer (required for enforcement cases)
- Description of activity/item shown (e.g., name of facility/site, specific project name, project number)
- Direction (if applicable)
- Site photo map (if applicable)

When directed by the sampling plan, a standard reference marker should be used in all documentary visual media. While the standard reference marker will be predominantly used in close-up feature documentation, consider including it in all scenes.

Images taken with a digital camera, smart phone, or tablet, should be downloaded at least once each day to a personal computer; the files should be in either "JPEG" or "TIFF" format. Files should be renamed at the time of download to correspond to the logbook or as directed in the site-specific plan.

Images taken with a camera as part of a field tool application that resides on a smart phone or tablet should fill out the photographic documentation in the application. The photographer will need to upload the data each night (at a minimum) to the field tool application database. The photographer should verify with the DM that photographs are properly stored and backup via the field tool application.

Regardless of the type of camera used, the photographs should be compared to the photo documentation to ensure that the log and the photographs match.

Close-Up and Feature Photography
When directed by the sampling plan, close-up photographs should include a standard reference marker of appropriate size, to indicate feature size. The photos should contain a slate or marker board marked with the site name and any identifying label, such as a well number or core depth, that clearly tells the viewer the specific feature being photographed.

Feature samples, core pieces, and other lithologic media should be photographed as soon as possible after they have been removed from their in situ locations. This enables a more accurate record of their initial condition and color. When directed by the sampling plan, include a standard reference color strip, like a color chart such as Munsell Soil Color Chart, within the scene. This serves as a reference aid to the viewer for formal lithologic observations and interpretations.

Site Photography
Site photography, in general, will consist predominantly of medium- and wide-angle shots. If required by the sampling plan, a standard reference marker should be placed adjacent to the feature or, when this is not possible, within the same focal plane.

While it is encouraged that a standard reference marker and slate/marker board be included in the scene, it is understood that situations will arise where they can't be included. This will be especially true of wide-angle shots. In such a case, the image number shall be entered in the photographic logbook along with other information pertinent to the scene.

5.2.3 General Photographic Documentation Using Digital Video Cameras

Documentary digital recordings of field activities may include an audio slate for all scenes. At the beginning of each video session, an announcer will recite the following information: date, time (in military units), photographer, site ID number, and site location. This oral account may include any additional information clarifying the subject matter being recorded.

A standard reference marker may be used when taking close-up shots of site features with a video camera. The scene may also include a caption/slate. It should be placed adjacent and parallel to the feature being photographed.

A standard reference marker and slate/marker board should be included in all scenes. The caption information is vital to the value of the documentary visual media and should be included. If it is not included within the scene, it should be placed before the scene.

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Original video recordings will not be edited. This will maintain the integrity of the information contained on the videotape or DVD. If editing is desired, a working copy of the original video recording can be made.

A digital recording filename should be created with the appropriate identifying information (project name, project number, date, location, etc.).

5.2.4 Photographic Documentation

If required by the site-specific plan, photographic activities should be documented in a photographic logbook or in a section of the field logbook or as part of the field tool application. The photographer will be responsible for making proper entries.

In addition to following the technical standards for logbook entry as referenced in SOP 4-1, the following information should be maintained in the appropriate logbook:

- Photographer name
- Sequential tracking number for each photograph taken (the camera-generated number may be used)
- Date and time (military time)
- Location
- A description of the activity/item photographed
- If needed, a description of the general setup, including approximate distance between the camera and the subject
- Record as much other information as possible to help identify the photographic document.

5.3 Post Operation

The photographer shall be responsible for downloading image files or recordings to the project files.

As required, the photographer(s) will ensure that the appropriate logbook is completely filled out and maintained as outlined in SOP 4-1. Images and recordings will be handled according to contract records requirements. The PM will ensure their proper distribution. Completed pages of the appropriate logbook will be copied weekly and submitted to the project files.

6.0 Restrictions/Limitations

This document is designed to provide a set of guidelines to maintain an effective and standardized program of visual documentation.

It is not within the scope of this document to provide instruction in photographic procedures, nor is it within the scope of this document to set guidelines for presentation or "show" photography.

The procedures outlined herein are general by nature. The photographer is responsible for specific operational activity or procedure described in site-specific plans. Questions concerning specific procedures or requirements should be directed to the PM or FTL.

Note: Some sites do not permit photographic documentation. Check with the site contact for any restrictions.

7.0 References

U. S. Environmental Protection Agency. 2013. Region 4. The Field Branches Quality System and Technical Procedures, Logbooks. SESDPROC-005-R5. January.

_____. 2013. Region 4. The Field Branches Quality System and Technical Procedures, Sample and Evidence Management SESDPROC-005-R2. January.

_____. 1992. National Enforcement Investigations Center. *Multi-Media Investigation Manual*, EPA-330/9-89-003-R. p. 85. Revised March.

U. S. Army Corps of Engineers. 2001. *Requirements for the Preparation of Sampling and Analysis Plans*, EM 200-1-3. Appendix F. February.

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EPA Region 4 Operating Procedures

Region 4
U.S. Environmental Protection Agency
Science and Ecosystem Support Division
Athens, Georgia

OPERATING PROCEDURE

Title: **Sample and Evidence Management**

Effective Date: May 25, 2016 | **Number:** SESDPROC-005-R3

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Revision History

The top row of this table shows the most recent changes to this controlled document. For previous revision history information, archived versions of this document are maintained by the SESD Document Control Coordinator on the SESD local area network (LAN).

History	Effective Date
SESDPROC-005-R3, *Sample and Evidence Management*, replaces SESDPROC-005-R2 **General:** Corrected any typographical, grammatical, and/or editorial errors. **Cover Page:** SESD's reorganization was reflected in the authorization section by making John Deatrick the Chief of the Field Services Branch. The FQM was changed from Bobby Lewis to Hunter Johnson. **Revision History:** Changes were made to reflect the current practice of only including the most recent changes in the revision history. **Section 2.2.2:** Revised to clarify accreditation and agency requirements for digital images. Also, language was added to accommodate new storage techniques.	May 25, 2016
SESDPROC-005-R2, *Sample and Evidence Management*, replaces SESDPROC-005-R1	January 29, 2013
SESDPROC-005-R1, *Sample and Evidence Management*, replaces SESDPROC-005-R0	November 1, 2007
SESDPROC-005-R0, Sample and Evidence Management, Original Issue	February 05, 2007

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1 General Information

1.1 Purpose

This document describes general and specific procedures, methods and considerations to be used and observed by SESD field investigators when handling and managing samples and other types of evidence after their collection and during delivery to the laboratory.

1.2 Scope/Application

The procedures contained in this document are to be used by field investigators when handling and managing samples and other evidence collected to support SESD field investigations. On the occasion that SESD field investigators determine that any of the procedures described in this section are either inappropriate, inadequate or impractical and that another procedure must be used, the variant procedure will be documented in the field log book, along with a description of the circumstances requiring its use. Mention of trade names or commercial products in this operating procedure does not constitute endorsement or recommendation for use.

1.3 Documentation/Verification

This procedure was prepared by persons deemed technically competent by SESD management, based on their knowledge, skills and abilities and have been tested in practice and reviewed in print by a subject matter expert. The official copy of this procedure resides on the SESD Local Area Network (LAN). The Document Control Coordinator is responsible for ensuring the most recent version of the procedure is placed on the LAN and for maintaining records of review conducted prior to its issuance.

1.4 References

SESD Operating Procedure for Control of Records, SESDPROC-002, Most Recent Version

SESD Operating Procedure for Packing, Marking, Labeling and Shipping of Environmental and Waste Samples, SESDPROC-209, Most Recent Version

USEPA Region 4 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (EISOPQAM), November 2001

USEPA Digital Camera Guidance for EPA Civil Inspections and Investigations, July 2006

2 Sample and Evidence Identification

2.1 Introduction

Sample identification, chain-of-custody records, receipt for sample records and other field records will be legibly recorded with waterproof, non-erasable ink, unless otherwise specified. If errors are made in any of these documents, corrections will be made by crossing a single line through the error and entering the correct information. All corrections must be initialed and dated. If possible, all corrections should be made by the individual making the error.

Following are definitions of terms used in this section:

Field Investigator
Any individual who performs or conducts field sampling, observation and/or measurement activities in support of field investigations

Project Leader
The individual with overall responsibility for conducting a specific field investigation in accordance with this procedure

Field Sample Custodian
Individual responsible for identifying the sample containers and maintaining custody of the samples and the Chain-of-Custody Record

Sample Team Leader
An individual designated by the project leader to be present during and responsible for all activities related to the collection of samples by a specific sampling team

Sampler
The individual responsible for the actual collection of a sample

Transferee
Any individual who receives custody of samples subsequent to release by the field sample custodian

Laboratory Sample Custodian
Individual responsible for accepting custody of samples from the field sample custodian or a transferee

One individual may fulfill more than one of the roles described above.

2.2 Sample and Evidence Identification Procedures

2.2.1 Sample Identification

The method of sample identification used depends on the type of sample collected. Field measurement samples are those collected for specific field analysis or measurement where the data are recorded directly in bound field logbooks or on the Chain-of-Custody Record. Examples of field measurements and analyses include XRF, pH, temperature, dissolved oxygen and conductivity. Samples collected for laboratory analysis will be identified by using a stick-on label or a tag which is attached to the sample container. In some cases such as biological samples, the label or tag may have to be affixed to a bag containing the sample. If a sample tag is used, the sample should be placed in a bag, then the sample and the tag will be placed in a second bag.

The following information will be included on the sample label or tag using waterproof, non-erasable ink:

- Project number;
- Field identification or sample station number;
- Date and time of sample collection;
- Designation of the sample as a grab or composite;
- Whether the sample is preserved or unpreserved;
- The general types of analyses to be performed.

Other information such as readily detectable or identifiable odor, color, or known toxic properties may be added as deemed necessary by the project leader or sample custodian.

2.2.2 Digital Images – Photographs and Videos

When digital images, which include but are not limited to photographs, digital still images and videos, are taken for purposes of documenting and supporting a field investigation, a record, containing relevant information, will be kept in a field logbook. The following information will be recorded in the log:

- Digital Image Location or Station Identification
- Description of what the digital image shows
- Date and time the digital image was taken
- Name of the individual that took the digital image
- Digital file name (assigned by camera)
- Orientation, if applicable
- Other pertinent information

When digital images are obtained during a field investigation, the permanent record for the official project file, will be stored on a project dedicated data storage device, which includes but is not limited to Secure Digital (SD) card, Compact Discs (CD), or Flash Drives. A new data storage device will be utilized for each project and once the project is completed the device, containing the unaltered investigation-related images, will be labeled with the project's unique identification number and placed in the official file. Photographs taken for educational or other purposes should be stored on an additional storage device and should not be included in the official project file.
It is SESD's policy that, during a field investigation, official project specific digital images should be obtained using SESD issued electronics but in the event that the only option field personnel have is to utilize their own electronic equipment the following steps should be taken:

- Record all required digital image information, as described above
- Record devices make, model and owner's name
- Transfer all digital images to a project specific data storage device and adhere to requirements outlined in the EPA Records Management Policy (CIO 2155.3).

2.2.3 Identification of Physical Evidence

Physical evidence, other than samples, will be identified, when possible, by recording the necessary information on the evidence. When samples are collected from vessels or containers which can be moved (drums for example), the vessel or container should be marked with the field identification or sample station number for future identification. The vessel or container may be labeled with an indelible marker (e.g., paint stick or spray paint). The vessel or container need not be marked if it already has a unique marking; however, these markings will be recorded in the bound field logbooks. In addition, it is suggested that photographs of any physical evidence (markings, etc.) be taken and the necessary information recorded in the field logbook.

