

Final

**Site Inspection Work Plan for
Site 66 Turkey Run Disposal Area**

**Naval Support Facility, Indian Head
Indian Head, Maryland**

Contract Task Order 0079

July 2007

Prepared for

**Naval Facilities Engineering Command
Washington**

Under the

**LANTDIV CLEAN III Program
Contract N62470-02-D-3052**

Prepared by



Chantilly, Virginia

Contents

Abbreviations and Acronyms	vii
Introduction.....	ix
QAPP Worksheet #1 (UFP-QAPP Section 2.1)	1-1
Title and Approval Page	1-1
QAPP Worksheet #2 (UFP-QAPP Section 2.2.4)	2-1
QAPP Identifying Information	2-1
QAPP Worksheet #3 (UFP-QAPP Manual Section 2.3.1)	3-1
Distribution List	3-1
QAPP Worksheet #4 (UFP-QAPP Manual Section 2.3.2)	4-1
Project Personnel Sign-Off Sheet	4-1
QAPP Worksheet #5 (UFP-QAPP Manual Section 2.4.1)	5-1
Project Organization Chart.....	5-1
QAPP Worksheet #6 (UFP-QAPP Manual Section 2.4.2)	6-1
Communication Pathways	6-1
QAPP Worksheet #7 (UFP-QAPP Manual Section 2.4.3)	7-1
Personnel Responsibilities and Qualification Table.....	7-1
QAPP Worksheet #8 (UFP-QAPP Manual Section 2.4.4)	8-1
Special Personnel Training Requirements Table.....	8-1
QAPP Worksheet #9 (UFP-QAPP Manual Section 2.5.1)	9-1
Project Scoping Session Participants Sheet.....	9-1
QAPP Worksheet #10 (UFP-QAPP Manual Section 2.5.2)	10-1
Problem Definition	10-1
QAPP Worksheet #11 (UFP-QAPP Manual Section 2.6.1)	11-1
Project Quality Objectives /Systematic Planning Process Statements.....	11-1
QAPP Worksheet #12 (UFP-QAPP Manual Section 2.6.2)	12-1
Measurement Performance Criteria Table	12-1
QAPP Worksheet #13 (UFP-QAPP Manual Section 2.7)	13-1
Secondary Data Criteria and Limitations Table	13-1
QAPP Worksheet #14 (UFP-QAPP Manual Section 2.8.1)	14-1
Summary of Project Tasks	14-1
QAPP Worksheet #15 (UFP-QAPP Manual Section 2.8.1)	15-1
Reference Limits and Evaluation Table	15-1
QAPP Worksheet #16 (UFP-QAPP Manual Section 2.8.2)	16-1
Project Schedule/Timeline Table.....	16-1

QAPP Worksheet #17 (UFP-QAPP Section 3.1.1)	17-1
Sampling Design and Rationale.....	17-1
QAPP Worksheet #18 (UFP-QAPP Manual Section 3.1.1)	18-1
Sampling Locations and Methods/SOP Requirements Table.....	18-1
QAPP Worksheet #19 (UFP-QAPP Manual Section 3.1.1)	19-1
Analytical SOP Requirements Table	19-1
QAPP Worksheet #20 (UFP-QAPP Manual Section 3.1.1)	20-1
Field Quality Control Sample Summary Table.....	20-1
QAPP Worksheet #21 (UFP-QAPP Manual Section 3.1.2)	21-1
Project Sampling SOP References Table	21-1
QAPP Worksheet #22 (UFP-QAPP Manual Section 3.1.2.4)	22-1
Field Equipment Calibration, Maintenance, Testing, and Inspection Table	22-1
QAPP Worksheet #23 (UFP-QAPP Manual Section 3.2.1)	23-1
Analytical SOP References Table.....	23-1
QAPP Worksheet #24 (UFP-QAPP Manual Section 3.2.2)	24-1
Analytical Instrument Calibration Table.....	24-1
QAPP Worksheet #25 (UFP-QAPP Manual Section 3.2.3)	25-1
Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table	25-1
QAPP Worksheet #26 (UFP-QAPP Manual Appendix A)	26-1
Sample Handling System.....	26-1
QAPP Worksheet #27 (UFP-QAPP Manual Section 3.3.3)	27-1
Sample Custody Requirements.....	27-1
QAPP Worksheet #28 (UFP-QAPP Manual Section 3.4)	28-1
QC Samples Table.....	28-1
QAPP Worksheet #29 (UFP-QAPP Manual Section 3.5.1)	29-1
Project Documents and Records Table	29-1
QAPP Worksheet #30 (UFP-QAPP Manual Section 3.5.2.3)	30-1
Analytical Services Table	30-1
QAPP Worksheet #31 (UFP-QAPP Manual Section 4.1.1)	31-1
Planned Project Assessments Table.....	31-1
QAPP Worksheet #32 (UFP-QAPP Manual Section 4.1.2)	32-1
Assessment Findings and Corrective Action Responses.....	32-1
Corrective Action Form.....	32-3
Field Performance Audit Checklist	32-5
QAPP Worksheet #33 (UFP-QAPP Manual Section 4.2)	33-1
QA Management Reports Table	33-1
QAPP Worksheet #34 (UFP-QAPP Manual Section 5.2.1)	34-1
Verification (Step I) Process Table	34-1

QAPP Worksheet #35 (UFP-QAPP Manual Section 5.2.2)	35-1
Validation (Steps IIa and IIb) Process Table.....	35-1
QAPP Worksheet #36 (UFP-QAPP Manual Section 5.2.2)	36-1
Validation (Steps IIa and IIb) Summary Table	36-1
QAPP Worksheet #37 (UFP-QAPP Manual Section 5.2.3)	37-1
Usability Assessment.....	37-1

Attachments

- Attachment 1 Figures
- Attachment 2 Laboratory SOPs (Included as a CD)

Abbreviations and Acronyms

bgs	below ground surface
BTAG	Biological Technical Assistance Group
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CLEAN	Comprehensive Long-term Environmental Action, Navy
COC	chain of custody
CTO	Contract Task Order
DO	dissolved oxygen
DQI	data quality indicator
Eco-SSL	Ecological Soil Screening Levels
EIS	Environmental Information Specialist
EPA	U.S. Environmental Protection Agency
EPIC	Environmental Photographic Interpretation Center
FTL	Field Team Leader
GPS	global positioning system
HASP	Health and Safety Plan
IAS	Initial Assessment Study
IDW	investigation-derived waste
IHIRT	Indian Head Installation Restoration Team
IR	Installation Restoration
MDE	Maryland Department of the Environment
MPC	Measurement Performance Criteria
NAVFAC	Naval Facilities Engineering Command
Navy	U.S. Navy
NFA	no further action
NSF-IH	Naval Support Facility, Indian Head
OVM	organic vapor meter
PCBs	polychlorinated biphenyls
PQO	project quality objective
QAPP	Quality Assurance Project Plan
QC	quality control
QL	quantitation limit
RBC	risk-based concentration
RI	Remedial Investigation

SI	Site Inspection
SOP	standard operating procedure
SVOC	semi-volatile organic compound
TAL	target analyte list
TCL	target compound list
TOC	total organic carbon
UFP-QAPP	Uniform Federal Policy for Quality Assurance Project Plans
U.S.	United States
VOC	volatile organic compound

Introduction

The United States (U.S.) Navy (Navy), Naval Facilities Engineering Command (NAVFAC), Atlantic Division, is conducting an Installation Restoration (IR) Program environmental investigation of Site 66, Turkey Run Disposal Area, at Naval Support Facility, Indian Head (NSF-IH), Indian Head, Maryland. This Site Inspection Work Plan (herein referred to as “Work Plan”) presents the objectives, scope, and procedures for a Site Inspection (SI) investigation at Site 66. This document was prepared under Comprehensive Long-term Environmental Action, Navy (CLEAN) Contract Number N62470-02-D-3052, Contract Task Order (CTO) 079 and in accordance with the Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP) guidance document (U.S. Environmental Protection Agency [EPA], 2005). Because this Work Plan follows the UFP-QAPP guidance document, it includes 37 worksheets that detail various aspects of the environmental investigation process that will serve as guidelines for the field work.

This document will ensure that environmental data collected for the SI are scientifically sound, of known and documented quality, and suitable for intended uses. The laboratory information cited in this Work Plan is specific to CompuChem Laboratory (Cary, North Carolina), which was selected based on a competitive selection process. If the actual laboratory changes from that included in this Work Plan, revised QAPP worksheets will be submitted to the Navy and regulatory agencies prior to commencing the fieldwork. Accompanying figures are included as Attachment 1, and site-specific laboratory standard operating procedures (SOPs) are included as Attachment 2.

This Work Plan incorporates by reference the *Master Plans for Installation Restoration Program Environmental Investigations* (Tetra Tech NUS, Inc., 2004) (hereafter referred to as the Master Plans). The Master Plans consist of the following documents:

- *Master Work Plan for Installation Restoration Program Environmental Investigations* (hereafter referred to as Master Work Plan)
- *Master Field Sampling Plan for Installation Restoration Program Environmental Investigations* (hereafter referred to as Master FSP)
- *Master Quality Assurance Project Plan for Installation Restoration Program Environmental Investigations* (hereafter referred to as Master QAPP)
- *Health and Safety Plan Guidance Document for Installation Restoration Program Environmental Investigations* (hereafter referred to as Master HASP)
- *Facility Standard Operating Procedures for Installation Restoration Program Environmental Investigations* (hereafter referred to as Facility SOPs)

Unless stated otherwise in this document, the SI procedures will be performed in accordance with these Master Plans.

**QAPP Worksheet #1
(UFP-QAPP Section 2.1)
Title and Approval Page**

Site Inspection Work Plan for Site 66 Turkey Run Disposal Area, Naval Support Facility,
Indian Head, Indian Head, Maryland

Document Title

U.S. Navy

Lead Organization

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Preparer's Address, Telephone Number, and E-mail Address

5 February 2007, revised 18 July 2007

Preparation Date (Day/Month/Year)

Investigative Organization's Project Manager/Date	Signature
---	-----------

Christine Metcalf/CH2M HILL

Printed Name/Organization

Investigative Organization's Project QA Officer/Date	Signature
--	-----------

Michael Zamboni/CH2M HILL

Printed Name/Organization

Lead Organization's Project Manager/Date	Signature
--	-----------

Jeff Morris/Joe Rail/NAVFAC Washington

Printed Name/Organization

**QAPP Worksheet #1
(UFP-QAPP Section 2.1)
Title and Approval Page**

Approval Signatures/Date

Signature

Margaret Kasim/CH2M HILL - Activity
Manager

Printed Name/Title

Other Approval Signatures/Date

Signature

Scott Saroff/CH2M HILL - Senior Consultant

Printed Name/Title

Document Control Numbering System: Document control is addressed in the header information in the upper-right or upper-left corner of each page. Later versions will have the version number and date on revised pages, and copies of all revised pages will be provided to the distribution list in Worksheet #3.