Occasionally, it is necessary to obtain copies of recorder and/or instrument charts from facility owned analytical equipment, flow recorders, etc., during field investigations and inspections. A unique identifier will be recorded on the document with that information as well as the following recorded in the logbook:

- Starting and ending time(s) and date(s) for the chart;
- An instantaneous measurement of the media being measured by the recorder will be taken and entered at the appropriate location on the chart along with the date and time of the measurement; and
- A description of the location being monitored and other information required to interpret the data such as type of flow device, chart units, factors, etc.

The field investigator will indicate who the chart (or copy of the chart) was received from and enter the date and time, as well as the field investigator's initials.

Documents such as technical reports, laboratory reports, etc., should be marked with the field investigator's signature, the date, the number of pages and from whom they were received. Documents that are claimed by a facility to be "confidential" and, therefore, potentially subject to the Confidential Business Information requirements, will be handled in accordance with SESD Operating Procedure for Control of Records (SESDPROC-002).

3 Chain-of-Custody Procedures

3.1 Introduction

Chain-of-custody procedures are comprised of the following elements: 1) maintaining custody of samples or other evidence, and 2) documentation of the chain-of-custody for evidence. To document chain-of-custody, an accurate record must be maintained to trace the possession of each sample, or other evidence, from the moment of collection to its introduction into evidence.

3.2 Sample Custody

A sample or other physical evidence is in custody if:

- It is in the actual possession of an investigator;
- It is in the view of an investigator, after being in their physical possession;
- It was in the physical possession of an investigator and then they secured it to prevent tampering; and/or
- It is placed in a designated secure area.

3.3 Documentation of Chain-of-Custody

The following are used to identify and demonstrate how sample integrity is maintained and custody is ensured.

Sample Identification
A stick-on sample label or a tag should be completed for each sample container using waterproof, non-erasable ink as specified in Section 2.2.1.

Sample Seals
If appropriate, samples should be sealed as soon as possible following collection using a custody seal with EPA identification. The sample custodian or project leader will write the date and their initials on the seal. The use of custody seals may be waived if field investigators keep the samples in their custody as defined in Section 3.2, from the time of collection until the samples are delivered to the laboratory analyzing the samples.

Field Sample Custodian
The field sample custodian is the person designated by the project leader to receive and manage custody of samples while in the field, including labeling and custody sealing.

Chain-of-Custody Record

The field Chain-Of-Custody record is used to document the custody of all samples or other physical evidence collected and maintained by investigators. All physical evidence or samples will be accompanied by a Chain-Of-Custody Record. This form may be generated by sample custody management software (Section 5) or it may be a pre-printed multi-sheet carbonless form for hand entry of required information. The Chain-Of-Custody Record documents transfer of custody of samples from the sample custodian to another person, to the laboratory or other organizational elements. The Chain-of-Custody Record will not be used to document the collection of split samples where there is a legal requirement to provide a receipt for samples (see Section 4, Receipt for Samples Form (CERCLA/RCRA/TSCA)). The Chain-Of-Custody Record also serves as a sample logging mechanism for the laboratory sample custodian. A separate Chain-of-Custody Record should be used for each final destination or laboratory used during the investigation.

All information necessary to fully and completely document the sample collection and required analyses must be recorded in the appropriate spaces to complete the field Chain-Of-Custody Record. The following requirements apply to Chain-Of-Custody records generated by either sample custody management software or by hand entry on pre-printed forms:

- All sampling team leaders must sign in the designated signature block.
- One sample should be entered on each line and not be split among multiple lines.
- If multiple sampling teams are collecting samples, the sampling team leader's name should be clearly indicated for each sample.
- The total number of sample containers for each sample must be listed in the appropriate column. Required analyses should be entered in the appropriate location on the Chain-of-Custody Record.
- The field sample custodian, project leader or other designee, and subsequent transferee(s) should document the transfer of the samples listed on the Chain-of-Custody Record. Both the person relinquishing the samples and the person receiving them must sign the form. The date and time that this occurs should be documented in the proper space on the Chain-of-Custody Record. The exception to this requirement would be when packaged samples are shipped with a common carrier. Even though the common carrier accepts the samples for shipment, they do not sign the Chain-of-Custody Record as having received the samples.

- The last person receiving the samples or evidence will be the laboratory sample custodian or their designee(s).

The Chain-of-Custody Record is a uniquely identified document. Once the Record is completed, it becomes an accountable document and must be maintained in the project file. The suitability of any other form for chain-of-custody should be evaluated based upon its inclusion of all of the above information in a legible format.

If chain-of-custody is required for documents received during investigations, the documents should be placed in large envelopes, and the contents should be noted on the envelope. The envelope will be sealed and an EPA custody seal placed on the envelope such that it cannot be opened without breaking the seal. A Chain-Of-Custody Record will be maintained for the envelope. Any time the EPA seal is broken, that fact will be noted on the Chain-Of-Custody Record and a new seal affixed, as previously described in this section.

Physical evidence such as video tapes or other small items will be placed in an evidence bag or envelope and an EPA custody seal should be affixed so that they cannot be opened without breaking the seal. A Chain-Of-Custody Record will be maintained for these items. Any time the EPA seal is broken, that fact will be noted on the Chain-of-Custody Record and a new seal affixed.

EPA custody seals can be used to maintain custody of other items when necessary by using similar procedures as those previously outlined in this section.

Samples should not be accepted from other sources unless the sample collection procedures used are known to be acceptable, can be documented and the sample chain-of-custody can be established. If such samples are accepted, a standard sample label containing all relevant information and the Chain-Of-Custody Record will be completed for each set of samples.

3.4 Transfer of Custody with Shipment

Transfer of custody is accomplished by the following:

- Samples will be properly packaged for shipment in accordance with the procedures outlined in SESD Operating Procedure for Packing, Marking, Labeling and Shipping of Environmental and Waste Samples (SESDPROC-209).

- All samples will be accompanied by the laboratory copy of the Chain-Of-Custody Record. If pre-printed forms are used, the white and pink sheets will be sent. If sample custody management software is used to generate the Chain-Of-Custody Record, the laboratory copy is identified with an "L" in the upper right corner. If multiple coolers are needed for shipment to a particular laboratory, the laboratory

copy of the Chain-Of-Custody Record for the entire shipment is placed in a sealed plastic bag in one of the coolers. When shipping samples via common carrier, the "Relinquished By" box should be filled in; however, the "Received By" box should be left blank. The laboratory sample custodian is responsible for receiving custody of the samples and will fill in the "Received By" section of the Chain-of-Custody Record. One copy of the Record will be provided to and retained by the project leader. After samples have been received and accepted by the laboratory, a copy of the Chain-of-Custody Record, with ASB sample identification numbers, will be transmitted to the project leader. This copy will become a part of the project file.

- If sent by mail, the package will be registered with return receipt requested. If sent by common carrier, an Air Bill should be used. The Air Bill number, shipment tracking number or registered mail serial number will be recorded in the remarks section of the Chain-Of-Custody Record.

4 Receipt for Samples Form (CERCLA/RCRA/TSCA)

4.1 Introduction

Section 3007 of the Resource Conservation and Recovery Act (RCRA) of 1976 and Section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) of 1980 require that a "receipt" for all facility samples collected during inspections and investigations be given to the owner/operator of each facility before the field investigator departs the premises. The Toxic Substances Control Act (TSCA) contains similar provisions. The laws do not require that homeowners or other off-site property owners be given this form.

4.2 Receipt for Samples Form

If necessary, a Receipt for Samples form, using either the pre-printed form or one generated by sample custody management software, is to be used to satisfy the receipt for samples provisions of RCRA, CERCLA and TSCA. The form also documents that split samples were offered and either "Received" or "Declined" by the owner/operator of the facility or site being investigated (if a sample is split with a facility, state regulatory agency or other party representative, the recipient should be provided (if enough sample is available) with an equal weight or volume of sample). All information must be supplied in the indicated spaces to complete the Receipt for Samples form.

- The sampler(s) must sign the form in the indicated location

- Each sample collected from the facility or site must be documented in the sample record portion of the form. The sample station number, date and time of sample collection, composite or grab sample designation, whether or not split samples were collected (yes or no should be entered under the split sample column), a brief description of each sampling location and the total number of sample containers for each sample must be entered.

- The bottom of the form is used to document the site operator's acceptance or rejection of split samples. The project leader must sign and complete the information in the "Split Samples Transferred By" section (date and time must be entered). If split samples were not collected, the project leader should initial and place a single line through "Split Samples Transferred By" in this section. The operator of the site must indicate whether split samples were received or declined and sign the form. The operator must give their title, telephone number and the date and time they signed the form. If the operator refuses to sign the form, the sampler(s) should note this fact in the operator's signature block and initial this entry.

The Receipt for Samples form is an accountable document after it is completed. A copy of the form is to be given to the facility or site owner/operator. The original form must be maintained in the project files.

5 Sample Custody Management Software

The container labels and the Chain-of-Custody record should be generated using a sample custody management software to streamline the documentation required by SESD and/or the Contract Laboratory Program (CLP) for sample identification and chain-of-custody. When possible, the sample custody management software should be used during all field investigations. Once the appropriate information is entered into the computer, the software will generate stick-on labels for the sample containers and will generate sample receipt forms and chain-of-custody records for the appropriate laboratory. The advantages to this system include faster processing of samples and increased accuracy. Accuracy is increased because the information is entered only once, and consequently, consistent for the bottle labels, sample receipt forms and chain-of-custody records. .

Region 4 U.S. Environmental Protection Agency Science and Ecosystem Support Division Athens, Georgia	
Operating Procedure	
Title: **Logbooks**	ID: **SESDPROC-1002-R0**
Issuing Authority: Deputy Director, SESD	
Effective Date: October 1, 2017	

Purpose

This procedure is specific to the Region 4 Science and Ecosystem Support Division (SESD) to maintain conformance to technical and quality system requirements. This procedure defines the process for documenting direct observations in logbooks or other record formats related to laboratory analyses, field investigations, or assessments of field sampling processes and laboratory operations of external entities.

Scope/Application

The requirements of this procedure apply to all personnel who perform work under SESD's quality system. This procedure contains requirements for documenting activities related to laboratory analyses, field investigations, or assessments of field sampling processes and laboratory operations of external entities and serves as a supplement to the overarching requirements for SESD records, outlined in the SESD Operating Procedure for Control of Records (SESDPROC-1001). While this SOP may be informative, it is not intended for and may not be directly applicable to operations in other organizations. Mention of trade names or commercial products in this operating procedure does not constitute endorsement or recommendation for use.