**QAPP Worksheet #2
 (UFP-QAPP Section 2.2.4)
 QAPP Identifying Information**

Site Name/Project Name: Site 66 - Turkey Run Disposal Area
 Title: Site Inspection Work Plan for Site 66 Turkey Run Disposal Area
 Site Location: NSF-IH, Indian Head, Maryland
 Revision Number: 1
 Site Number/Code: Site 66
 Revision Date: N/A
 Operable Unit: N/A
 Contractor Name: CH2M HILL
 Contractor Number: N62470-02-D-3052
 Contract Title: NAVFAC, Atlantic Division, CLEAN III Program
 Work Assignment Number: N62470-02-D-3052 CTO-0079

1. Identify regulatory program

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)

2. Identify approval entity:

U.S. Navy

3. The QAPP is (select one)

Generic Project Specific

4. List dates of scoping sessions that were held:

August 23, October 11, and November 8, 2006

5. List dates and titles of QAPP documents written for previous site work, if applicable

Title	Approval Date
<i>Master Quality Assurance Project Plan for Installation Restoration Program Environmental Investigations at Naval District Washington, Indian Head, Indian Head, Maryland</i>	June 2004
<i>Master Work Plan for Installation Restoration Program Environmental Investigations at Naval District Washington, Indian Head, Indian Head, Maryland</i>	June 2004
<i>Master Field Sampling Plan for Installation Restoration Program Environmental Investigations at Naval District Washington, Indian Head, Indian Head, Maryland</i>	June 2004
<i>Health and Safety Plan Guidance Document for Installation Restoration Program Environmental Investigations at Naval District Washington, Indian Head, Indian Head, Maryland</i>	June 2004

**QAPP Worksheet #2
(UFP-QAPP Section 2.2.4)
QAPP Identifying Information**

Facility Standard Operating Procedures for Installation Restoration Program June 2004
*Environmental Investigations at Naval District Washington, Indian Head, Indian
Head, Maryland*

6. List organizational partners (stakeholders) and connection with lead organization

U.S. Navy, Lead Agency; NSF-IH, environmental cleanup partner; EPA Region III, regulatory partner; and Maryland Department of the Environment (MDE), regulatory partner.

7. List data users:

Same as above, and their contractors

8. If any required QAPP elements and required information are not applicable to the project, then circle the omitted QAPP elements and required information on the attached table. Provide an explanation for their exclusions below:

N/A

**QAPP Worksheet #2
 (UFP-QAPP Section 2.2.4)
 QAPP Identifying Information**

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Related Documents
<i>Project Management and Objectives</i>		
2.1 Title and Approval Page	- Title and Approval Page	Worksheet #1
2.2 Document Format and Table of Contents	- Table of Contents	Intro
2.2.1 Document Control Format		
2.2.2 Document Control Numbering System		
2.2.3 Table of Contents		
2.2.4 QAPP Identifying Information	- QAPP Identifying Information	Worksheets # 1 and 2
2.3 Distribution List and Project Personnel Sign-Off Sheet	- Distribution List	Worksheet #3
2.3.1 Distribution List	- Project Personnel Sign-Off Sheet	Worksheet #4
2.3.2 Project Personnel Sign-Off Sheet		
2.4 Project Organization		
2.4.1 Project Organizational Chart	- Project Organizational Chart	Worksheet # 5
2.4.2 Communication Pathways	- Communication Pathways	Worksheet # 6
2.4.3 Personnel Responsibilities and Qualifications	- Personnel Responsibilities and Qualifications Table	Worksheet # 7
2.4.4 Special Training Requirements and Certification	- Special Personnel Training Requirements Table	Worksheet # 8
2.5 Project Planning/Problem Definition	- Project Planning Session Documentation (including Data Needs tables)	Worksheet # 10
2.5.1 Project Planning (Scoping)	- Project Scoping Session Participants Sheet	Worksheet # 9
2.5.2 Problem Definition, Site History, and Background	- Problem Definition, Site History, and Background	Worksheet # 10

QAPP Worksheet #2
(UFP-QAPP Section 2.2.4)
QAPP Identifying Information

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Related Documents
	- Site Maps (historical and present)	Attachment #1
2.6 Project Quality Objectives (PQOs) and Measurement Performance Criteria (MPC)	- Site-Specific PQOs	Worksheet # 11
2.6.1 Development of PQOs Using the Systematic Planning Process	- MPC Table	Worksheet # 12
2.6.2 MPC		
2.7 Secondary Data Evaluation	- Sources of Secondary Data and Information	Worksheet #13
	- Secondary Data Criteria and Limitations Table	Worksheet # 13
2.8 Project Overview and Schedule	- Summary of Project Tasks	Worksheet # 14
2.8.1 Project Overview	- Reference Limits and Evaluation Table	Worksheet # 15
2.8.2 Project Schedule	- Project Schedule/Timeline Table	Worksheet # 16
<i>Measurement/Data Acquisition</i>		
3.1 Sampling Tasks	- Sampling Design and Rationale	Worksheet # 17
3.1.1 Sampling Process Design and Rationale	- Sample Location Map	See Figure 3 in Attachment 1
3.1.2 Sampling Procedures and Requirements	- Sampling Locations and Methods/SOP Requirements Table	Master Plan Facility SOPs (SA-1.1, SA-1.2, SA-1.3, SA-2.5)/ Worksheet # 18
3.1.2.1 Sampling Collection Procedures	- Analytical Methods/SOP Requirements Table	Worksheet #19 Worksheet #20

QAPP Worksheet #2
(UFP-QAPP Section 2.2.4)
QAPP Identifying Information

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Related Documents
3.1.2.2 Sample Containers, Volume, and Preservation	- Field Quality Control (QC) Sample Summary Table	Master Field Sampling Plan Section 2.6.1/ Worksheet # 21
3.1.2.3 Equipment/Sample Containers Cleaning and Decontamination Procedures	- Sampling SOPs	Worksheet # 22
3.1.2.4 Field Equipment Calibration, Maintenance, Testing, and Inspection Procedures	- Project Sampling SOP References Table	
3.1.2.5 Supply Inspection and Acceptance Procedures	- Field Equipment Calibration, Maintenance, Testing, and Inspection Table	
3.1.2.6 Field Documentation Procedures		
3.2 Analytical Tasks		
3.2.1 Analytical SOPs	- Analytical SOPs	CD attachment Worksheet #23
3.2.2 Analytical Instrument Calibration Procedures	-- Analytical SOP References Table	Worksheet #24
3.2.3 Analytical Instrument and Equipment Maintenance, Testing, and Inspection Procedures	Analytical Instrument Calibration Table	Worksheet #25
3.2.4 Analytical Supply Inspection and Acceptance Procedures	- Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table	
3.3 Sample Collection Documentation, Handling, Tracking, and Custody Procedures	- Sample Collection Documentation Handling, Tracking, and Custody SOPs	Master Plan Facility SOPs (SA-6.1, SA-6.3), CD attachment
3.3.1 Sample Collection Documentation	- Sample Container Identification	Master Plan Facility SOPs (CT-04)
3.3.2 Sample Handling and Tracking System	- Sample Handling Flow Diagram	Worksheet #27
3.3.3 Sample Custody	- Example Chain-of-Custody Form and Seal	
3.4 QC Samples		
3.4.1 Sampling QC Samples	- QC Samples Table	Worksheet #20
3.4.2 Analytical QC Samples	- Screening/Confirmatory Analysis Decision Tree	Worksheet #28

QAPP Worksheet #2
(UFP-QAPP Section 2.2.4)
QAPP Identifying Information

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Related Documents
3.5 Data Management Tasks	- Project Documents and Records Table	Worksheet # 29
3.5.1 Project Documentation and Records		
3.5.2 Data Package Deliverables	- Analytical Services Table	Worksheet # 30
3.5.3 Data Reporting Formats		
3.5.4 Data Handling and Management	- Data Management SOPs	Master QAPP Section 9
3.5.5 Data Tracking and Control		
<i>Assessment/Oversight</i>		
4.1 Assessments and Response Actions	- Assessments and Response Actions	Worksheet # 31
4.1.1 Planned Assessments Assessment Findings and Corrective Action Responses	- Planned Project Assessments Table	Worksheet # 31
	- Audit Checklists	Worksheet # 32-3
	- Assessment Findings and Corrective Action Responses Table	Worksheet # 32-2
4.2 QA Management Reports	- QA Management Reports Table	Worksheet # 33
4.3 Final Project Report		
<i>Data Review</i>		
5.1 Overview		
5.2 Data Review Steps	- Verification (Step I) Process Table	Worksheet #34
5.2.1 Step I: Verification		
5.2.2 Step II: Validation	- Validation (Steps IIa and IIb) Process Table	Worksheet #35
5.2.2.1 Step IIa Validation Activities		
5.2.2.2 Step IIb Validation Activities		
5.2.3 Step III: Usability Assessment	- Validation (Steps IIa and IIb) Summary Table	Worksheet #36

QAPP Worksheet #2
(UFP-QAPP Section 2.2.4)
QAPP Identifying Information

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Related Documents
5.2.3.1 Data Limitations and Actions from Usability Assessment 5.2.3.2 Activities	- Usability Assessment	Worksheet #37
5.3 Streamlining Data Review 5.3.1 Data Review Steps To Be Streamlined 5.3.2 Criteria for Streamlining Data Review 5.3.3 Amounts and Types of Data Appropriate for Streamlining		Master QAPP

**QAPP Worksheet #3
 (UFP-QAPP Manual Section 2.3.1)
 Distribution List**

List those entities to whom copies of the approved QAPP, subsequent QAPP revisions, addenda, and amendments will be sent.

Worksheet Not Applicable (State Reason)

QAPP Recipients	Title	Organization	Telephone Number	Fax Number	E-mail Address	Document Control Number
Jeff Morris/ Joe Rail	Remedial Project Manager	NAVFAC Washington	202-685-3279/ 202-685-3105	202-433-6193	jeffrey.w.morris@navy.mil/ joseph.rail@navy.mil	Site66-01
Shawn Jorgensen	Installation Restoration Project Manager	NSF-IH	301-744-2263	301-744-4180	shawn.a.jorgensen@navy.mil	Site66-02
Dennis Orenshaw	Remedial Project Manager	EPA Region III	215-814-3361	215-814-3051	orenshaw.dennis@epamail.epa. gov	Site66-03
Curtis DeTore	Remedial Project Manager	MDE	410-537-3791	410-537-3472	cdetore@mde.state.md.us	Site66-04
Scott Saroff	Senior Consultant	CH2M HILL	315-233-9457	267-675-4573	Scott.Saroff@ch2m.com	Site66-05
Margaret Kasim	Activity Manager	CH2M HILL	703-376-5154	703-376-5654	Margaret.Kasim@ch2m.com	Site66-06
Christine Metcalf	Project Manager	CH2M HILL	703-376-5193	703-376-5693	Christine.Metcalf@ch2m.com	Site66-07
Rachel Kopec	Project QAPP Preparer	CH2M HILL	973-316-0159 ext. 4507	215-640-9396	Rachel.Kopec@ch2m.com	Site66-08

The Distribution List lists the primary stakeholder agency leads and project team members. Others, as assigned by the stakeholders and lead contractor (CH2M HILL), may also receive the Work Plan and associated documents.

QAPP Worksheet #4
(UFP-QAPP Manual Section 2.3.2)
Project Personnel Sign-Off Sheet

Have copies of this form signed by key project personnel from each organization to indicate that they have read the applicable sections of the QAPP and will perform the tasks as described. Ask each organization to forward signed sheets to the central project file.

Worksheet Not Applicable (State Reason)

Organization: NAVFAC Washington

Project Personnel	Title	Telephone Number	Signature	Date QAPP Read
Jeff Morris/Joe Rail	Remedial Project Manager	202-685-3279/ 202-685-3105		

QAPP Worksheet #4
(UFP-QAPP Manual Section 2.3.2)
Project Personnel Sign-Off Sheet

Organization: NFS-IH

Project Personnel	Title	Telephone Number	Signature	Date QAPP Read
Shawn Jorgensen	Installation Restoration Project Manager	301-744-2263		

QAPP Worksheet #4
(UFP-QAPP Manual Section 2.3.2)
Project Personnel Sign-Off Sheet

Organization: CH2M HILL

Project Personnel	Title	Telephone Number	Signature	Date QAPP Read
Scott Saroff	Senior Consultant	315-233-9457		
Margaret Kasim	Activity Manager	703-376-5154		
Christine Metcalf	Project Manager	703-376-5193		
Mike Zamboni	Project Chemist	703-376-5301		
John Mason	Senior Hydrogeologist	215-640-9049		
Christopher Houck	Field Team Leader (FTL) / Site Safety Coordinator	703-376-5140		
John Burgess	Ecological Risk Assessor	207-793-4506		
Roni Warren	Human Health Risk Assessor	814-364-2454		
Rachel Kopec	Project Work Plan Preparer	973-316-0159 ext. 4507		
Steve Beck	Health and Safety Officer	414-272-1052 ext. 277		
Stacy Davenport	Environmental Information Specialist (EIS)	703-376-5082		

QAPP Worksheet #4
(UFP-QAPP Manual Section 2.3.2)
Project Personnel Sign-Off Sheet

Organization: CompuChem

Project Personnel	Title	Telephone Number	Signature	Date QAPP Read
Cathy Dover	Laboratory Project Manager	919-379-4089		
Valgena Respass	Laboratory QA Officer	919-379-4011		

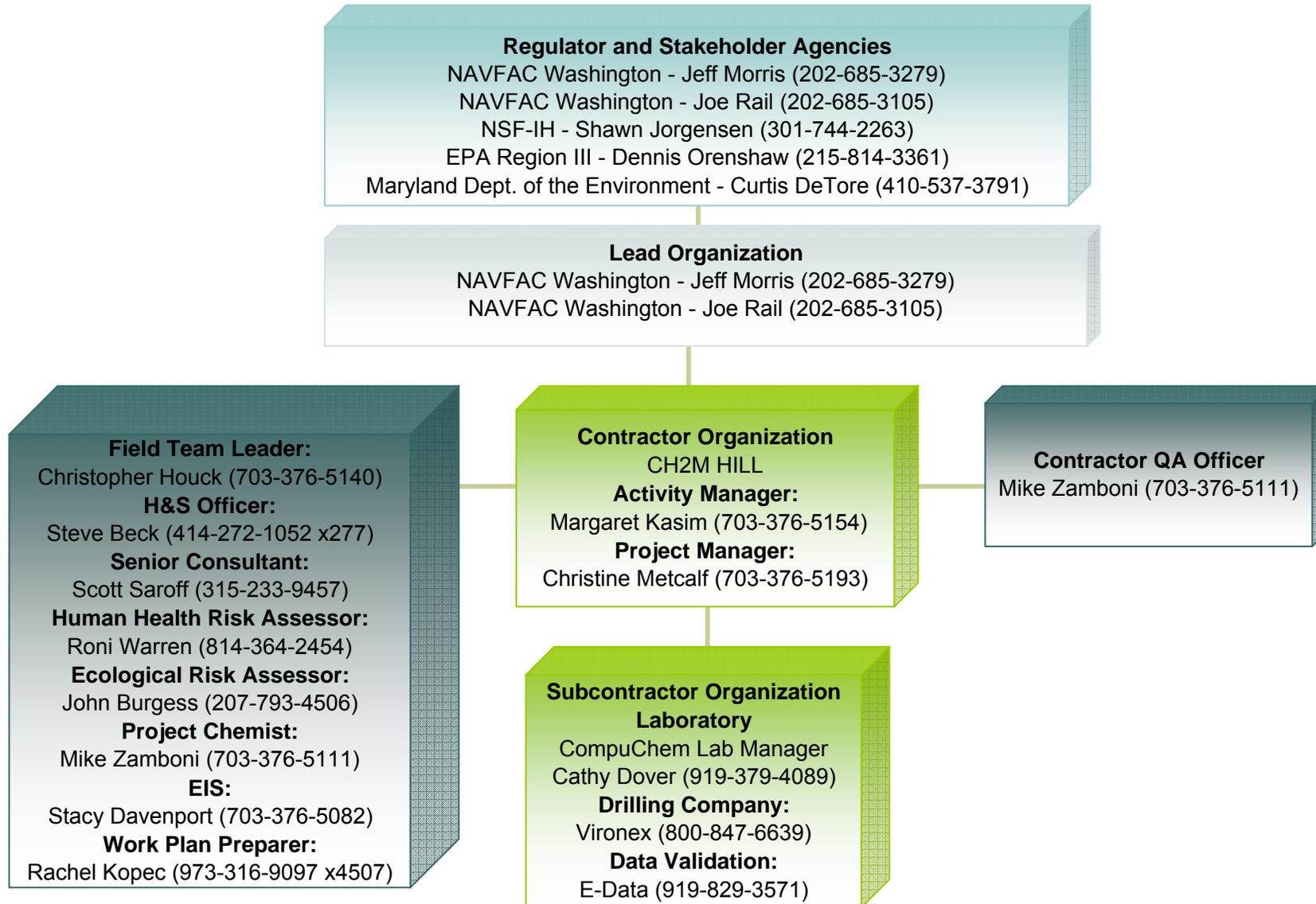
QAPP Worksheet #5
(UFP-QAPP Manual Section 2.4.1)
Project Organization Chart

Identify reporting relationships between all organizations involved in the project, including the lead organization and all contractor and subcontractor organizations. Identify the organizations providing field sampling, on-site and off-site analysis, and data review services, including the names and telephone numbers of all project managers, project team members, and/or project contacts for each organization.

Worksheet Not Applicable (State Reason)

QAPP Worksheet #5

Project Organizational Chart



QAPP Worksheet #6 (UFP-QAPP Manual Section 2.4.2) Communication Pathways

Describe the communication pathways and modes of communication that will be used during the project, after the QAPP has been approved. Describe the procedures for soliciting and/or obtaining approval between project personnel, between different contractors, and between samplers and laboratory staff. Describe the procedure that will be followed when any project activity originally documented in an approved QAPP requires real-time modifications to achieve project goals or a QAPP amendment is required. Describe the procedures for stopping work and identify who is responsible.

Worksheet Not Applicable (State Reason)

Communication Drivers	Responsible Entity	Name	Phone Number	Procedure (Timing, Pathways, etc.)
Communication with Navy (lead agency)	Remedial Project Manager	Jeff Morris/Joe Rail	202-685-3279/ 202-685-3105	Primary point of contact for Navy; can delegate communication to other internal or external points of contact.
Communication with EPA (lead regulatory agency)	Remedial Project Manager	Dennis Orenshaw	215-814-3361	Primary point of contact for EPA; can delegate communication to other internal or external points of contact
Communication with MDE (supporting regulatory agency)	Remedial Project Manager	Curtis DeTore	410-537-3791	Primary point of contact for MDE; can delegate communication to other internal or external points of contact
Oversees Project Implementation (activity level)	Activity Manager	Margaret Kasim	703-376-5154	Oversees project and will be informed of project status by the project manager Christine Metcalf
Field Program: answer questions and data interpretation assistance	Senior Consultant	Scott Saroff	315-233-9457	Contact senior consultant regarding questions/issues encountered in the field, input on data interpretation, as needed.
Point of Contact with Navy, EPA, and MDE	Project Manager	Christine Metcalf	703-376-5193	All information and materials about the project will be forwarded to Jeff Morris or Joe Rail (NAVFAC Washington), Dennis Orenshaw (EPA) and Curtis DeTore (MDE) by Christine Metcalf

QAPP Worksheet #6
(UFP-QAPP Manual Section 2.4.2)
Communication Pathways

Communication Drivers	Responsible Entity	Name	Phone Number	Procedure (Timing, Pathways, etc.)
Manage all Project Phases	Project Manager	Christine Metcalf	703-376-5193	Christine Metcalf will be the primary point of contact and responsible for all technical, administrative, and field aspects of the project.
Work Plan changes in field	FTL	Christopher Houck	703-376-5140	Documentation of deviations from the work plan will be made in the field logbook and the PM will be notified. Deviations made only with the approval from the PM.
Daily Field Progress Reports	FTL	Christopher Houck	703-376-5140	Daily field progress reports will be either emailed or faxed to Christine Metcalf.
Health and Safety	Site Safety Coordinator	Christopher Houck	703-376-5140	Responsible for the adherence of team members to the site safety requirements described in the HASP.
Reporting Lab Data Quality Issues	Laboratory QA officer	Valgena Respass	919-379-4011	All QA/QC issues with project field samples will be reported within 2 days to the project chemist (Mike Zamboni) by the laboratory.
Data Tracking from collection through upload to database	EIS	Stacy Davenport	703-376-5082	EIS (Stacy Davenport) will track data from sample collection through upload to the database ensuring Work Plan requirements are met by laboratory and field staff.
Field and Analytical Corrective Actions	Project Chemist	Mike Zamboni	703-376-5111	Any corrective actions for field and analytical issues will be determined by the FTL (Chris Houck) and/or the Project Chemist (Mike Zamboni).
Release of Analytical Data	Project Chemist	Mike Zamboni	703-376-5111	No analytical data can be released until validation of the data is completed and has been approved by the Project Chemist.