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1.0 Procedure

1.1 General Requirements

General requirements for SESD logbook or other record format entries related to laboratory analyses, field investigations, or assessments of field sampling processes and laboratory operations of external entities:

1. Observations, data and calculations will be recorded at the time they are made.
2. Dedicated bound logbooks will be used.
3. Entries will be legible, containing pertinent, accurate, and inclusive documentation of project activities, free of personal feelings or other terminology which might prove inappropriate.
4. Unless prohibited by environmental conditions, pens with permanent ink will be used to record all data. When environmental conditions do not make it feasible to use permanent ink, entries should be made using a non-smear lead pencil (e.g., 2H or 3H). Upon returning from the field, the project leader will photocopy the penciled section of the logbook and certify, in writing, that the photocopied record is a true copy of the original logbook entry. The photocopy will be included in the project file.
5. Entries in logbooks shall be dated and signed or initialed by staff.
6. Data or other information that has been entered incorrectly shall only be corrected using a single strike-through, date and initials of the person making the correction. Under no circumstances should the incorrect material be erased, made illegible or obscured so that it cannot be read.
7. To demonstrate continuity of the work and maintain the integrity of the data collection process, pages should not be removed from any bound logbook.
8. Blank pages or spaces should not be present in logbooks. Blank areas should be lined through and initialed and dated to prevent the opportunity for back-filling.
9. Logbook pages and books shall be numbered. The numbering format will consist of "page x of y", where "x" is the current page number and "y" is the total number of pages of the logbook.
10. To facilitate accurate and complete documentation of activities, SESD-generated forms may be used. In order to be utilized, SESD-generated forms must be bound prior to use and adhere to all requirements outlined in this procedure. In cases where unbound pages/forms are necessary due to project requirements or practicality, the appropriate Section Chief and System Manager will determine the best course of action.
11. If pre-printed adhesive labels are used in logbooks or bound forms to facilitate organization of information entry, the SESD staff responsible for taking notes will sign the label with the signature beginning on the label and ending on the page of the logbook such that the label cannot be removed without detection.

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1.2 Laboratory Logbooks

The following are requirements for laboratory logbooks, in addition to those established in Section 1.1. Each sample preparation, analysis or equipment check is maintained using logbooks in the appropriate laboratory. Active logbooks are maintained within the laboratory where the instrument or equipment is located and should be maintained with the instrument throughout its useful life. At such time the instrument is removed from service, the logbook is transferred with the appropriate form to the LQM, and then to the SESD Records Room.

1.2.1 Instrument Maintenance Logbooks

Each major instrument shall have a maintenance logbook. At a minimum the following information will be included:

1. Instrument serial number
2. Instrument's unique name
3. Software version
4. In-service date (if known)

In addition, maintenance, service and repair records are maintained in these logbooks. Preventive maintenance schedules should be noted in the log, or in a separate maintenance log. When a service or maintenance call is completed by the vendor, the analyst should place a copy of the documentation or transcribe the details for the work that was performed on the instrument in the logbook. The original work order invoice should be provided to the Office of Program Support for payment. Instrument Maintenance logbooks are purchased as bound record books that contain pre-numbered pages. The numbering convention does not account for the number of pages per book.

1.2.2 Instrument Logbooks

Instrument logs shall include:

1. Instrument serial number
2. Date of analysis
3. Analyst and samples which have been analyzed
4. A reference or a record of which options or analytical conditions were used for analysis
5. Where appropriate, instrument acceptance criteria (e.g., tune criteria, sensitivity checks)

1.2.3 Preparation Logbooks

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Preparation logs shall document all information to reconstruct the preparation of samples, reagents, and standards, and should include, but not limited to:

1. Analyst's name
2. Weights
3. Volumes
4. Lot number of digestion tubes
5. ID of any preparation equipment used
6. Certification dates of equipment, if applicable
7. Reagents/standards used
8. Preservation checks
9. Units
10. Any cleanup procedures used
11. Project Number/Name and Workorder Number will be included on each page.

Electronic traceability via Element® is an acceptable option for documenting standard preparation. If Element® is used as the standard prep log, it is subject to all the requirements of this section.

1.2.4 Analysis Logbooks

Electronic records, including spreadsheets which contain original measurements, may be used to create logbooks if all the required information can be captured by the instrumental software; however, a sequential analysis log must still be created and maintained. This is accomplished by printing a copy of the electronic record and including it in a notebook. These sequential logs must also include failed runs, or sequences which were abandoned prior to completion. When a pre-determined number of pages has been accumulated (e.g., 50 pages), the individual records are combined into a single bound logbook and retained as specified in the SESD Operating Procedure for Records Management (SESDPROC-1001). Any electronic records must accurately reflect actual analytical information. For analyses with holding times < 72 hours, or when time-critical or method-specified times are included in the analysis, the time of analysis must also be recorded.

1.2.5 Laboratory Equipment Logbooks

Equipment Logbooks, such as balance logs, are maintained in the lab in close proximity to the equipment. At a minimum the following information must be included:

1. Equipment serial number
2. Equipment unique name
3. Vendor name
4. In-service date (if known)

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In addition, calibration check, maintenance, service and repair information may also be recorded and/or maintained in the logbook.

1.3 Field Operation Logbooks

The following are requirements for field logbooks, in addition to those established in Section **1.1**

1.3.1 General Information Required in All Field Operations Logbooks

The following information shall be included either on the front cover or the first page of all field logbooks:

1. Project name
2. Project location
3. Project identification number
4. Project leader (full name)
5. Sample team leader (full name) and initials
6. Sample team member(s) (full names) and initials

In addition, the project's unique identifier (unique identification number(s)) will be included on each page.

Any deviations from the quality assurance project plan (QAPP) that occur while in the field shall be noted in the logbook(s). Field logbook entries that may be considered privileged or confidential information shall be handled in accordance with the relevant sections of SESD Operating Procedure for Control of Records (SESDPROC-1001). The logbooks will be placed in the SESD project file upon transmittal of the final report to the project requestor.

1.3.2 Information Required for Sample Collection

In addition to previously listed requirements, the following information will be included in all field logbooks when **samples** are collected:

1. Applicable SESD Operating Procedures for field sampling.
2. Date and time of collection.
3. Station identification, including GPS coordinates (non-logging GPS units), if applicable.
4. Sample identification.
5. Method of collection.
6. Number and type of containers (describe, as needed).
7. Sample collection equipment.

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8. SESD equipment identification number, if applicable.
9. Matrix sampled.
10. Physical description of sample.
11. Sample team member duties (calibration, collection, deployment, etc.).
12. Sample preservation method (e.g., indirect contact with ice), if applicable.
13. Environmental conditions such as rain, wind, smoke, dust, extreme temperature, etc., which may adversely impact quality of samples, if applicable.
14. Location of electronic data file backups, if applicable.
15. Monitoring of condition of ice in coolers or sampler, if applicable.
16. Date and time of sample arrival to SESD. Storage room for samples, even if it is for initial, temporary purposes.
17. Sample team member duties (e.g., calibration, equipment deployment, collection, sample preservation, sample preservation monitoring, etc.).
18. Other pertinent information.

1.3.3 Information Required for Field Measurements

In addition to previously listed requirements, the following information will be included in all logbooks when **measurements** are conducted:

1. Applicable SESD Operating Procedures for field measurement.
2. Date and time of measurement or instrument/equipment deployment.
3. Sample identification, if appropriate.
4. Station identification, including GPS coordinates (non-logging GPS units), if applicable.
5. Sample measurement equipment.
6. SESD sample measurement equipment identification number.
7. Manufacturer name, lot number and expiration date of all pH buffers and chemical standards.*
8. Calibration information, including before and after calibration readings.*
9. Meter and check information.
10. Equipment deployment depth and total depth, if applicable.
11. Pinger identification number and frequency for deployed equipment, if applicable.
12. Date and time of retrieval for deployed equipment, if applicable.
13. Matrix measured.
14. Physical description of matrix.
15. Measurement values for non-logging equipment.
16. Ambient air temperature, where applicable.

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17. Environmental conditions that may adversely impact quality of measurement (e.g., rain, wind, smoke, dust, extreme temperatures), if applicable.
18. Equipment or instrument maintenance performed, if applicable.
19. Meter malfunctions, troubleshooting efforts and final status, if applicable.
20. Location of electronic data file backups, if applicable.
21. Measurement team member duties (e.g., calibration, equipment deployment, measurement, maintenance, troubleshooting, etc.).
22. Other pertinent information.

* Entry of calibration information in logbooks is only required for calibrations conducted in the field. All calibrations conducted at the SESD Field Equipment Center or laboratory will be recorded in the appropriate equipment tracking logbook.

1.3.4 Additional Information for Inclusion in Field Activity Logbooks

The following visual information may be included in field logbooks, as appropriate:

1. Maps/sketches.
2. Photographic or video-graphic log.
3. Process diagrams.

1.4 Quality Assurance Field Documentation

The following are requirements for Quality Assurance (QA) field documentation, in addition to those established in Section 1.1. The following information shall be included either on the front cover or the first page of all QA field documentation:

1. Audit/facility name
2. Audit/facility location
3. Audit leader
4. Audit team members
5. Audit dates
6. Audit Identification Number

In addition to logbooks, QA uses checklists to document audits of methods and procedures during the onsite evaluation of laboratories and facilities. These checklists are printed and/or used electronically to document field observations. These electronic checklists are located on the SESD LAN and updated periodically as changes are needed.

1.5 Other Logbooks and Documentation

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Some methods and measurements do not use instrumentation to generate a result. For these methods, SESD relies on spreadsheets or other calculating software for recording/documenting original observations made (e.g., weights). All spreadsheets or other calculating software used as logbooks or used in support of data generation will be validated and controlled. All cells, except informational input cells, will be locked to prevent alteration of a formula or essential static information, such as the unique identifier. All calculations in electronic spreadsheets and calculating software files will be hand-validated by the responsible party and submitted through the Section Chief to the appropriate System Manager for approval and posting. The entire spreadsheet or software-generated electronic file will be password protected, which will be assigned by the System Manager at the time of posting on the LAN.

2.0 Definitions

None

3.0 Related Documents and Forms

U.S. EPA, Region 4, SESD, Analytical Services Branch, Logbook Transfer Form.

4.0 References

U.S. EPA, Region 4, SESD, SESD Field Branches Quality Management Plan, SESDPLAN-001, most recent version.

U.S. EPA, Region 4, SESD, ASB, Laboratory Operations and Quality Assurance Manual, most recent version.

U.S. EPA, Region 4, SESD, Records Management Standard Operating Procedures, most recent version.

U.S. EPA, Region 4, SESD, Quality Management Plan, most recent version.

U.S. EPA, Region 4, SESD, SESD Operating Procedure for Control of Records, SESDPROC-002, most recent version.

ISO/IEC 17025: General Testing for the Competence of Testing and Calibration Laboratories, 2nd Ed., 2005, 05/15/2015, Switzerland.

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ANAB, ISO/IEC 17025: Accreditation Requirements for Forensic Testing Laboratories, pp. 49, Document Number MA 3011, Effective Date: 02/02/2015.

5.0 Revision History

This table shows changes to this controlled document over time. The most recent version is presented in the top row of the table. Previous versions of the document are maintained by the SESD Document Control Coordinator.

History	Effective Date
SESDPROC-1002-R0, Logbooks, Original Issue	October 1, 2017

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Attachment 5

EPA Superfund Oversight Guidance Memo

CDM Smith

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
ENFORCEMENT AND
COMPLIANCE ASSURANCE

MEMORANDUM JAN 24 2007

SUBJECT: Superfund Oversight Guidance

FROM: Susan E. Bromm, Director Susan E Bromm
Office of Site Remediation Enforcement

TO: Office of Regional Counsel Superfund Branch Chiefs
Regional CERCLA Program Branch Chiefs
Regional Finance Office Branch Chiefs

The purpose of this memo is to transmit two guidance documents regarding Superfund oversight. These guidance documents reflect the coordinated efforts of the Office of Solid Waste and Emergency Response, the Office of the Chief Financial Officer, and my office, the Office of Enforcement and Compliance Assurance. By disseminating these guidance documents at the same time it confirms EPA's commitment to promote transparency in determination of oversight amounts.

The first, "Using RCRA's 'Results-Based Approaches and Tailored Oversight Guidance" when Performing Superfund PRP Oversight" should assist regions in determining the proper level of oversight to perform at a sight based on site specific conditions.