QAPP Worksheet #7 (UFP-QAPP Manual Section 2.4.3) Personnel Responsibilities and Qualification Table

Identify project personnel associated with each organization, contractor, and subcontractor participating in responsible roles. Include data users, decisionmakers, project managers, QA officers, project contacts for organizations involved in the project, project health and safety officers, geotechnical engineers and hydrogeologists, field operation personnel, analytical services, and data reviewers. Identify project team members with an asterisk (*). Attach resume to this worksheet or note the location of the resumes.

Worksheet Not Applicable (State Reason)

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
Jeff Morris	Remedial Project Manager	NAVFAC Washington	Oversees Project	B.S. Mechanical Engineering/Biology, 17 yrs experience as Environmental Engineer
Shawn Jorgensen	Installation Restoration Project Manager	NSF-IH	Oversees Site Activity	
Christine Metcalf	Project Manager	CH2M HILL	Manages Project	B.A., Environmental Studies/Biology, 8 yrs. exp.
Margaret Kasim	Activity Manager	CH2M HILL	Oversees Project Activities	B.S., Botany; M.S., Geology (Geochemistry); Ph.D., Engineering Geology; 13 yrs exp.
Scott Saroff	Senior Consultant	CH2M HILL	Provides general senior guidance	B.S., Forest Biology (Aquatic Ecology); M.S., Geology, CPG #7745 (AIPG), PA PG # 2908 , WI PG #944
John Mason	Senior Hydrogeologist	CH2M HILL	Provides senior guidance on hydrogeological principles	B.S., M.A. Geology, 17 yrs exp.
Mike Zamboni	Project Chemist	CH2M HILL	Performs data validation and QA oversight and prepares Work Plan	B.S. Chemistry, 5 yrs. exp.
Christopher Houck	FTL	CH2M HILL	Coordinates all field activities and sampling	M.S., Geology, 5 yrs. exp.
John Burgess	Ecological Risk Assessor	CH2M HILL	Performs Ecological Risk Assessment	M.S., Zoology, B.A., Biology, 9 yrs. exp.

QAPP Worksheet #7
(UFP-QAPP Manual Section 2.4.3)
Personnel Responsibilities and Qualification Table

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
Roni Warren	Human Health Risk Assessor	CH2M HILL	Performs human health risk assessment	B.S. Computer Science, M.S. Environmental Engineering, 15 yrs. exp.
Rachel Kopec	QAPP Preparer	CH2M HILL	Prepares Work Plan following UFP – QAPP guidelines	B.S., Environmental Science/Biology, 6 yrs. exp.
Steve Beck	H&S Officer	CH2M HILL	Oversees H&S for field activities	M.S., Occupational Safety and Health, 14 yrs. Exp.
Stacy Davenport	EIS	CH2M HILL	Data Management: manages sample tracking, coordinates laboratory, and data validator	B.S., Integrated Science and Technology (Environment Concentration), 1 yr. exp.
Cathy Dover	Laboratory Project Manager	CompuChem	Manages samples tracking and maintains good communication with project chemist	24 yrs. experience in an environmental analytical laboratory
Valgena Respass	Laboratory QA Officer	CompuChem	Responsible for audits, corrective action, checks of QA performance within the laboratory	B.S. Chemistry, 22 yrs. experience
Gene Burke	Direct Push Technology Subcontractor	Vironex	Install boring locations	TBD
Christopher Ohland	Data Validator	E-data, Inc.	Validate data received from laboratory prior to data use	TBD
Resumes are maintained by the individuals' organization and are available upon request; other staff with similar qualifications may be removed, added, or substituted as necessary.				

QAPP Worksheet #8
(UFP-QAPP Manual Section 2.4.4)
Special Personnel Training Requirements Table

Provide the following information for those projects requiring personnel with specialized training. Attach training records and/or certificates to the QAPP or note their location.

Worksheet Not Applicable (State Reason)

Project Function	Specialized Training – Title or Description of Course	Training Provider	Training Date	Personnel/Groups Receiving Training	Personnel Titles/ Organizational Affiliation	Location of Training Records/Certificates
Site 66 environmental work	Hazwoper 40-hour training or 8-hour annual refresher, as appropriate	Registered training organization	Project-specific	Christopher Houck (FTL), Stacy Davenport (field team member); Navy and regulatory agency representatives	Field team members, site safety coordinators, all from CH2M HILL; Navy, EPA, and MDE	Navy, agency, or contractor human resources department

QAPP Worksheet #9 (UFP-QAPP Manual Section 2.5.1) Project Scoping Session Participants Sheet

Complete this worksheet for each project scoping session held. Identify project team members who are responsible for planning the project.

Worksheet Not Applicable (State Reason)

Project Name: Site Inspection for Site 66 Turkey Run Disposal Area, Naval Support Facility, Indian Head, Indian Head, Maryland

Projected Date(s) of Sampling: 3/19/2007 to 4/21/2007

Site Name: Site 66 - Turkey Run Disposal Area

Project Manager: Christine Metcalf

Site Location: NSF-IH, Indian Head, Maryland

Date of Session: August 23, 2006, October 11, 2006, and November 8, 2006

Scoping Session Purpose: To identify possible environmental concerns and develop a sampling plan

Name	Title	Affiliation	Phone #	E-mail Address	Project Role
Jeff Morris	Remedial Project Manager	NAVFAC Washington	202-685-3279	jeffrey.w.morris@navy.mil	RPM
Joseph Rail	Remedial Project Manager	NAVFAC Washington	202-685-3105	joesph.rail@navy.mil	RPM
Shawn Jorgensen	Installation Restoration Project Manager	NSF-IH	301-744-2263	shawn.a.jorgensen@navy.mil	IRPM
Dennis Orenshaw	Remedial Project Manager	EPA Region III	215-814-3361	orenshaw.dennis@epamail.epa.gov	RPM
Curtis DeTore	Remedial Project Manager	MDE	410-537-3791	cdetore@mde.state.md.us	RPM
Margaret Kasim	Activity Manager	CH2M HILL	703-376-5154	margaret.kasim@ch2m.com	Activity Manager
Christine Metcalf	Project Manager	CH2M HILL	703-376-5193	christine.metcalf@ch2m.com	Project Manager

QAPP Worksheet #9 (UFP-QAPP Manual Section 2.5.1) Project Scoping Session Participants Sheet

August 23, 2006 Project Scoping Session

Comments/Decisions: In 2003, Site 66 was discussed by the Indian Head Installation Restoration Team (IHIRT [Team]) and the Team conducted a visit to the site. In 2005, the Team brainstormed a potential path forward for the site. On August 23, 2006, CH2M HILL made a presentation to the Team on the sampling approach for Site 66. A figure showing the location of Site 66, north of Site 11 – Caffee Road Landfill, was provided to the Team. An overview of background information was also presented to the Team. According to historical documents (Initial Assessment Study [IAS] [Naval Energy and Environmental Support Activity, 1983]), disposal activities were reported in the vicinity of Building 1440 (former “otto” fuel storage and polychlorinated biphenyl transformer storage). The EPA Environmental Photographic Interpretation Center (EPIC) study indicated fill and dark- and light-toned materials in the vicinity of Site 66 between the years 1956 and 1963.

Because no sampling has been conducted at the site, the Team agreed to the collection of soil, groundwater, surface water, and sediment samples and analyses of the samples for the full suite of parameters. It was further agreed by the Team that a site visit will have to be conducted to refine the sample locations and number of samples to be collected.

October 11, 2006 Site Visit

On October 11, 2006, a site visit was conducted by some members of the Team. Attendees included Jeff Morris (NAVFAC Washington), Shawn Jorgensen (NSF-IH), Curtis DeTore (MDE), Margaret Kasim (CH2M HILL), John Mason (CH2M HILL), and Christine Metcalf (CH2M HILL). The site appeared to be hummocky along the banks of the stream creek because of mounds of waste and ash material, which are partially overgrown with vegetation. Other materials observed at the site included lead flooring, metal objects, tires, asbestos/transite roofing, concrete slabs, land clearing debris, creosote telephone poles, crumpled copper and copper pieces, 55-gallon drums, 5-gallon empty cans, a washing machine, ash/slag, bricks, and laboratory bottles.

November 8, 2006 Project Scoping Session

Comments/Decisions: During the November 8, 2006 partnering meeting, the Team modified the sampling approach based on the field observations made during the site visit on October 11, 2006. Detailed information is presented in the IHIRT Meeting Minutes (November 2006) and will not be presented in this section. In summary, the following changes were made: the number of samples collected for each medium; ash material samples will be collected; and *in situ* groundwater samples will be collected from boreholes using direct-push technology. The Team agreed that monitoring wells will be installed at a future date, if necessary, based on the results of the *in situ* groundwater grab samples. Furthermore, a debris survey will be conducted, using a global positioning system (GPS) equipment, to better delineate the site boundary before beginning fieldwork.

QAPP Worksheet #10
(UFP-QAPP Manual Section 2.5.2)
Problem Definition

Clearly define the problem and the environmental questions that should be answered for the current investigation and develop the project decision "If..., then..." statements in the QAPP, linking data results with possible actions. The prompts below are meant to help the project team define the problem. They are not comprehensive.

Worksheet Not Applicable (State Reason)

The problem to be addressed by the project: Site 66 (Figures 1 and 2 in Attachment 1) was discovered by Indian Head personnel and brought to the attention of the IHIRT during the remedial investigation (RI) of Site 11 - Caffee Road Landfill (CH2M HILL, 2004). The site is an unregulated dump that contains various solid wastes, including construction debris, metal scrap, lead flooring, scrap wood, asphalt, and laboratory bottles. Because environmental sampling has never been performed, there is no available chemical data to evaluate the impact of past activities to various media at the site. The chemical data collected from this SI will be used to determine the nature and extent of contaminants associated with the disposal activities. The IHIRT will use the information to make a site management decision.

The environmental questions being asked:

Primary Questions:

1. Are contaminants present in surface soil, subsurface soil, sediment, surface water, groundwater, and ash material, as a result of past unregulated disposal activities?
2. Are contaminants present at levels that might pose risks to human health and the environment?
3. Are contaminants present at levels that warrant the need for further investigation or remediation?

Secondary Questions (necessary environmental data to resolve the primary questions):

1. What is the spatial distribution of contaminants in the various media at the site?

QAPP Worksheet #10 (UFP-QAPP Manual Section 2.5.2) Problem Definition

2. What additional data (e.g., total organic carbon [TOC], pH, and hardness) are necessary to interpret the chemical data on various media at the site?