The second, "Additional Guidance on Prepayment of Oversight and Special Accounts" provides additional guidance on obtaining prepayment of oversight and the benefits of depositing such payments into special accounts.

If you have any questions, please contact Vince Velez, (202) 564-4972, or Melissa Franolich, (202) 564-6300, of my staff.

Attachments

cc: Superfund Program Enforcement Contacts

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

DEC 22 2006

MEMORANDUM

SUBJECT: Using RCRA's "Results-Based Approaches and Tailored Oversight Guidance" when Performing Superfund PRP Oversight

FROM: Susan E. Bromm, Director Susan E Bromm
Office of Site Remediation Enforcement

Barnes Johnson, Acting Director Barnes Johnson
Office of Superfund Remediation and Technology Innovation

TO: Superfund National Policy Managers, Regions I-X
Regional Counsel, Regions I-X

The purpose of this memorandum is to provide you with additional information in support of Superfund's Administrative Reform on PRP oversight. Attached is a copy of the Office of Solid Waste's "Results-Based Approaches and Tailored Oversight Guidance," dated September 2003, for facilities subject to corrective action under Subtitle C of the Resource Conservation and Recovery Act (RCRA). We ask that Superfund program managers consider the principles contained in Section III, Tailored Oversight, when developing oversight plans with PRPs for their Superfund sites.

As most of you already know, the Agency announced several new Superfund Reforms in October 1995. Among these reforms was an initiative to address the cost of oversight activities at sites where the responsible parties are performing work. In the intervening years, the Agency has taken steps to implement the PRP oversight reform. On May 17, 2000, we issued the current guidance entitled, "Interim Guidance on Implementing the Superfund Administrative Reform on PRP Oversight," OSWER Directive No. 9200.0-32P. This document emphasizes the need for open dialogue between EPA and PRPs who have settled with EPA as a way to foster improved relationships and to attain appropriate levels of oversight. This guidance recommends that EPA offer settling PRPs the opportunity to discuss their oversight expectations and to provide suggestions on how to conduct oversight. It also states that where PRPs have entered into agreements to pay EPA's oversight costs, EPA will strive to issue timely oversight bills.

More recently, EPA issued its "Results-Based Approaches and Tailored Oversight Guidance" for RCRA corrective action facilities which expands the "Corrective Action Oversight" guidance issued in January 1992. The Tailored Oversight guidance in Section III promotes flexibility and the use of different oversight levels within the corrective action program based on facility specific conditions "rather than a pre-determined *one size fits all* process." We recommend that Superfund program managers use this approach to compliment the current Superfund oversight guidance when considering the level of oversight to perform at a particular site.

If you have any questions, please contact Vince Velez, (202) 564-4972, or Sharon Cullen, (202) 564-6037, of OSRE. If you need a copy of the January 1992 "Corrective Action Oversight" guidance, please contact Vince or Sharon.

Attachment

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EPA 530-R-03-012
September 2003

Results-Based Approaches and Tailored Oversight Guidance

for Facilities Subject to Corrective Action Under Subtitle C of the Resource Conservation and Recovery Act

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I. Background

Why did EPA write this guidance?

In its ongoing effort to improve the RCRA Corrective Action Program[1], EPA, with the assistance of interested stakeholders, identified several improvements to increase the efficiency and cost-effectiveness of facility cleanups. One of those improvements, as outlined under the RCRA Cleanup Reforms announcement (EPA, 1999), was to issue guidance on results-based[2] approaches that emphasizes the importance of outcomes and eliminating unnecessary procedural steps. This guidance document provides an overview (Section II) of specific results-based approaches regulators and facility owners and operators can use to improve cleanups of hazardous waste facilities. This guidance also describes the benefits of "tailoring" regulatory oversight (Section III) of RCRA cleanups and specific recommendations with respect to the level of oversight that might be appropriate in a given situation.

EPA also wrote this guidance because we believe greater use of results-based approaches will help us achieve our short-term goals established in response to the Government Performance and Results Act (GPRA - see Highlight Box), as well as our long-term goals associated with facility-wide cleanups.

RCRA Corrective Action GPRA Goals

The GPRA goals for the RCRA corrective action program are that, by 2005, EPA and authorized states will have verified that 95% of 1,714 RCRA GPRA Cleanup Baseline facilities have met the Current Human Exposures Under Control environmental indicator and that 70% of baseline facilities have met the Migration of Contaminated Groundwater Under Control environmental indicator.

For more information regarding the RCRA Cleanup Baseline, refer to http://www.epa.gov/correctiveaction/facility.htm. For more information concerning environmental indicators, refer to http://www.epa.gov/correctiveaction/eis.htm

Who should use this guidance?

We wrote this guidance to help State and EPA regulators, owners and operators of facilities subject to RCRA corrective action, and members of the public better understand EPA's results-based strategy for RCRA corrective action. Throughout the rest of this guidance, we will refer to these three

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[1] Activities at permitted and/or interim status facilities that treat, store or dispose of hazardous wastes (TSD facilities) have sometimes resulted in releases of hazardous waste or hazardous constituents into soil, groundwater, surface water, sediments, or air. The RCRA Corrective Action Program requires such facilities to conduct investigations and cleanup actions as necessary to protect human health and the environment. See, e.g., RCRA Sections 3004(u)(v), and 3008(h) and 40 C.F.R. Section 264.101.

2 Results-based approaches was a fundamental message of the 1996 Advanced Notice of Proposed Rulemaking (ANPR; EPA, 1996) which the Agency still views as key operating guidance for the RCRA Corrective Action Program.

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groups as regulators, facilities, and the public, respectively. Sometimes, we will refer to all three groups collectively as "stakeholders."

This document provides guidance to EPA Regional and State corrective action authorities, as well as to facility owners or operators, and the general public on how EPA intends to exercise its discretion in implementing the statutory and regulatory provisions that concern RCRA corrective action. The RCRA statutory provisions and EPA regulations described in this document contain legally binding requirements. This document does not substitute for those provisions or regulations, nor is it a regulation itself. Thus, it does not impose legally-binding requirements on EPA, States, or the regulated community, and may not apply to a particular situation based upon the circumstances. EPA and State decisionmakers retain the discretion to adopt approaches on a case-by-case basis that differ from this guidance where appropriate. Any decisions regarding a particular facility will be made based on the applicable statutes and regulations. Therefore, interested parties are free to raise questions and objections about the substance of this guidance, and the appropriateness of the application of this guidance to a particular situation. EPA will consider whether or not the recommendations or interpretations in the guidance are appropriate in that situation.

II. Results-Based Approaches for RCRA Corrective Action

What do we mean by "results-based approaches" for RCRA Corrective Action?

The purpose of the Corrective Action program is to address releases of hazardous waste and hazardous constituents at RCRA facilities in a timely and protective manner. Results-based approaches emphasize outcomes, or results, in cleaning up releases, and strive to tailor process requirements to the characteristics of the specific corrective action. Results-based approaches involve, where appropriate, setting goals, providing procedural flexibility in how goals are met, inviting innovative technical approaches, focusing data collections, and letting owner/operators undertake cleanup action with reduced Agency oversight. Under such approaches, facilities are held fully accountable for the results they agree to achieve.

EPA's results-based strategy conveyed in this guidance provides a recommended framework for RCRA program implementors to run programs that effectively use available corrective action cleanup tools and private party and regulatory agency resources to address environmental problems. We recommend regulators weigh the facility-specific circumstances, including the cooperativeness and technical capability of the facilities, in deciding the specific approaches to be taken at a given facility.

What are the benefits of results-based corrective action?

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Encourages regulators and facilities to design approaches and processes that are appropriate for their particular facilities;
Generally achieves faster environmental results;
Provides opportunities for resource savings to both the facility and regulatory agency; and
Maximizes efficiency of a cleanup

What are EPA's expected program results?

The overarching goal of the corrective action program is to clean up contaminated facilities as necessary to protect human health and the environment.

In the short-term, the corrective action program generally focuses on preventing unacceptable exposures to humans and prevent the further migration of contaminated groundwater. To ensure long-term protection, EPA recommends that regulators and facilities use the following threshold criteria as general goals for final cleanups and as screening tools for potential remedies:

1. Achieve media cleanup objectives[3]; and
2. Control the source(s) of release so as to reduce or eliminate, to the extent practicable, further releases of hazardous waste or hazardous constituents that may pose a threat to human health and the environment.

Protecting human health and the environment is the mandate of the RCRA statute and regulations; therefore, it is appropriate that remedies should meet the criteria outlined above as a means to demonstrate progress toward achieving the overall mandate to protect human health and the environment.

For further information with regards to RCRA guidance documents, Section VI has a listing of specific reference documents which are available on-line.

What are some approaches to results-based corrective action?

Below are brief descriptions of five core results-based approaches that we recommend facilities and regulators consider at any corrective action site to promote results-based corrective action. Also described are four supplemental results-based approaches that may expedite cleanups. Because they are more dependent on the presence of specific site factors, the supplemental approaches are not expected to be applicable as often as the core approaches. Section III of this document provides more detailed guidance on "Tailored Oversight" because we believe this concept is generally a very effective approach to expediting cleanups and ensuring that facilities achieve cleanup goals. We recommend that any tailored oversight approach chosen be consistent with any permit, order or other enforceable mechanism that

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[3] Media cleanup objectives for final remedies typically includes the more specific concepts of media cleanup levels, points of compliance, and cleanup time frames. In previous guidance (EPA, 1996a - page 19449), EPA referred to media cleanup objectives as media cleanup standards; we now use media cleanup objectives to avoid confusion over the term "standard" that is often associated just with numeric values.

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applies to a facility.

Results-Based Approaches We Recommend Considering at All Corrective Action Facilities

Tailored oversight - Oversight, in general, is the responsibility of the lead regulator[4] to ensure the facility implements corrective action. Tailored oversight is an oversight plan developed based on facility-specific conditions such as site complexity, compliance history, and financial and technical capability of the facility. In addition to discussing and using results-based approaches with facilities, we recommend regulators evaluate the facility-specific conditions and develop a plan with an appropriate level of oversight that will enhance timely, efficient, and protective cleanups. Tailored oversight may result in the elimination of administrative or technical steps, usually for facilities who have agreed to, and have demonstrated that they are capable of, meeting the environmental objectives and specific requirements established for their facility. In some instances, an analysis of facility capabilities may result in greater oversight to ensure environmental results are achieved in a timely manner.

Holistic Approach - The 1996 ANPR states, "In general, EPA believes that a holistic approach to corrective action, could increase cleanup efficiency and reduce transaction costs." (61 FR 19432, May 1, 1996, 19456). The term "holistic" in this context means taking a "big picture" look so facility representatives and regulators can prioritize their resources based on risk[5] to human health and the environment. For example, in a situation where there are many on-site sources of contamination contributing to an off-site plume of contaminated groundwater, a holistic approach could first focus on identifying and controlling, in the near-term, current risks to humans from the site as a whole. Subsequent to controlling these risks, the facility could then conduct additional focused investigations to help evaluate additional cleanup activities needed to achieve other short- and long-term cleanup objectives associated with individual sources. EPA believes that viewing corrective action sites holistically is particularly appropriate to help meet Environmental Indicator goals. Ultimately, the facility would still be responsible for meeting final remedy corrective action goals.