Observations from any site reconnaissance reports: CH2M HILL, with representatives of the Navy and the MDE, conducted a site reconnaissance on October 11, 2006. The site appeared to be hummocky along the banks of the stream creek because of mounds of waste and ash material, which are partially overgrown with vegetation. Other materials observed at the site included lead flooring, metal objects, tires, asbestos/transite roofing, concrete slabs, land clearing debris, creosote telephone poles, crumpled copper and copper pieces, 55-gallon drums, 5-gallon empty cans, a washing machine, ash/slag, bricks, and laboratory bottles.

A synopsis of secondary data or information from site reports: Site 66 is a new site at NSF-IH. Previous investigations have not been conducted at this site. However, the site is mentioned in two historical documents: the IAS (Fred C. Hart Associates, 1983) and EPA EPIC Study. As part of a discussion of Site 11 in the IAS, it was stated that "...undetermined materials were deposited in the lowland areas near Building 1440." In addition, the EPA EPIC study identified fill material (1956 photograph; see Figure 4 in Attachment 1 of this document; and 1963 photograph; see Figure 5 in Attachment 1 of this document); and solid waste, light-toned materials, and dark-toned materials (1961 photograph) as part of its review of historical aerial photographs.

The possible classes of contaminants and the affected matrices: Because sampling and analyses of various media have never been performed at this site, the possible classes of contaminants include the full suite of parameters: volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), metals including cyanide, explosives including nitroglycerine and nitroguanidine, perchlorate, dioxins, and furans. Furthermore, all matrices will be sampled: surface soil, subsurface soil, sediment, surface water, groundwater, and ash.

The rationale for inclusion of chemical and nonchemical analyses: Because previous investigations have not been conducted at the site, the full suite of potential constituents will be analyzed and evaluated.

Information concerning various environmental indicators: To date no environmental data have been collected at the site. Current site features include a stream and partially wooded land. Attachment 1 of this document contains site figures and aerial photographs.

Project decision conditions ("If..., then..." statements): The data from the analyses of surface soil, subsurface soil, sediment, surface water, groundwater, and ash samples will be the primary basis for project decisions. The quality and quantity of the data must be sufficient to compare analytical data with appropriate screening levels. Screening data need not be of the same quality as data used to

QAPP Worksheet #10
(UFP-QAPP Manual Section 2.5.2)
Problem Definition

support human health and ecological risk assessments. In general, the data will be of the quantity and quality necessary to provide technically sound and defensible assessments of potential risks to human and ecological receptors posed by the identified contaminants..

Following the collection of information during the investigation, the following decisions will be made:

For each medium, concentrations of detected constituents will be assessed for nature and extent of contamination.

For each medium, concentrations of detected constituents will be compared to appropriate regulatory screening criteria (see Worksheet #11) to determine if a potential for human health or ecological risk exists.

If concentrations of constituents do not exceed risk-screening levels, they will be eliminated from further consideration.

If concentrations of constituents exceed risk-screening levels, they will be further evaluated by comparing them to the *Background Soil Investigation Report for Indian Head and Stump Neck Annex* (Tetra Tech NUS, Inc., 2002a).

If concentrations are lower than background, they will be eliminated from further consideration.

If concentrations are higher than background, a recommendation may be made for further investigation or remediation.

If risk-based criteria and background levels are exceeded, additional investigation, risk evaluations, interim removal actions, or remediation may be recommended.

The results will be presented to the IHIRT and the SI report will document the consensus of the IHIRT for the site.

QAPP Worksheet #11
(UFP-QAPP Manual Section 2.6.1)
Project Quality Objectives /Systematic Planning Process Statements

Use this worksheet to develop PQOs in terms of type, quantity, and quality of data determined using a systematic planning process. Provide a detailed discussion of PQOs in the QAPP. List PQOs in the form of qualitative and quantitative statements. These statements should answer questions such as those listed below. These questions are examples only, however; they are neither inclusive nor appropriate for all projects.

Worksheet Not Applicable (State Reason)

Who will use the data? The data will be used by the Navy, EPA, MDE, CH2M HILL, and other Navy contractors.

What will the data be used for? The data will be used for the following:

1. Determine the nature and extent of contamination in various environmental media from past solid waste disposal activities.
2. Determine if a potential exists for human health and environmental risks.
3. IHIRT will make a management decision for the path forward based on the results of data analysis.

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

1. Samples will be collected from the surface soil, subsurface soil, groundwater, surface water, sediment, and ash material and will be analyzed by an offsite laboratory (CompuChem).
2. Surface soil, subsurface soil, groundwater, surface water and groundwater samples will be analyzed for: Target Compound List (TCL) VOCs, SVOCs, pesticides, PCBs, Target Analyte List (TAL) metals and cyanide, dissolved TAL metals (groundwater), explosives including nitroglycerine and nitroguanidine, and perchlorate. Surface water and sediment will also be analyzed for pH and TOC. All samples collected will be in accordance with the Master Plan QAPP (Tetra Tech NUS, June 2004).
3. Ash samples will be analyzed for dioxins and furans in accordance with the Master Plan QAPP (Tetra Tech NUS, June 2004).

QAPP Worksheet #11
(UFP-QAPP Manual Section 2.6.1)
Project Quality Objectives /Systematic Planning Process Statements

4. All soil samples collected will be field screened with an organic vapor meter (OVM) by splitting the acetate liner or by taking readings in a bowl after the sample is collected from a hand auger. More detail can be found in the *Facility Standard Operating Procedures for Installation Restoration Program Investigations at Naval District Washington, Indian Head, Indian Head, Maryland, June 2004*, and in laboratory SOPs (Attachment 2).

How “good” do the data need to be in order to support the environmental decision? Data gathered during the SI will be used to assess the nature and extent of contamination at the site and used for conducting human health and ecological risk screening. Consequently, the quality and quantity of the data must be sufficient to compare analytical data with appropriate screening levels. Screening data need not be of the same quality as data used to support human health and ecological risk assessments. In general, the data will be of the quantity and quality necessary to provide technically sound and defensible assessments of potential risks to human and ecological receptors posed by the contaminants identified. To support risk assessment and decisionmaking, laboratory methods will meet EPA Region III, MDE, and Navy guidance. In addition, the data will also be validated by a third party using EPA Region III and national functional guidelines.

How much data are needed? (number of samples for each analytical group, matrix, and concentration): The data will be of the quantity and quality necessary to provide technically sound human and ecological risk screening assessments and will be collected within Navy funding limits. See Worksheets #18 and #19 for details, and see Attachment 1, Figure 3, for sample locations.

Where, when, and how should the data be collected/generated? The data will be collected following the procedures outlined in this Work Plan and associated field SOPs in the *Facility Standard Operating Procedures for Installation Restoration Program Investigations at Naval District Washington, Indian Head, Indian Head, Maryland, June 2004*.

Who will collect and generate the data? Field staff will collect the samples. In general, a laboratory will analyze samples and produce sample data. In some cases, data will be field-generated, such as field screening (i.e., OVM readings, etc.) and testing (i.e., water levels, etc.) data.

How will the data be reported? The results of the SI and analyses will be documented in an SI Report. The SI Report will summarize the background, objectives, and analytical methods used in the investigation, and will present the results of the SI. The report will also provide recommended management decisions for the site, such as no further action (NFA) or conducting additional investigations.

QAPP Worksheet #11
(UFP-QAPP Manual Section 2.6.1)
Project Quality Objectives /Systematic Planning Process Statements

A human health risk screening will be performed to determine if there is the potential for adverse effects from exposure to constituents in soil, groundwater, surface water or sediment by human receptors. The maximum detected concentrations in each medium will be compared to the appropriate EPA Region III risk-based concentrations (RBCs) from the current EPA Region III RBC table. Soil data will be compared to residential soil RBCs, groundwater data to tap water RBCs, surface water data to 10 times tap water RBCs, and sediment data to 10 times residential soil RBCs. RBCs based on noncarcinogenic effects will be divided by 10 (to adjust to a Hazard Index of 0.1 to account for exposure to multiple constituents. RBCs associated with carcinogenic effects are based on an excess lifetime cancer risk of 10^{-6} , and will not be adjusted from the values in the RBC table. If the maximum detected concentration exceeds the applicable screening value, the site-related concentrations will be compared with background concentrations identified in the *Background Soil Investigation Report for Indian Head and Stump Neck Annex* (Tetra Tech NUS, Inc., 2002a). If maximum detected concentrations exceed the screening levels, and site-related concentrations are above background concentrations, the site will be considered to warrant further consideration of potential human health risk.

An ecological risk screening will be performed to determine if site conditions create potential for adverse effects to direct contact ecological receptors. Chemical concentrations measured in samples of site media will be compared to ecological screening values. If chemical concentrations exceed the ecological screening values, the chemical concentrations will be compared with background concentrations identified in the *Background Soil Investigation Report for Indian Head and Stump Neck Annex* (Tetra Tech NUS, Inc., 2002). Chemical concentrations exceeding ecological screening values and background chemical concentrations will warrant further evaluation. No further ecological evaluation will be recommended for chemicals below background concentrations.

The ecological screening values for surface water and sediment that will be used for the risk screening are the EPA Region III Biological Technical Assistance Group (BTAG) Screening Benchmarks for freshwater. The ecological screening values that will be used for the risk screening of surface soil will be the EPA Ecological Soil Screening Levels (Eco-SSLs) and the EPA Region III BTAG soil screening values. Additional literature-based ecological screening values will be used for chemicals for which an Eco-SSL or BTAG screening value is not available. Surface soil chemical concentrations will also be compared with the most conservative Eco-SSL for upper trophic-level receptors, where available, to provide a secondary risk screening for these chemicals.

How will the data be archived? The data will be archived in accordance with federal law and also uploaded into a centralized database used for Navy projects (EnDat). At the end of the project, archived data will be returned to the Navy.