Procedural flexibility - Regulators and facilities place their primary focus on environmental results and ensure that each corrective action-related activity at a given facility directly supports cleanup goals at that site. Corrective action is generally structured around seven elements common to most cleanups: initial facility assessment, site characterization, short-term (interim) actions, remedy evaluation and selection, remedy implementation, remedy completion and public participation. EPA emphasizes that no individual results-based approach that implements these

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[4] A "lead regulator" is typically the first-line staff person for the government authority that is responsible for ensuring that a facility implements corrective action as necessary to meet facility-specific corrective action goals. The lead regulator, could depending on the circumstances, either be a federal employee working in an EPA regional office or an employee of a particular State or Territory (EPA, 2001).

[5] "Risk-based decision making is especially important in the corrective action program, where it should be used to ensure that corrective action activities are fully protective given reasonable exposure assumptions and consistent with the degree of threat to human health and the environment at a given facility." (EPA, 1996; page 19441)

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cleanup elements is likely to be appropriate for all corrective action facilities. EPA continues to encourage regulators and facilities to focus on the desired result of cleanup rather than a predetermined (or "generic") step-by-step cleanup process that does not reflect site-specific circumstances. We recommend these seven elements be viewed as evaluations generally necessary to make good cleanup decisions. By focusing on results, regulators are encouraged to use the most effective approaches for facility management and oversight.

Performance Standards - The regulator, working (as appropriate) with the facility, develops general performance standards to prescribe the scientific, technical, and administrative requirements the facility must fulfill in order to implement and ultimately complete corrective action. Under this approach, it is anticipated that the facility, not the regulator, is responsible for determining the methods by which the performance standards are attained, *e.g.,* designing a remedy that will meet the required performance standard. That is, the regulator establishes clear, reasonable, and protective performance standards, while the facility (with an appropriate level of regulatory oversight) determines how those standards are met.

Targeted (or Focused) Data Collection - As described in the 1996 ANPR, there are a variety of results-based approaches that regulators and facilities might use to focus data gathering efforts to identify and implement appropriate responses at a corrective action facility. For example, EPA encourages facilities and regulators to develop and use a conceptual site model[6] (CSM) to identify and prioritize data needs based on a particular corrective action goal. Additionally, facilities might dramatically improve the effectiveness and efficiency of data collection by taking advantage of numerous innovative site characterization techniques.[7] Also, EPA recommends using data quality objectives[8] (DQOs) to identify the amount, type, and quality of data needed to support corrective action decisions (EPA, 1994; page 19445).

Supplemental Results-Based Approaches

Presumptive Remedies - As EPA worked through hundreds of individual cleanups, the Superfund program found that similar remedies were successfully used to address many similar sites. This makes sense because certain types of sites, such as wood treater sites, used similar processes which resulted in similar contamination problems. EPA calls the similar approaches used to address these similar sites "presumptive remedies"[9] and has developed a series of presumptive remedy guidance documents for particular categories of sites (e.g., landfills, metals

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[6] A Conceptual Site Model is a three-dimensional representation of what is known or suspected about the sources, releases, and release mechanisms, contaminant fate and transport, exposure pathways and potential receptors, and risk.

[7] To access detailed information, guidance and other resources pertaining to innovative site characterization tools and approaches, see http://www.clu-in.org/char1.cfm

[8] The overall degree of data quality or uncertainty that a decision maker is willing to accept is referred to as the Data Quality Objective (DQO) for a decision.

[9] EPA defines presumptive remedies as preferred technologies for common categories of sites, based on historical patterns of remedy selection and EPA's scientific and engineering evaluation of how well technologies perform (EPA, 1993).

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in soils, volatile organics in soils, contaminated groundwater, wood treaters). As stated in the 1996 ANPR, EPA recommends presumptive remedies be used at "...appropriate sites, including RCRA facilities, to help ensure consistency in remedy selection and implementation, and to reduce the cost and time required to investigate and cleanup similar types of sites." EPA's guidance on presumptive remedies is available at Http://www.epa.gov/superfund/resources/presump/index.htm.

Innovative Technologies - EPA recommends regulators and facilities use innovative technologies when they offer the potential for comparable or superior treatment performance or implementability, fewer adverse impacts, or lower costs for equivalent levels of performance when compared to more conventional technologies. When results-based cleanups allow for innovative approaches, we recommend the overseeing agency require the owner or operator to document the agreed-upon results. We believe that results-based approaches can provide for this kind of flexibility to incorporate many different technical solutions and approaches to facility management. EPA's Office of Superfund Remediation and Technology Innovation maintains a website (http://www.clu-in.org/) that offers a number of resources related to innovative technologies.

Phased Approach - Facilities and regulators may improve efficiencies by phasing corrective action to focus first on areas that represent the greatest short-term threat to human health and/or the environment. For example, a phased approach might first focus the facility on meeting corrective action environmental indicators (EIs), then after meeting EIs, the regulator and facility can discuss cleanup time frames and how to achieve intermediate milestones, where appropriate, or final cleanup goals using a phased approach. Phased approaches may also benefit situations where the facility is interested in selling or redeveloping parts of their property.

Facility-Lead (or Voluntary) Corrective Action Agreements - A facility-lead corrective action agreement is typically a letter from the regulatory agency to the facility that generally (1) outlines the intent of the facility to undertake corrective action, and (2) contains broad performance standards that provide a framework to guide corrective action. The advantage of this approach is that it can provide an opportunity to expedite corrective action activities and reduce the amount of resources expended by facilities and regulators. In the normal case, this letter is non-binding, but may appeal to a facility who wants to sell its property or conduct corrective action requirements prior to a permit, order or other enforceable mechanism being implemented. Facilities interested in a facility-lead approach should contact the regulator if they are interested in this option. Under facility-lead corrective action, as in any corrective action approach, it is important for all parties to understand what environmental results are expected by the regulator and how the facility should go about meeting the results with the appropriate level of oversight. We recommend the facility provide meaningful opportunities for public participation. In our experience, this is typically crucial in order for it to be a success. In particular, we recommend the public be provided an opportunity to review and comment on the cleanup activities.

III. Tailored Oversight

What is tailored oversight?

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As stated previously, oversight, in general, is the responsibility of the lead regulator to ensure the facility implements corrective action in accordance with applicable requirements. Under a tailored oversight approach, regulators and facilities (where appropriate) develop a plan that allows for the appropriate level of oversight for a particular facility rather than a pre-determined "one size fits all" process. We recommend the regulator base the oversight plan on, among other appropriate factors, facility-specific conditions and facility capabilities.

We recommend that state and federal regulators, as appropriate, evaluate and implement tailored oversight at facilities requiring corrective action. Tailored oversight is a significant tool in the overall diversified strategy of results-based project management. EPA recommends program implementers use tailored oversight to help run programs that effectively and efficiently use resources to address environmental problems.

This guidance does not supersede EPA's previous guidance (January 1992) that addressed the subject of tailored oversight at corrective action facilities; rather, it reaffirms and expands the previous guidance to recommend that regulators tailor oversight to facility-specific circumstances. Both this and the 1992 guidance stress that there are flexible approaches to oversee cleanups.

What are the benefits of tailored oversight?

The potential benefits of tailored oversight are:

Focuses stakeholders on goals;
Provides an opportunity for resource savings for both the implementing agency and the facility;
May lead to faster results because expectations are clearly communicated and documented;
Streamlines administrative steps such as interim deliverables and duplicative federal/state reviews;
Tailors oversight resources to site-specific factors; and
Provides a high level of certainty to stakeholders because corrective action objectives and the oversight approach is discussed at the beginning of corrective action activities.

Does tailored oversight result in less protective cleanups?

No. EPA's goal remains the same – that is, protection of human health and the environment. Tailored oversight does not change the overall expected results of the RCRA Corrective Action program. It simply offers opportunities, where appropriate, for a facility to reach those results faster. Achieving protection of human health and the environment more efficiently is a benefit to all stakeholders.

How does a regulator use tailored oversight?

EPA recommends that regulators consider the following factors[10] when tailoring their

[10] Recommended factors are based on experience of EPA regional and state personnel overseeing corrective action, and previous EPA guidance (EPA, 1992; EPA, 1996b; EPA, 1997a; and, EPA 2001e)

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oversight at a particular facility.

- Severity of risk (see Highlight box) to human health and/or the environment;
- Site complexity;
- Compliance history of the facility;
- Public interest or facility's record on public involvement;
- Existence of incentives and motivation to expeditiously and willingly clean up the facility; and
- Demonstrated technical capability of facility

In determining the appropriate level of oversight, we recommend regulators consider each factor against the site-specific conditions that exist at the facility. For example, a reduced oversight approach might be appropriate for even a complex site where the facility is undertaking significant stakeholder outreach, has gained the trust of the community, is cooperative with the overseeing agency, and has a good compliance record.

In our experience, compliance history has been a key factor regulators use in determining the level of oversight for a given corrective action facility. For example, oversight might be reduced where a facility has demonstrated a willingness and ability to cooperatively perform necessary cleanup activities. For non-compliant facilities, oversight might need to be increased to help bring these parties back into, or ensure future compliance.

Another element in analyzing how to tailor oversight is the facility's active participation in developing a tailored oversight approach. In addition, in our experience, a facility's willingness and motivation to achieve short term measures or final cleanup increase the likelihood of a successful outcome using tailored oversight. Again, we recommend regulators determine an appropriate level of oversight based on the previously recommended factors.

What are some of the general questions we generally ask when we evaluate risk at a facility?

What is/are the:

- actual or potential exposures of nearby populations, animals, or plants to hazardous constituents
- actual or potential contamination of drinking water supplies or sensitive ecosystems
- other situations that may pose threats to human health or the environment.
- presence of hazardous wastes or hazardous constituents in drums, barrels, or bulk storage containers that may pose a threat of release
- risks of fire or explosion or the potential for exposure to hazardous constituents as a result of an accident or failure of a container or handling system
- presence of high levels of hazardous constituents in soils at or near the surface that may migrate
- further degradation of the affected media that may occur if remedial action is not initiated expeditiously
- weather conditions that may cause releases of hazardous constituents or migration of existing contamination
- the time required to develop and implement a final remedy

Regardless of the level of oversight used at a facility, we recommend that the overseeing agency ensure that the facility is required to attain and document results. Clear and measurable results (e.g., Environmental Indicators, final cleanup levels, public participation opportunities, performance standards), established at the beginning, should help the facility demonstrate that the remedy meets RCRA requirements.

How does EPA recommend results-based corrective action objectives be established under

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tailored oversight approaches?

In EPA's experience, the cornerstone of effective oversight of corrective action activities is a clear – and documented – understanding of facility-specific cleanup goals[11]. Clear goals can greatly enhance the prospect of achieving results that will satisfy EPA or the State. We recommend that regulators and facilities describe goals in all key decision documents and reports, and ensure that the public has access to this information. Tailored oversight, without clearly defined goals, is susceptible to unfocused investigations, irrelevant data, slow cleanups, and added costs.

What are some examples of situations where a regulator might tailor his/her oversight?

Regulators and facilities should be aware that the level of needed oversight might change throughout the course of corrective action based on facility-specific issues. Furthermore, we recommend that regulators and facilities, where appropriate, balance streamlining objectives with public information needs when developing tailored oversight plans. Once the overall level of oversight is established, specific levels of oversight can be determined for specific activities. For example, general expectations for low, medium, and high levels of oversight might be:

Low Oversight - minimal role of the regulator that primarily consists of establishing performance standards and verifying that the facility has achieved these standards, after certification by the facility. When there are compliance schedules in a permit that extend beyond a year, refer to 40CFR § 264.100.

Medium Oversight - increased role of regulator, including increased informal discussions, facility visits, inspections, and more stringent review and verification of an increased number of submittals.

High Oversight - the regulator directly oversees an intensive effort during which all documents are reviewed and discussed with the facility.

The following is a list of some oversight reducing activities that regulators might adapt as appropriate based on facility-specific circumstances. These include, but are not limited to:

- Eliminating duplicative state/federal reviews of documents;
- Eliminating interim deliverables while maintaining accountability of the facility to produce a measurable end product;
- Limiting review where agency approval is not required for the facility to proceed;
- Increasing the use of meetings, briefings, and other communication methods to identify and resolve issues early on rather than requiring formal documents be submitted and reviewed by the Agency;
- Limiting the number of facility visits for routine field activities when the facility demonstrates competence in achieving remedial results;
- Establishing performance standards that define clear and attainable results;
- Using briefings, conversations, and progress reports from the facility to replace some of the

[11] Refer to Section II of this document for an overview of short- and long-term cleanup goals for RCRA Corrective Action.

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formal interim deliverables while still making this information publicly available where appropriate; and,

- Encouraging communication among the regulator, facility and the community (e.g., make up-to-date facility information available at publically accessible locations). EPA believes public participation is a key component of the corrective action process

How does tailored oversight affect formal reporting?

Under a tailored oversight approach, the regulator might modify the number of formal reports a facility submits to the agency based on facility-specific factors and the facility's capabilities. For example, the regulator might replace some of the traditional formal reporting requirements, with informal communication approaches. In such a case, we recommend the permit, order or other enforceable mechanism be written to allow informal communication and reporting. If, however, a regulator tailors oversight at this level and the facility does not achieve the stated or agreed-upon results, the regulator might find it appropriate to alter the oversight plan (and implementing mechanism), if necessary, to include more formal reporting requirements and a higher level of oversight.

Although EPA generally expects a facility to submit a reduced number of documents when tailored oversight is implemented, the administrative record requirements for such corrective actions remain the same for any corrective action. Agency staff should consult with their Office of Regional Counsel regarding appropriate documentation for the Agency's corrective action decisions.

The Guidance on Enforcement Approaches for Expediting RCRA Corrective Action (EPA, 2001c) provides examples of how an Agency might limit time spent negotiating consent orders and permits, establish time limits to negotiate work plans, consider fixed and flexible schedules of compliance, and limit a facility's revision opportunities.

Does tailored oversight mean reduced data quality?

No. Under the tailored oversight discussed in this guidance, the regulator works with the facility to ensure the appropriate level of oversight. Part of tailoring oversight is defining the problem that the facility needs to address. Once the regulator defines the problem, he or she can help the facility develop a data gathering plan to obtain sufficient high quality data that will allow for remedy decisions. Regardless of the level of oversight, the facility has the responsibility to provide sufficient quality data to verify that the agreed upon results have been met. Documentation allows the regulator and the public to assess the decisions that the facility

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performed during corrective action. EPA recommends facilities use the data quality objectives as a framework to explain their data and decisions in the context of facility goals (see EPA, 1994a).

Does tailored oversight mean less communication between the facility and the regulator?

No. In fact, the tailored oversight approach is designed to result in more effective and timely communication between the regulator and the facility. As previously stated in this guidance, we generally expect that reduced oversight approaches will lead to an increase in less formal meetings, briefings and other communication methods to identify and resolve issues. This informal approach reduces the amount of formal procedure, but may provide more frequent contact between the regulator and the facility.

What general activities occur during a cleanup that EPA recommends a regulator discuss with a facility before, during, and after developing a tailored oversight plan?

The general activities listed below are typically discussed in characterizing and remediating a facility. The activities do not distinguish between the regulator's or the facility's responsibility, but rather what usually happens when both work together. They may seem overly simplified, but we think that recognizing and understanding each one is a good starting point for regulators and facilities involved in a facility cleanup.

General Cleanup Activities

- Review site history;
- Determine the nature and extent of environmental contamination;
- Stabilize (i.e., control) problems if they represent a near-term unacceptable threat to human health or the environment;
- Notify and solicit input from the public at the beginning of corrective action, at key junctures, and as appropriate given site-specific circumstances;
- Work with appropriate parties to determine how decisions will be made for the following:
  - relative priority of problems
  - future land use
  - establishing cleanup goals and risk levels
- Develop reasonable alternatives to clean up priority areas of contamination, which might include consideration of appropriate presumptive remedies that might eliminate the need to evaluate multiple remedy alternatives;
- Evaluate remedy alternatives;
- Make decisions (e.g., relative priority, land use, cleanup goals and risk levels, remedy selection) using the rules you developed above that include consideration of all key stakeholder opinions and values;
- Implement the remedy; and
- Keep good records and document all key decisions throughout corrective action implementation

Can tailored oversight lead to resource savings?

Yes. While the actual remedy cost (e.g., excavation and treatment) may not change,

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innovative technologies, presumptive remedies, tailored interim deliverables, and other results-based tools may provide substantial cost savings in the total costs expended by the regulatory agency and facility.

How does tailored oversight ensure public involvement?

EPA is committed to substantial and meaningful involvement of communities throughout RCRA corrective action activities. We recommend regulators and facilities develop and maintain effective community involvement by developing a public participation strategy at the beginning of the corrective action process.

Timely and meaningful public participation is generally key to community acceptance of the remedy. In addition to establishing the typical mandatory public involvement at critical stages of decision making in corrective action activities, EPA continues to recommend frequent, meaningful public involvement for corrective action activities in general.

EPA's general expectations for public participation, as conveyed in Chapters four and five of *The RCRA Public Participation Manual* (EPA, 1996a), are that facilities and regulators should involve the public early in corrective action and share responsibilities for public participation activities. Another rule on public participation is the *RCRA Expanded Public Participation Rule* (EPA, 1995) which contains many of the same concepts and ideas as the Public Participation Manual. Note that it might be appropriate, based on site-specific circumstances, to include additional public participation in situations where there is less regulatory oversight.

In general, we recommend regulators and facilities provide opportunities for meaningful public participation throughout corrective action, as appropriate, given site-specific circumstances and community interest. We recommend public participation generally occur at the:

- Initiation of corrective action;
- Selection of significant interim measures, as appropriate;
- Selection of final remedy; and,
- Completion of corrective action

How will the regulatory agency use enforcement under tailored oversight approaches?

If a facility has not met deadlines or the agreed upon results, then there are a number of enforcement options. Identifying enforcement options is likely to be especially important when tailored oversight is extended over a long period of time. For non-compliance, enforcement options might include taking formal enforcement action (e.g., enforcing the corrective action provisions of the permit, issuing an order, referring a case to the Department of Justice), collecting stipulated penalties, and putting facilities on strict oversight and compliance schedules. For additional guidance on enforcement, refer to EPA, 2001c.

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What are some examples of activities that facilities might conduct under a tailored oversight approach?

Initial Site Assessments	Where RCRA Facility Assessments (RFAs) have not yet been completed, the regulator might allow facilities to choose to conduct their own site assessment or characterization, and submit the report for regulatory review. If the regulator believes the site assessment is adequate, they might approve and adopt it as the RFA for the facility.
Evaluate Environmental Indicators	Under a tailored oversight plan, the regulator might allow the facility to complete evaluations for the Current Human Exposures Under Control and Migration of Contaminated Groundwater Under Control environmental indicators and then submit it for Agency review and ultimate decision-making.
Interim (or Short-Term) Measures	The nature and scope of the interim measure may allow us to rely on simple confirmation sampling or self-documentation of achieving a particular performance standard without involving ourselves heavily in the design phase or may allow the facility to prove their capability and earn reduced oversight on later, larger project components.
Public Involvement	Stakeholder involvement is typically extremely important in corrective action cleanups, regardless of the levels of oversight used.
Final Remedy Selection and Implementation	Using a tailored oversight approach, EPA expects remedies to protect human health and the environment. Cleanup goals are generally conveyed terms of media cleanup levels, points of compliance, cleanup time frames, and source control. Public comments should be taken into account in the remedy decision.

Once a regulator develops a tailored oversight plan for a facility, what goals and milestones does EPA recommend regulators require them to use to measure progress?

The goal of the corrective action program is to protect human health and the environment. We recommend the specific goals and milestones that regulators, as well as facilities use to measure progress be linked to the major corrective action activities (e.g., facility-wide assessments, evaluating whether cleanup actions are needed for all releases, selecting final remedies within an acceptable risk range and hazard index, public participation throughout corrective action, and a preference for treatment of principle threats). In protecting human health and the environment, we recommend that regulators select a remedy that attains appropriate media clean-up standards, controls, where necessary, the source(s) of releases to reduce or eliminate further releases of hazardous waste, and complies with applicable standards for waste management. We recommend that regulators and the facility state these goals and milestones, where appropriate, in all key decision documents and reports.

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For the near-term, we recommend the regulator and the facility focus on the two environmental indicators which are the primary short-term goals of the corrective action program. Because environmental indicators focus on results, they might, where appropriate, serve well as short-term results measures for remedial activities. While meeting these indicators is an appropriate near-term goal, we recommend regulators emphasize that final cleanup is the ultimate goal for corrective action. Additionally, we recommend the regulator and the facility establish, at the beginning, public participation milestones throughout the corrective action process.

IV. Conclusion

By focusing on tailoring process requirements to site-specific circumstances, regulators and facilities may more efficiently and cost-effectively manage facility-wide clean ups that protect human health and the environment. Results-based approaches provide the RCRA program with tools to address environmental contamination in ways that protect human health and the environment while tailoring the approaches to facility-specific factors. We recommend regulators use the results-based approaches outlined in this guidance, where appropriate, to help facilities fulfill their corrective action obligations.

Tailored oversight is an integral part of results-based corrective action. We recommend regulators look at their oversight levels on a facility-specific basis and make the appropriate adjustments. Using tailored oversight approaches, regulators eliminate administrative or technical steps, as appropriate, for facilities that have shown they are capable of meeting the environmental objectives established for their facilities. Tailored oversight is designed to help focus activities on environmental results rather than "one-site-fits-all" process steps and ensure that each corrective action-related activity, at any given facility, directly supports cleanup goals at that facility.

V. Contacts

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VI. References

EPA, 2001a. Handbook of Groundwater Protection and Cleanup Policies for RCRA Corrective Action (EPA/530/F-01/021, September). Available at http://www.epa.gov/correctiveaction/resource/guidance/gw/gwhandbk/gwhndbk.htm

EPA, 2001b. Risky Business? An Overview of Risk Assessment and RCRA (EPA/530/F-00/032, February). Available at http://www.epa.gov/epaoswer/osw/docs/riskfinal.pdf

EPA, 2001c. Guidance on Enforcement Approaches for Expediting RCRA Corrective Action (January). Available at http://www.epa.gov/compliance/resources/policies/index.html

ED_013295_00000003-00248

EPA, 2001d. RCRA Cleanup Reforms Round II -- Fostering Creative Solutions (EPA/530/F-01/001, January). Available at http://www.epa.gov/epaoswer/hazwaste/ca/reforms.htm

EPA, 2000a. Institutional Controls: A Site Manager's Guide to Identifying, Evaluating and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanups (EPA/540/F-00/005, September). OSWER Directive 9355.0-74FS-P. Available at http://www.epa.gov/epaoswer/hazwaste/ca/resource/guidance/ics/icfactfinal.pdf.

OSWER directive (9230.0-75) "Federal Facilities Streamlined Oversight Directive Objective"; November 29, 1996.