QAPP Worksheet #12
(UFP-QAPP Manual Section 2.6.2)
Measurement Performance Criteria Table

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

Worksheet Not Applicable (State Reason)

**QAPP Worksheet #12-1
Measurement Performance Criteria Table**

Matrix	Soil/Sediment				
Analytical Group	TCL Volatiles				
Concentration Level	Low Soil (OLM04.3)				
Sampling Procedure ¹	Analytical Method/SOP ²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.3 SA-1.2	EPA CLP OLM04.3/ 1.1.4.1, 1.2.1.3, 1.2.3.2	contamination	must meet all internal standard and system monitoring compound criteria; all target compounds < CRQL except methylene chloride and cyclohexane < 2.5 times CRQL and acetone and 2-butanone which must be < 5 times the CRQL	Field Blanks (Equipment Rinsate Blank, Ambient Field Blank, Trip Blank)	S&A
		contamination/bias	must meet all internal standard and system monitoring compound criteria; all target compounds < CRQL except methylene chloride and cyclohexane < 2.5 times CRQL and acetone and 2-butanone which must be < 5 times the CRQL	Method Blank	A
		contamination	must meet method blank criteria	Instrument Blank	A
		accuracy	recovery must meet % recovery criteria in SOW	System Monitoring compounds	A
		precision/accuracy	must meet relative RT criteria; should meet advisory % recovery and RPD criteria in SOW	Matrix spike/Matrix spike duplicate	S&A
		contamination/bias	must meet method blank criteria	Storage Blank	A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23

EPA = U.S. Environmental Protection Agency

CLP = Contract laboratory program

CRQL = Contract Required Quantitation Limit

RPD = Relative Percent Difference

SOW = Statement of Work

**QAPP Worksheet #12-2
 Measurement Performance Criteria Table**

Matrix	Soil/Sediment				
Analytical Group	TCL Semivolatiles				
Concentration Level	Low Soil (OLM04.3)				
Sampling Procedure ¹	Analytical Method/SOP ²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.3 SA-1.2	EPA CLP OLM04.3/ 2.4.3.2, 2.4.3.4	contamination	must meet all internal standard and surrogate criteria in SOW; all target compounds < CRQL except phthalate esters < 5 times CRQL	Field Blanks (Equipment Rinsate Blank, Ambient Field Blank, Trip Blank)	S&A
		contamination/bias	must meet all internal standard and surrogate criteria in SOW; all target compounds < CRQL except phthalate esters < 5 times CRQL	Method Blank	A
		accuracy	must meet % recovery criteria in SOW	Surrogates	A
		precision/accuracy	must meet relative RT criteria; should meet advisory spike recovery and RPD criteria in the SOW	Matrix spike/Matrix spike duplicate	S&A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23

EPA = U.S. Environmental Protection Agency
 CLP = Contract laboratory program
 CRQL = Contract Required Quantitation Limit
 RPD = Relative Percent Difference
 SOW = Statement of Work

**QAPP Worksheet #12-3
 Measurement Performance Criteria Table**

Matrix	Soil/Sediment				
Analytical Group	TCL Pesticides/ Aroclors				
Concentration Level	Soil (OLM04.3)				
Sampling Procedure ¹	Analytical Method/SOP ²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.3 SA-1.2	EPA CLP OLM04.3/ 2.1.1.1, 2.1.1.6	contamination	all target compounds < CRQL; surrogates must be within RT windows; surrogate recoveries must be within 30-150%	Field Blanks (Equipment Rinsate Blank, Ambient Field Blank)	S&A
		contamination/bias	all target compounds < CRQL; surrogates must be within RT windows; surrogate recoveries must be within 30-150%	Method Blank	A
		contamination/bias	same as method blank	Sulfur Blank	A
		contamination/bias	all target compounds < half CRQL; surrogates must be within RT windows	Instrument Blank	A
		accuracy	must be within the RT windows; must meet % recovery criteria in SOW	Surrogate Spikes	A
		precision/accuracy	surrogates must be within RT windows; should meet advisory spike recovery and RPD criteria in SOW	Matrix spike/Matrix spike duplicate	S&A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23

EPA = U.S. Environmental Protection Agency

CLP = Contract laboratory program

CRQL = Contract Required Quantitation Limit

RPD = Relative Percent Difference

SOW = Statement of Work

**QAPP Worksheet #12-4
Measurement Performance Criteria Table**

Matrix	Soil/Sediment				
Analytical Group	TAL Metals/ Cyanide				
Concentration Level	Soil (ILM04.1)				
Sampling Procedure ¹	Analytical Method/SOP ²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.3 SA-1.2	EPA CLP ILM04.1/ 3.1.1.3, 3.1.1.4, 3.4.3, 3.3.3, 3.3.4, 3.4.5	contamination	all target compound < CRDL	Field Blanks (Equipment Rinsate Blank, Ambient Field Blank)	S&A
		contamination/bias	All analytes must be < the CRDL	Calibration Blank	A
		contamination/bias	absolute values of all analyte concentrations must be ≤ the CRDL	Preparation blank	A
		accuracy/bias	must be within ± 2x the CRDL of the analyte's true value or ± 20% of the analyte's true value, whichever is greater	Interference Check Sample (ICS)	A
		accuracy/bias	spike recovery limits are 75-125%	Matrix Spike	S&A
		accuracy	spike recovery limits are 80-120% for all elements except Ag and Sb	LCS	A
		precision/accuracy	RPD of ±20%, if concentration is ≥ 5x CRDL; or ± the CRDL if the concentration is < 5x CRDL	Sample Duplicate	A
		precision/accuracy	should agree within 10% of the undiluted sample	Serial Dilution	A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23

EPA = U.S. Environmental Protection Agency

CLP = Contract laboratory program

CRDL = Contract Required Detection Limit

RPD = Relative Percent Difference

SOW = Statement of Work

**QAPP Worksheet #12-5
 Measurement Performance Criteria Table**

Matrix	Soil/Sediment				
Analytical Group	Explosives				
Concentration Level	Medium (SW-846 8330)				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.3 SA-1.2	SW-846 8330/ 2.3.2.2, 2.3.2.4	contamination	no target compounds > the reporting limit; surrogate recovery must be within the limits of 38-155%	Field Blanks (Equipment Rinsate Blank, Ambient Field Blank)	S&A
		contamination/bias	no target compounds > the reporting limit; surrogate recovery must be within the limits of 38-155%	Method Blank	A
		accuracy/bias	surrogate recovery must be within the limits of 38-155%; spike recovery limits must be within the range of 50-150%	LCS	A
		precision/accuracy	spike recovery limits are 50-150%; RPD limits are 30%	MS/MSD	S&A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23
 RPD = Relative Percent Difference

**QAPP Worksheet #12-6
 Measurement Performance Criteria Table**

Matrix	Soil/Sediment				
Analytical Group	Explosives				
Concentration Level	Medium (SW-846 8332)				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.3 SA-1.2	SW-846 8332/ 2.3.2.2, 2.3.2.4	contamination	no target compounds > the reporting limit; surrogate recovery must be within the limits of 50-150%	Field Blanks (Equipment Rinsate Blank, Ambient Field Blank, Trip Blank)	S&A
		contamination/bias	no target compounds > the reporting limit; surrogate recovery must be within the limits of 50-150%	Method Blank	A
		accuracy/bias	surrogate recovery must be within the limits of 50-150%; spike recovery limits must be within the range of 50-150%	LCS	A
		precision/accuracy	spike recovery limits are 50-150%; RPD limits are 30%	MS/MSD	S&A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23
 RPD = Relative Percent Difference

**QAPP Worksheet #12-7
 Measurement Performance Criteria Table**

Matrix	Soil/Sediment				
Analytical Group	Explosives				
Concentration Level	Medium (USACOE 89-35)				
Sampling Procedure ¹	Analytical Method/SOP ²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.3 SA-1.2	USACOE 89-35/ SOC-NITG	contamination	no target compounds > the reporting limit; surrogate recovery must be within the limits of 39-132%	Field Blanks (Equipment Rinsate Blank, Ambient Field Blank, Trip Blank)	S&A
		precision	should meet RPD criteria of 35% for soil/sediment	Field Duplicate	S&A
		contamination/bias	no target compounds > the reporting limit; surrogate recovery must be within the limits of 39-132%	Method Blank	A
		accuracy/bias	surrogate recovery must be within the limits of 39-132%; spike recovery limits must be within the range of 50-150%	LCS	A
		precision/accuracy	spike recovery limits are 50-150%; RPD limits are 30%	MS/MSD	S&A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23

EPA = U.S. Environmental Protection Agency

CLP = Contract laboratory program

CRQL = Contract Required Quantitation Limit

RPD = Relative Percent Difference

SOW = Statement of Work

**QAPP Worksheet #12-8
 Measurement Performance Criteria Table**

Matrix	Soil/Sediment				
Analytical Group	Explosives				
Concentration Level	Medium (SW-846 6850)				
Sampling Procedure ¹	Analytical Method/SOP ²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.3 SA-1.2	SW-846 6850/ HPLC-DoD Perchlorate	contamination	no target compounds > 1/2 the reporting limit	Field Blanks (Equipment Rinsate Blank, Ambient Field Blank, Trip Blank)	S&A
		precision	should meet RPD criteria of 35% for soil/sediment	Field Duplicate	S&A
		contamination/bias	no target compounds > 1/2 the reporting limit	Method Blank	A
		accuracy/bias	spike recovery limits must be within the range of 85-115%	LCS	A
		precision/accuracy	spike recovery limits are 75-125%; RPD limits are 20%	MS/MSD	S&A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23

EPA = U.S. Environmental Protection Agency

CLP = Contract laboratory program

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**QAPP Worksheet #12-9
Measurement Performance Criteria Table**

Matrix	Soil/Sediment				
Analytical Group	Wet Chemistry				
Concentration Level	Medium (various)				
Sampling Procedure ¹	Analytical Method/SOP ²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.3 SA-1.2	Lloyd Kahn / 3.6.2.2	contamination	analyte concentration < reporting limit	Field Blanks (Equipment Rinsate Blank, Ambient Field Blank)	S&A
		contamination/bias	< CRQL	Calibration Blank	A
		contamination/bias	< CRQL	Method Blank	A
		accuracy	spike recovery $\pm 25\%$; RPD of ≤ 20	MS/MSD	S&A
		accuracy	spike recovery $\pm 10\%$	LCS	A
SA-1.3 SA-1.2	SW-846 9045C / 3.5.14.3	accuracy	must agree within ± 0.10 pH unit of true value	ICV (Initial Calibration Verification)	A
		accuracy	± 0.05 pH unit of the temperature adjusted pH value	CCV(Continuing Calibration Verification)	A
		precision/accuracy	must agree within ± 0.10 pH unit of true value	Sample Duplicate	A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23

**QAPP Worksheet #12-10
 Measurement Performance Criteria Table**

Matrix	Groundwater / Surface Water				
Analytical Group	TCL Volatiles				
Concentration Level	Water (OLM04.3)				
Sampling Procedure ¹	Analytical Method/SOP ²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.1 SA-1.2	EPA CLP OLM04.3/ 1.2.3.3	contamination	must meet all internal standard and system monitoring compound criteria; all target compounds < CRQL except methylene chloride and cyclohexane < 2.5 times CRQL and acetone and 2-butanone which must be < 5 times the CRQL	Field Blanks (Equipment Rinsate Blank, Ambient Field Blank, Trip Blank)	S&A
		contamination/bias	must meet all internal standard and system monitoring compound criteria; all target compounds < CRQL except methylene chloride and cyclohexane < 2.5 times CRQL and acetone and 2-butanone which must be < 5 times the CRQL	Method Blank	A
		contamination	must meet method blank criteria	Instrument Blank	A
		accuracy	recovery must meet % recovery criteria in SOW	System Monitoring Compounds	A
		precision/accuracy	must meet relative RT criteria; should meet advisory % recovery and RPD criteria in SOW	Matrix spike/Matrix spike duplicate	S&A
		contamination/bias	must meet method blank criteria	Storage Blank	A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23