OSWER directive (9200.4-15); (See EPA 1996b) OSWER Directive (9200.0-32P) "Interim Guidance on Implementing the Superfund Administrative Reform on PRP Oversight" on 5/17/2000). Available at Http://www.epa.gov/superfund/programs/reforms/docs.htm

EPA, 1999a. RCRA Cleanup Reforms (EPA/530/F-99/018, July). For more information, refer to http://www.epa.gov/epaoswer/hazwaste/ca/reforms.htm

EPA, 1999b. Interim Final Guidance for RCRA Corrective Action Environmental Indicators (February 5). Available at http://www.epa.gov/epaoswer/correctiveaction/eis/ei_guida.pdf

EPA, 1998a. RCRA Orientation Manual (EPA/530/R-98/004). Available at http://www.epa.gov/epaoswer/general/orientat/index.htm

EPA, 1998b. Hazardous Waste Identification Rule for Contaminated Media, Final Rule (63 FR 65874). Available at http://www.epa.gov/epaoswer/hazwaste/id/hwirmdia.htm

EPA, 1998c. EPA memorandum on "Management of Remediation Waste Under RCRA" (October). Available at http://www.epa.gov/epaoswer/correctiveaction/workshop/remwaste/memo.pdf.

EPA, 1998d. Memorandum from Elizabeth Cotsworth to RCRA Senior Policy Advisors titled, Risk-Based Clean Closure (March 16). Available at http://www.epa.gov/correctiveaction/resource/guidance/risk/cclosfnl.pdf.

EPA, 1998e. Standards Applicable to Owners and Operators of Closed and Closing Hazardous Waste Management Facilities: Post-Closure Permit Requirement and Closure Process; Final Rule (63 FR 56710). Available at http://www.epa.gov/fedrgstr/EPA-WASTE/1998/October/Day-22/f28221.pdf.

EPA, 1997a. EPA memorandum "Lead Regulator Policy for Cleanup Activities at Federal Facilities on the National Priorities List" (November).

EPA, 1997a. Memorandum from Elliott P. Laws and Steven A. Herman to RCRA/CERCLA Senior Policy Managers titled, "Use of the Corrective Action Advance Notice of Proposed Rulemaking as Guidance" (January 17). Available at http://yosemite.epa.gov/osw/rcra.nsf/documents/8BF009F9B367256385256611 0072DA71.

ED_013295_00000003-00249

EPA, 1997b. Rules of Thumb for Superfund Remedy Selection (EPA/540/R-97/013). Available at http://www.epa.gov/superfund/resources/rules/rulesthm.pdf

EPA, 1997c. A Citizen's Guide to Understanding Presumptive Remedies (EPA/540/F-97/019, October). Available at http://www.epa.gov/superfund/resources/presump/finalpdf/citizen.pdf

EPA, 1996a. RCRA Public Participation Manual (EPA/530/R-96/007). Available at http://www.epa.gov/epaoswer/hazwaste/permit/pubpart/manual.htm Particularly relevant pages: 2.5-2.7.

EPA, 1996b. Reducing Federal Oversight at Superfund Sites with Cooperative and Capable Parties (July). OSWER Directive 9200.4-15. Available at: Http://www.epa.gov/superfund/programs/reforms/docs.htm.

EPA, 1996c. Soil Screening Guidance Fact Sheet (EPA/540/F-95/041, July). Available at http://www.epa.gov/oerrpage/superfund/resources/soil/

EPA, 1996d. Advance Notice of Proposed Rulemaking (61 FR 19432, May 1). Available at http://www.epa.gov/docs/fedrgstr/EPA-WASTE/1996/May/Day-01/pr-547.pdf.

EPA, 1995. RCRA Expanded Public Participation Rule (60 FR 63417). Available at http://www.epa.gov/epaoswer/hazwaste/permit/pubpart.htm

EPA, 1994a. Guidance for the Data Quality Objective Process (EPA/600/R-96/055, September). Available at http://www.epa.gov/correctiveaction/resource/guidance/qa/epaqag4.pdf

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

DEC 22 2006

MEMORANDUM

SUBJECT: Additional Guidance on Prepayment of Oversight Costs and Special Accounts

FROM: Susan E. Bromm, Director
Office of Site Remediation Enforcement
Office of Enforcement and Compliance Assurance

Barnes Johnson, Acting Director
Office of Superfund Remediation Technology Innovation
Office of Solid Waste and Emergency Response

Lorna McAllister, Director
Office of Financial Management
Office of the Chief Financial Officer

For Milton Brown, Director
Office of Financial Services
Office of the Chief Financial Officer

TO: Superfund National Policy Managers, Regions I-X
Regional Counsel, Regions I-X
Regional Comptrollers, Regions I-X

I. INTRODUCTION

The purpose of this memorandum is to provide additional guidance on the prepayment of oversight costs discussed in the October 4, 2002 "Consolidated Guidance on the Establishment, Management and Use of CERCLA Special Accounts" ("Consolidated Guidance"). Attached to this memorandum is sample settlement language for the prepayment of oversight costs.[1] This language was developed in consultation with the Department of Justice Environmental Enforcement Section.

[1] While the sample language in Attachment 1 is for an RD/RA Consent Decree, it may be modified to accommodate other types of settlements for performance of work (e.g., RI/FS, removal action).

II. BACKGROUND

Section 122(b)(3) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. § 9622(b)(3), authorizes EPA to retain and use funds received through an agreement to pay for response actions contemplated in the agreement. EPA retains these funds in site-specific accounts, called "special accounts," which are subaccounts within the EPA Hazardous Substance Superfund ("Trust Fund"). EPA uses these funds to address response actions at a site.[2] EPA considers oversight of work performed by a PRP to be a response action.[3] The Consolidated Guidance generally discusses issues relevant to special accounts and money received for EPA oversight of PRP work.[4]

In most agreements under which PRPs agree to perform work, the PRPs also agree to reimburse the Agency for all EPA "future costs." Future costs include the "direct" and "indirect" costs the Agency incurs for oversight of the PRPs' activities.[5] It has been the Agency's general practice to use appropriated Trust Fund money to pay for EPA's oversight, and periodically bill the PRPs. Payments received are then deposited in the Trust Fund. In the past several years, however, the Agency has been placing the amounts received into a special account (in accordance with language in the settlement agreements), which it has been using to fund oversight costs. The Region still continues to bill the PRPs for oversight while using the special account to fund those activities. The chief benefit of this approach is that it ensures that oversight will be immediately available for the site while, at the same time, conserving appropriated Trust Fund money for use at other sites where there are no viable PRPs.

III. PREPAYMENT OF OVERSIGHT COSTS

The Consolidated Guidance generally discusses negotiating with PRPs to prepay oversight costs.[6] As a means to save additional appropriated Trust Fund dollars, Regions should, in appropriate cases, request that PRPs prepay the first installment of oversight costs under any settlement where the PRPs have agreed to perform a response action (e.g. RI/FS, RD/RA, or removal actions) and pay future oversight costs. Oversight is a necessary part of a PRP-lead response action, and it is appropriate, as part of that response action, to ask the PRPs to prepay a certain amount up front so that the Agency does not have to expend Trust Fund money.

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[2] *See* the 2001 Model RD/RA Consent Decree ("Model RD/RA CD") for language concerning the establishment and use of special accounts.

[3] October 4, 2002 "Consolidated Guidance on the Establishment, Management and Use of CERCLA Special Accounts."

[4] *See* Consolidated Guidance, section III.E "Oversight Payments," at 4-5.

[5] *See* Consolidated Guidance, at 2.

[6] *See* Consolidated Guidance at 5.

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Requiring PRPs to prepay the first year of estimated oversight costs also does not significantly burden PRPs because cost payments are not increased, but are merely accelerated. We acknowledge that the PRPs would lose the use of, or interest on, the prepaid funds.

For a number of situations, it will be unnecessary to seek prepayment of oversight costs. For example, at sites for which there is already an established special account, the Agency will already have access to special account dollars as an additional funding source so there is no need to request prepayment of oversight. Prepayment may also be unnecessary if, as part of the settlement agreement, the PRPs will be paying past costs that can be placed into a special account that can be used to initially fund oversight.[7] In addition, it may not be cost-effective to request prepayment of oversight costs where the overall amount of oversight costs is expected to be minimal (e.g., less than $25,000), or the duration of the response action will be relatively short (e.g., less than 9 months). Further, prepayment may be inappropriate where there is a significant orphan share compromise in the form of an initial reduced oversight bill. Finally, the case team may, within its discretion, determine that requesting prepayment of oversight is inappropriate based on site-specific circumstances.

A. Establishing the Amount

When seeking prepayment of oversight costs, a Region should first estimate the dollar amount necessary to fund the cost of oversight. Often, the decision document (e.g., Action Memorandum or Record of Decision) will be useful to determine the amount necessary to fund oversight costs. Similarly, historic oversight costs at the site or estimates from other operable units at similar sites may be useful to determine these costs.[8] Regions may estimate an amount to address both direct and indirect costs, but at a minimum, should seek an amount to fund expected direct oversight costs.

After establishing the total dollar amount of oversight, the Region will need to determine the amount of oversight dollars to be prepaid prior to the commencement of the response action. If the response action is a longer term action, like a remedial action, the prepaid amount should typically be for the portion of the full amount the Region anticipates it will need to cover costs from the commencement of the work until the estimated date it would likely receive payment for the first bill. For shorter term actions, like a removal action, Regions may request that the PRPs prepay the total amount of oversight. Regions may also consider requesting an amount that includes an additional amount to offset the possibility that costs could be higher than expected. This approach ensures that Trust Fund dollars will not have to be used for oversight at that site.

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[7] If the existing funds in the special account or the past costs obtained under a settlement are earmarked for a specific purpose or need to be retained for other activities at the site then negotiating for the prepayment of oversight costs may be appropriate.

[8] *See A Guide to Developing and Documenting Cost Estimates During the Feasibility Study*, OSWER Directive 9355.0-75, July 2000.

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B. Accounting for and Managing the Prepaid Funds and Other Oversight Payments

When the Agency receives funds prior to work being performed, for financial and reporting purposes, the Agency classifies the funds received as a "cashout." Oversight amounts that are prepaid would be categorized as a cashout, and entered into the financial management system as "unearned" (TR2) revenue, because the funds are being collected in anticipation of future costs to be incurred.[9] In the situation where it is necessary to obligate and/or expend funds prior to receipt of the prepaid amount, Regions can still obligate appropriated Trust Fund dollars ("T"), but should then reclassify any expended amounts once the prepaid amount is received.[10] Any open obligations (unliquidated) recorded in the "T" appropriation should be modified to reflect the TR2B special account fund code.

After receiving the prepaid amount, the Regions should use their existing oversight billing procedures for all future billings to PRPs.[11] This means that for the initial billing after the receipt of the prepaid amount, and all subsequent billings, the Region will seek payment of all actual direct and indirect costs incurred in that billing period.[12] Amounts received, which are considered as a cost recovery, would then be deposited into the special account (TR2B) for that site as provided in the settlement document. These amounts are considered "earned revenue" because it is the collection of costs previously incurred during that period.[13] This process would be repeated for each subsequent payment.[14] For the shorter term actions where the region receives the full amount prepaid, the region would still bill the PRPs for any costs (e.g., unpaid indirect costs) associated with that action that exceed the prepayment amount.

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[9] *See Superfund Special Account Guidance*, (OCFO) July 16, 2002, at Attachment 1, p. 7. Typically oversight costs are coded as TR2B or "earned" revenue because they are costs that are being collected or have already been incurred.

[10] *See* discussion in *Superfund Special Account Guidance*, July 16, 2002, at Attachment 4, p. 2, for proper steps to undertake for the reclassification process; *see also* Consolidated Guidance, at p. 7, for general reclassification discussion.