EPA = U.S. Environmental Protection Agency

CLP = Contract laboratory program

CRQL = Contract Required Quantitation Limit

RPD = Relative Percent Difference

SOW = Statement of Work

**QAPP Worksheet #12-11
Measurement Performance Criteria Table**

Matrix	Groundwater / Surface Water				
Analytical Group	TCL Semivolatiles				
Concentration Level	Water (OLM04.3)				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.1 SA-1.2	EPA CLP OLM04.3/ 2.4.3.1, 2.4.3.4	contamination	must meet all internal standard and surrogate criteria in SOW; all target compounds < CRQL except phthalate esters which must be < 5 times CRQL	Field Blanks (Equipment Rinsate Blank, Ambient Field Blank, Trip Blank)	S&A
		contamination/bias	must meet all internal standard and surrogate criteria in SOW; all target compounds < CRQL except phthalate esters which must be < 5 times CRQL	Method Blank	A
		accuracy	must meet % recovery criteria in SOW	Surrogates	A
		precision/accuracy	must meet relative RT criteria; should meet advisory spike recovery and RPD criteria in the SOW	Matrix spike/Matrix spike duplicate	S&A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23

EPA = U.S. Environmental Protection Agency

CLP = Contract laboratory program

CRQL = Contract Required Quantitation Limit

RPD = Relative Percent Difference

SOW = Statement of Work

**QAPP Worksheet #12-12
 Measurement Performance Criteria Table**

Matrix	Groundwater / Surface Water				
Analytical Group	TCL Pesticides/ Aroclors				
Concentration Level	Water (OLM04.3)				
Sampling Procedure ¹	Analytical Method/SOP ²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.1 SA-1.2	EPA CLP OLM04.3/ 2.1.1.6, 2.1.1.6, 2.1.1.5	contamination	all target compounds < CRQL; surrogates must be within RT windows; surrogate recoveries must be within 30-150%	Field Blanks (Equipment Rinsate Blank, Ambient Field Blank)	S&A
		contamination/bias	all target compounds < CRQL; surrogates must be within RT windows; surrogate recoveries must be within 30-150%	Method Blank	A
		contamination/bias	same as method blank	Sulfur Blank	A
		contamination/bias	all target compounds < half CRQL; surrogates must be within RT windows	Instrument Blank	A
		accuracy	must be within RT windows; must meet % recovery criteria in SOW	Surrogate Spikes	A
		precision/accuracy	surrogates must be within RT windows; should meet advisory spike recovery and RPD criteria in SOW	Matrix spike/Matrix spike duplicate	S&A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23

EPA = U.S. Environmental Protection Agency
 CLP = Contract laboratory program
 CRQL = Contract Required Quantitation Limit
 RPD = Relative Percent Difference
 SOW = Statement of Work

**QAPP Worksheet #12-13
Measurement Performance Criteria Table**

Matrix	Groundwater / Surface Water				
Analytical Group	TAL Metals/ Cyanide TAL Filtered Metals				
Concentration Level	Water (ILM04.1)				
Sampling Procedure ¹	Analytical Method/SOP ²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.1 SA-1.2	EPA CLP ILM04.1/ 3.1.1.2, 3.1.1.4, 3.4.1, 3.4.5, 3.3.1, 3.3.4	contamination	all analyte concentrations must be ≤ the CRDL	Field Blanks (Equipment Rinsate Blank, Ambient Field Blank)	S&A
		precision	RPD of 20%, if concentration is > 5x CRDL; or ± the CRQL if the concentration is < 5x CRQL	Duplicate Sample	S&A
		contamination/bias	All analytes must be < the CRDL	Calibration Blank	A
		contamination/bias	absolute values of all analyte concentrations must be ≤ the CRDL	Preparation blank	A
		accuracy/bias	must be within ± 2x the CRDL of the analyte's true value or ± 20% of the analyte's true value, whichever is greater	Interference Check Sample (ICS)	A
		accuracy/bias	spike recovery limits are 75-125%	Matrix Spike	S&A
		accuracy	must meet the recovery limits of 80- 120% of the true value, except for Ag and Sb	LCS	A
		precision/accuracy	should agree within 10% of the undiluted sample	Serial Dilution	A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23

EPA = U.S. Environmental Protection Agency

CLP = Contract laboratory program

CRDL = Contract Required Detection Limit

RPD = Relative Percent Difference

SOW = Statement of Work

**QAPP Worksheet #12-14
 Measurement Performance Criteria Table**

Matrix	Groundwater / Surface Water				
Analytical Group	Explosives				
Concentration Level	Medium (SW-846 8330)				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.1 SA-1.2	SW-846 8330/ 2.3.2.5, 2.3.2.6	contamination	no target compounds > the reporting limit; surrogate recovery must be within the limits of 39-132%	Field Blanks (Equipment Rinsate Blank, Ambient Field Blank)	S&A
		contamination/bias	no target compounds > the reporting limit; surrogate recovery must be within the limits of 39-132%	Method Blank	A
		accuracy/bias	surrogate recovery must be within the limits of 39-132%; spike recovery limits must be within the range of 50-150%	LCS	A
		precision/accuracy	spike recovery limits are 50-150%; RPD limits are 30%	MS/MSD	S&A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23
 RPD = Relative Percent Difference

**QAPP Worksheet #12-15
Measurement Performance Criteria Table**

Matrix	Groundwater / Surface Water				
Analytical Group	Explosives				
Concentration Level	Medium (SW-846 8332)				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.1 SA-1.2	SW-846 8332/ 2.3.2.5, 2.3.2.6	contamination	no target compounds > the reporting limit; surrogate recovery must be within the limits of 50-150%	Field Blanks (Equipment Rinsate Blank, Ambient Field Blank)	S&A
		contamination/bias	no target compounds > the reporting limit; surrogate recovery must be within the limits of 50-150%	Method Blank	A
		accuracy/bias	surrogate recovery must be within the limits of 50-150%; spike recovery limits must be within the range of 50-150%	LCS	A
		precision/accuracy	spike recovery limits are 50-150%; RPD limits are 30%	MS/MSD	S&A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23
RPD = Relative Percent Difference

**QAPP Worksheet #12-16
Measurement Performance Criteria Table**

Matrix	Groundwater / Surface Water				
Analytical Group	Explosives				
Concentration Level	Medium (USACOE 89-35)				
Sampling Procedure ¹	Analytical Method/SOP ²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.1 SA-1.2	USACOE 89-35/ SOC-NITG	contamination	no target compounds > the reporting limit; surrogate recovery must be within the limits of 39-132%	Field Blanks (Equipment Rinsate Blank, Ambient Field Blank, Trip Blank)	S&A
		precision	should meet RPD criteria of 30% for surface water/groundwater	Field Duplicate	S&A
		contamination/bias	no target compounds > the reporting limit; surrogate recovery must be within the limits of 39-132%	Method Blank	A
		accuracy/bias	surrogate recovery must be within the limits of 39-132%; spike recovery limits must be within the range of 50-150%	LCS	A
		precision/accuracy	spike recovery limits are 50-150%; RPD limits are 30%	MS/MSD	S&A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23

EPA = U.S. Environmental Protection Agency

CLP = Contract laboratory program

CRQL = Contract Required Quantitation Limit

RPD = Relative Percent Difference

SOW = Statement of Work

**QAPP Worksheet #12-17
Measurement Performance Criteria Table**

Matrix	Groundwater / Surface Water				
Analytical Group	Explosives				
Concentration Level	Medium (SW-846 6850)				
Sampling Procedure ¹	Analytical Method/SOP ²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.1 SA-1.2	SW-846 6850/ HPLC-DoD Perchlorate	contamination	no target compounds > 1/2 the reporting limit	Field Blanks (Equipment Rinsate Blank, Ambient Field Blank, Trip Blank)	S&A
		precision	should meet RPD criteria of 25% for surface water/groundwater	Field Duplicate	S&A
		contamination/bias	no target compounds > 1/2 the reporting limit	Method Blank	A
		accuracy/bias	spike recovery limits must be within the range of 85-115%	LCS	A
		precision/accuracy	spike recovery limits are 75-125%; RPD limits are 20%	MS/MSD	S&A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23

EPA = U.S. Environmental Protection Agency

CLP = Contract laboratory program

CRQL = Contract Required Quantitation Limit

RPD = Relative Percent Difference

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**QAPP Worksheet #12-18
 Measurement Performance Criteria Table**

Matrix	Groundwater / Surface Water				
Analytical Group	Wet Chemistry				
Concentration Level	Medium (various)				
Sampling Procedure ¹	Analytical Method/SOP ²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.1 SA-1.2	EPA 130.2/ 3.5.7.1	contamination	absolute value < reporting limit	Field Blanks (Equipment Rinsate Blank, Ambient Field Blank)	S&A
		contamination/bias	< CRQL	Calibration Blank	A
		contamination/bias	absolute value < reporting limit	Method Blank	A
		accuracy	spike recovery limits ± 25%	LCS	A
		precision/accuracy	spike recovery limits ± 25%; RPD ± 20 %	MS/MSD	S&A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23
 RPD = Relative Percent Difference

**QAPP Worksheet #12-19
 Measurement Performance Criteria Table**

Matrix	Ash				
Analytical Group	Dioxins/Furans				
Concentration Level	Medium (SW-846 8280A)				
Sampling Procedure ¹	Analytical Method/SOP ²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.1 SA-1.2	SW-846 8280A / HRMS-8280A	contamination	all target compounds < CRQL; surrogates must be within RT windows; surrogate recoveries must be within 25-150%	Field Blanks (Equipment Rinsate Blank, Ambient Field Blank, Trip Blank)	S&A
		precision	should meet RPD criteria of 25% for surface water/groundwater	Field Duplicate	S&A
		contamination/bias	all target compounds < CRQL; surrogates must be within RT windows; surrogate recoveries must be within 25-150%	Method Blank	A
		contamination/bias	same as method blank	Sulfur Blank	A
		contamination/bias	all target compounds < CRQL; surrogates must be within RT windows	Instrument Blank	A
		accuracy	surrogates must be within RT windows; surrogate recoveries must be with 25-150%; spike recoveries must meet criteria in DLM02.0 SOW	Laboratory Control Sample	A
		accuracy	must be within RT windows; must meet % recovery criteria in DLM02.0 SOW	Surrogate Spikes	A
		precision/accuracy	surrogates must be within RT windows; should meet advisory spike recovery and RPD criteria in DLM02.0 SOW	Matrix spike/Matrix spike duplicate	S&A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23