[11] In July 1999, the Office of the Chief Financial Officer created a new performance measure for the timely, periodic billing of future response costs and further defined "periodic billing" as annual billings of such costs (for purposes of the measure only). Oversight bills are to be billed in accordance with the terms of individual settlement agreements. See CERCLA Future Response Costs: Settlement, Billing and Collection, June 20, 2002, at p.5. See also Model RD/RA CD, Section XVI, Payments for Response Costs, ¶ 55, which states "...on a periodic basis the United States will send Settling Defendants a bill requiring payment...."

[12] These monies should be treated as cost recovery (TR2B) dollars because such amounts are considered earned revenue.

[13] *See Superfund Special Account Guidance*, July 16, 2002, at Attachment 1, p. 3.

[14] A bill would still be sent to PRPs at the end of the first year for all the oversight costs incurred in that year in order to ensure available funding for the second year's oversight.

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Once the Region receives the first reimbursement payment for future costs, the Region should cease drawing down on the prepaid amounts (TR2) (the cashout funds),[15] and instead should start using the reimbursed amounts (TR2B) (the cost recovery or reimbursed funds) to fund oversight for the remainder of the response action.[16] It is not necessary to establish a separate special account to accomplish this task. To accommodate this, Regions should modify any open obligations (unliquidated) recorded in TR2 to reflect the TR2B special account fund code.

C. Addressing a Shortfall

There may be situations where it becomes clear that the prepaid amount will be exhausted before receipt of the first reimbursement payment from the PRPs. In this case, the Region may want to consider sending the first oversight bill early to avoid running out of prepayment funds. In addition, at the time of settlement negotiations, the Regions should consider including a provision that allows the Agency to request additional funds if it becomes apparent that the prepaid amount will be insufficient to fund the oversight prior to the receipt of the first reimbursement payment. If the settlement provides for a one-time payment of oversight costs, the Regions may wish to include a provision that would allow the Agency to: (1) request a set additional amount, (2) issue one or more requests for the estimated amount necessary to complete the oversight of the project, or (3) begin to send future oversight bills based on the amount actually spent above the original payment. If the settlement provides for periodic billing of future costs, the additional payment provision could require the PRPs to pay a set amount that is expected to be significant enough to cover all expenses until the first billing period. Alternatively, the language could be drafted to allow EPA to estimate at the time of demand what will be needed to fund oversight until receipt of the first reimbursement payment. In either case, the "trigger" for a new payment should be established when a negotiated dollar balance remains from the prepaid amount.

D. Remainder of Prepaid Funds

When work parties agree to pay oversight costs, the parties usually only agree to pay the actual direct and indirect costs of EPA oversight. In the prepayment situation, this may result in prepaid amounts remaining in the special account after the completion of the response action. As a result, after completion of the work any remaining prepaid dollars plus any interest earned may be used to reduce the PRPs' last payment for oversight once EPA has accounted for all of its direct and indirect oversight costs. In the alternative, as long as it is negotiated in advance, it is also acceptable for those funds to be transferred to a different special account at the site for use by the Agency to address other response actions for which the same PRPs are also liable. In that

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[15] This allows the Agency to keep a reserve of funds if necessary to use if oversight funds for the site fall short between billing periods and maximizes interest accrued on the prepaid amounts.

[16] *See* Attachment 2 for an example of how the prepayment scenario of oversight may work.

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situation, the Region should consider providing a credit against future liability for amounts already paid. If none of these options is selected, the remaining prepaid amount should be returned to the PRPs (See Attachment 2).

IV. CONCLUSION

It is important to maximize the use of available mechanisms to finance work. Prepayment of PRP oversight costs contributes toward this goal. This memorandum is intended to encourage EPA personnel to include this model language in ongoing and upcoming settlement negotiations.

This guidance and any internal procedures adopted for its implementation are intended exclusively as guidance for employees of the U.S. Environmental Protection Agency. This guidance is not a rule and does not create any legal obligations or enforceable rights. Whether and how EPA applies the guidance to any particular site will depend on the facts at the site. EPA may periodically review the implementation of this guidance to evaluate settling parties' compliance with the terms of the consent decree and NCP cleanup requirements.

Questions or comments regarding this memorandum should be directed to Melissa Franolich in OSRE at (202) 564-6300, Leslie Kelley-Huffman in OCFO at (202) 564-4805, or Kevin Hollingsworth in OSRTI at (703) 603-9058.

Attachments

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ATTACHMENT 1
DRAFT PREPAYMENT LANGUAGE FOR MODEL RD/RA CD

XVI. PAYMENTS FOR RESPONSE COSTS

[NOTE: If the Settling Defendants will be prepaying any part of EPA's Future Response Costs, include the following language]

55. Payment of Future Response Costs.

a. Within 30 days of the Effective Date, Settling Defendants shall pay to EPA $_____ in prepayment of Future Response Costs. The total amount paid shall be deposited by EPA in the **(Site Name)** Future Response Costs Special Account, within the EPA Hazardous Substance Superfund. These funds shall be retained and used by EPA to conduct or finance Future Response Actions. Payment shall be made by FedWire Electronic Funds Transfer ("EFT"), to the U.S. Department of Justice account in accordance with current EFT procedures, referencing the civil action number, EPA Site/Spill ID Number ____, and DOJ Case Number ____. Payment shall be made in accordance with instructions provided to the Settling Defendants by the Financial Litigation Unit of the United States Attorney's Office for the District of ____ following lodging of the Consent Decree. Any payment received by the Department of Justice after 4:00 p.m. (Eastern Time) will be credited on the next business day. [If the payment amount is less than $10,000, use the language in Paragraph 54.a of the Model RD/RA Decree for certified or cashier's check.] Any amounts received under this Subparagraph will be credited to Settling Defendants in the final accounting pursuant to Subparagraph 55.e.

b. At the time of payment, Settling Defendants shall send notice that payment has been made to the United States, to the EPA Project Coordinator and to the Servicing Financing Office, in accordance with Section XXVI (Notices and Submissions).

c. Settling Defendants shall pay to EPA all Future Response Costs not inconsistent with the National Contingency Plan. On a periodic basis, the United States will send Settling Defendants a bill requiring payment that includes a **[insert name of standard Regionally-prepared costs summary, which includes the direct and indirect costs incurred by EPA and its contractors, and name of DOJ-prepared cost summary, which reflects costs incurred by DOJ and its contractors, if any].** Settling Defendants shall make all payments within 30 days of Settling Defendants' receipt of each bill requiring payment, except as otherwise provided in Paragraph 56. Settling Defendants shall make all payments required by this Paragraph in the manner required by Subparagraph 55.a., with notice as required by Subparagraph 55.b. The total amount paid will be deposited by EPA in the **(Site Name)** Future Response Costs Special Account within the EPA Hazardous Substance Superfund. These funds will be retained and used by EPA to conduct or finance Future Response Costs. Any amounts remaining in the **(Site Name)** Future Response Costs Special Account, will be disbursed or credited in accordance with Subparagraph 55.e.

[NOTE: Subparagraph 55.d. below is an optional provision to address shortfalls.]

d. In the event that EPA's use of the **(Site Name)** Future Response Costs Special Account results in there being $_____ or less in the **(Site Name)** Future Response Costs Special Account at any time, Settling Defendants agree, within [ ] days of EPA's notice that the **(Site Name)** Future Response Costs Special Account has reached $____ or less, to remit to EPA $ _____ for deposit in the **(Site Name)** Future Response Costs Special Account, in accordance with the payment procedure described in Subparagraph 55.a and 55.b. Any amounts received under this Subparagraph will be credited to Settling Defendants in the final accounting in Subparagraph 55.e.

e. After EPA issues its written Certification of Completion of Work and EPA has performed a final accounting of Future Response Costs, EPA shall (**choose one or more provisions from the following language: "offset the final bill for Future Response Costs by the unused amount paid by the Settling Defendants pursuant to Subparagraphs 55.a. or 55.d"; "apply any unused amount paid by the Settling Defendants pursuant to Subparagraphs 55.a. or 55.d to any other unreimbursed response costs or response actions remaining at the Site for which the Settling Defendants are liable," or "remit and return to Settling Defendants any unused amount of the funds paid by Settling Defendants pursuant to Subparagraphs 55.a or 55.d.")**

56. Settling Defendants may contest payment of any Future Response Costs under Paragraph 55 that were incurred during the time period that any prepaid amounts were received under Subparagraph 55.c., with the exception of amounts due under Paragraphs 55.a and 55.d., if they determine that the United States [or the State] has made a mathematical error or if they allege that a cost item that is included represents costs that are inconsistent with the NCP or outside the definition of Future Response Costs.

ATTACHMENT 2

An Example of How Prepayment of Oversight May Work

- Oversight Estimate for Remedial Action: $300,000 per billing period. PRP enters into CD under which it agrees to prepay $450,000 (base amount plus 50% premium) 30 days after entry of CD. The appropriate servicing finance office records a billing document using the TR2 fund code in the amount of $450,000.
- Region obligates and begins expending, in advance of prepayment receipt, $100,000 of appropriated Trust Fund money (T) to bring on oversight contractor at entry of CD. Once prepayment amount of $450,000 is received and deposited to TR2, the $100,000 is reclassified from T to TR2 (the freed up T funds are then available, through the regional budget office, for regional use at this or other sites). Any remaining open obligations attributable to the T appropriation should be modified to reflect the TR2 special account fund code. In this example, the total $100,000 was obligated and expended, so only the reclassification of the $100,000 is necessary.
- Region spends $300,000 of the prepaid amount (TR2) for oversight during the first billing period (consisting of the $100,000 reclassification and $200,000 in direct costs expended, both recorded in TR2). Region's actual bill to PRPs is $420,000 ($300,000 direct costs plus $120,000 indirect costs, assuming a 40% indirect rate). Amount received is deposited in the special account using the TR2B fund code, since these receipts are classified as earned. At the time the payment is received, the remaining prepaid amount (TR2) is $150,000 (consisting of original $450,000 prepaid amount less the $100,000 reclassified amount, and the $200,000 direct costs expended during the 1st billing period above). The Region then stops using the prepaid amount (TR2) to fund oversight and starts using the reimbursed amounts, as explained in Section III, B of this guidance.
- Region continues to bill and use reimbursed amounts (TR2B) in subsequent years.
- At completion of RA, the bill for oversight for that billing period (direct and indirect costs) is $420,000 ($300,000 direct costs plus $120,000 indirect costs). Before sending this final bill, the Region should perform a reconciliation of the special account to determine what the PRPs have paid and what costs the Agency incurred. The reconciliation will allow for indirect costs paid but not charged in the IFMS system to be accounted for. This will allow the Region to determine if there are any amounts the PRP overpaid and is eligible to receive, or in the alternative, will need to be billed for.[17] In this example, the $150,000 available amount to the TR2 special

[17] See *OCFO Superfund Special Account Guidance*, Attachment 5, for handling indirect costs under pre-paid future costs special accounts. This is especially important where, as applicable, remaining pre-paid amounts are to be refunded to a PRP in accordance with settlement agreement provisions, or applied to a final oversight bill.

account should be reduced by $120,000 for the indirect costs ($300,000 @ 40%). In addition, the $120,000 available amount to the TR2B special account ($420,000 less the $300,000 direct cost at completion) should be reduced by $120,000 ($300,000 @ 40%). Thus a total of $30,000 is available for refunding to the PRP or handling otherwise in accordance with the terms of the settlement agreement.