EPA = U.S. Environmental Protection Agency

CLP = Contract laboratory program

CRQL = Contract Required Quantitation Limit

RPD = Relative Percent Difference

SOW = Statement of Work

**QAPP Worksheet #12-20
 Measurement Performance Criteria Table**

Matrix	Solid IDW				
Analytical Group	TCLP Volatiles				
Concentration Level	Medium (SW-846 8260B)				
Sampling Procedure ¹	Analytical Method/SOP ²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.3	SW-846 1311, SW-846 8260B/ 2.7.3, 1.3.2.2	contamination/bias	must meet all internal standard and surrogate criteria; all target compounds < reporting limit	TCLP Blank	A
		contamination/bias	must meet all internal standard and surrogate criteria; all target compounds < reporting limit	Method Blank	A
		accuracy	must meet the control limit criteria in the SOP	Laboratory Control Sample	A
		accuracy	surrogate recovery must meet % recovery criteria in SOP	Surrogates	A
		precision/accuracy	must meet relative RT criteria; should meet advisory % recovery and RPD criteria in SOP	Matrix spike/Matrix spike duplicate	S&A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23
 RPD = Relative Percent Difference

**QAPP Worksheet #12-21
 Measurement Performance Criteria Table**

Matrix	Solid IDW				
Analytical Group	TCLP Semivolatiles				
Concentration Level	Medium (SW-846 8270C)				
Sampling Procedure ¹	Analytical Method/SOP ²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.3	SW-846 1311, SW-846 8270C /2.7.2, 2.5.2.7, 2.5.2.2	contamination/bias	must meet all internal standard and surrogate criteria in SOP; all target compounds < reporting limit except phthalate esters which must be < 5 times the reporting limit	TCLP Blank	A
		contamination/bias	must meet all internal standard and surrogate criteria in SOP; all target compounds < reporting limit except phthalate esters which must be < 5 times the reporting limit	Method Blank	A
		accuracy	must meet all internal standard, surrogate and spike recovery criteria in SOP	Laboratory Control Sample	A
		accuracy	surrogate recovery must meet % recovery criteria in SOP	Surrogates	A
		precision/accuracy	must meet relative RT criteria; should meet advisory spike recovery and RPD criteria in the SOP	Matrix spike/Matrix spike duplicate	S&A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23

RPD = Relative Percent Difference

**QAPP Worksheet #12-22
Measurement Performance Criteria Table**

Matrix	Solid IDW				
Analytical Group	TCLP Pesticides				
Concentration Level	Medium (SW-846 8081A)				
Sampling Procedure ¹	Analytical Method/SOP ²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.3	SW-846 1311, SW-846 8081A/ 2.7.2, 2.2.4.3, 2.2.4.10	contamination/bias	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries meet criteria in SOP	Method Blank	A
		contamination/bias	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries meet criteria in SOP	Sulfur Blank	A
		contamination/bias	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries meet criteria in SOP	TCLP Blank	A
		contamination/bias	all target compounds < CRQL	Instrument Blank	A
		accuracy	surrogates must be within RT windows; surrogate and spike recoveries must meet criteria in SOP	Laboratory Control Sample	A
		accuracy	must be within RT windows; must meet % recovery criteria in SOP	Surrogate Spikes	A
		precision/accuracy	surrogates must be within RT windows; should meet advisory spike recovery and RPD criteria in SOP	Matrix spike/Matrix spike duplicate	S&A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23
RPD = Relative Percent Difference

**QAPP Worksheet #12-23
 Measurement Performance Criteria Table**

Matrix	Solid IDW				
Analytical Group	TCLP Herbicides				
Concentration Level	Medium (SW-846 8151A)				
Sampling Procedure ¹	Analytical Method/SOP ²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.3	SW-846 1311, SW-846 8151A/ 2.7.2, 2.2.7.3, 2.2.7.4	contamination/bias	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries must meet criteria in SOP	Method Blank	A
		contamination/bias	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries must meet criteria in SOP	Sulfur Blank	A
		contamination/bias	all target compounds < reporting limit	Instrument Blank	A
		accuracy	surrogates must be within RT windows; surrogate and spike recoveries must be within criteria in SOP	Laboratory Control Sample	A
		accuracy	must be within RT windows; must meet % recovery criteria in SOP	Surrogate Spikes	A
		precision/accuracy	surrogates must be within RT windows; should meet advisory spike recovery and RPD criteria in SOP	Matrix spike/Matrix spike duplicate	S&A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23
 RPD = Relative Percent Difference

QAPP Worksheet #12-24
Measurement Performance Criteria Table

Matrix	Solid IDW				
Analytical Group	TCLP Metals				
Concentration Level	Medium (SW-846 6010B)				
Sampling Procedure ¹	Analytical Method/SOP ²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.3	SW-846 1311, SW-846 6010B/ 2.7.2, 3.2.1.7, 3.2.1.6	accuracy	analyte concentration 50-150% of true value	Low Range Standard (LRS)	A
		contamination/bias	All analytes must be ≤ the reporting limit	Calibration Blank	A
		contamination/bias	All analytes must be ≤ the reporting limit	Preparation blank	A
		accuracy/bias	must be within ± 20% of the analyte's true value	Interference Check Sample (ICS)	A
		accuracy/bias	spike recovery limits are 80-120%	Matrix Spike	S&A
		accuracy	must meet the recovery limits of 20% of the true value	LCS	A
		precision/accuracy	RPD of 20%, if concentration is > 10x reporting limit	Sample Duplicate	A
precision/accuracy	should agree within 10% of the undiluted sample, If the analyte concentration is 50 times or more above the instrument detection limit in the original sample.	Serial Dilution	A		

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23
RPD = Relative Percent Difference

**QAPP Worksheet #12-25
 Measurement Performance Criteria Table**

Matrix	Solid IDW				
Analytical Group	Reactivity				
Concentration Level	Medium (SW-846 9014, SW-846 9034)				
Sampling Procedure ¹	Analytical Method/SOP ²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.3	SW-846 9014, SW-846 9034/3.4.4, 3.5.18.1	contamination/bias	absolute values of all analyte concentrations must be ≤ the reporting limit	Preparation blank	A
		accuracy/bias	should meet spike recovery limits in SOP	Matrix Spike	S&A
		accuracy	must meet the recovery limits in SOP	LCS	A
		precision/accuracy	RPD of ± 20	Sample Duplicate	A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23

RPD = Relative Percent Difference

**QAPP Worksheet #12-26
 Measurement Performance Criteria Table**

Matrix	Solid IDW				
Analytical Group	Reactivity				
Concentration Level	Medium (SW-846 9045C)				
Sampling Procedure ¹	Analytical Method/SOP ²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.3	SW-846 9045C/ 3.5.14.3	accuracy	must agree within ± 0.10 pH unit of true value	ICV (Initial Calibration Verification)	A
		accuracy	± 0.05 pH unit of the temperature adjusted pH value	CCV(Continuing Calibration Verification)	A
		precision/accuracy	must agree within ± 0.10 pH unit of true value	Sample Duplicate	A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23

**QAPP Worksheet #12-27
 Measurement Performance Criteria Table**

Matrix	Solid IDW				
Analytical Group	Ignitability				
Concentration Level	Medium (Pensky Martens)				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.3	Pensky Martens/ 3.5.9.1	accuracy	must agree within ± 0.05 pH unit of true value	ICV (Initial Calibration Verification)	A
		accuracy	must agree within $\pm 2^\circ$ F.	Sample Duplicate	A
		precision/accuracy	flash point must be $81^\circ \pm 2^\circ$ F.	Laboratory Control Sample	A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23

**QAPP Worksheet #12-28
 Measurement Performance Criteria Table**

Matrix	Liquid IDW				
Analytical Group	TCLP Volatiles				
Concentration Level	Medium (SW-846 8260B)				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.2	SW-846 1311, SW-846 8260B/ 2.7.3, 1.2.3.3	contamination/bias	must meet all internal standard and surrogate criteria; all target compounds < reporting limit	TCLP Blank	A
		contamination/bias	must meet all internal standard and surrogate criteria; all target compounds < reporting limit	Method Blank	A
		accuracy	must meet the control limit criteria in the SOP	Laboratory Control Sample	A
		accuracy	surrogate recovery must meet % recovery criteria in SOP	Surrogates	A
		precision/accuracy	must meet relative RT criteria; should meet advisory % recovery and RPD criteria in SOP	Matrix spike/Matrix spike duplicate	S&A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23

RPD = Relative Percent Difference

**QAPP Worksheet #12-29
 Measurement Performance Criteria Table**

Matrix	Liquid IDW				
Analytical Group	TCLP Semivolatiles				
Concentration Level	Medium (SW-846 8270C)				
Sampling Procedure ¹	Analytical Method/SOP ²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.2	SW-846 1311, SW-846 8270C/ 2.7.6, 2.5.2.2, 2.5.2.7	contamination/bias	must meet all internal standard and surrogate criteria in SOP; all target compounds < reporting limit except phthalate esters which must be < 5 times the reporting limit	TCLP Blank	A
		contamination/bias	must meet all internal standard and surrogate criteria in SOP; all target compounds < reporting limit except phthalate esters which must be < 5 times the reporting limit	Method Blank	A
		accuracy	must meet all internal standard, surrogate and spike recovery criteria in SOP	Laboratory Control Sample	A
		accuracy	surrogate recovery must meet % recovery criteria in SOP	Surrogates	A
		precision/accuracy	must meet relative RT criteria; should meet advisory spike recovery and RPD criteria in the SOP	Matrix spike/Matrix spike duplicate	S&A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23

RPD = Relative Percent Difference

**QAPP Worksheet #12-30
 Measurement Performance Criteria Table**

Matrix	Liquid IDW				
Analytical Group	TCLP Pesticides				
Concentration Level	Medium (SW-846 8081A)				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.2	SW-846 1311, SW-846 8081A/ 2.7.6, 2.2.4.3, 2.2.4.10	contamination/bias	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries meet criteria in SOP	Method Blank	A
		contamination/bias	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries meet criteria in SOP	Sulfur Blank	A
		contamination/bias	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries meet criteria in SOP	TCLP Blank	A
		contamination/bias	all target compounds < CRQL	Instrument Blank	A
		accuracy	surrogates must be within RT windows; surrogate and spike recoveries must meet criteria in SOP	Laboratory Control Sample	A
		accuracy	must be within RT windows; must meet % recovery criteria in SOP	Surrogate Spikes	A
		precision/accuracy	surrogates must be within RT windows; should meet advisory spike recovery and RPD criteria in SOP	Matrix spike/Matrix spike duplicate	S&A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23

RPD = Relative Percent Difference

**QAPP Worksheet #12-31
Measurement Performance Criteria Table**

Matrix	Liquid IDW				
Analytical Group	TCLP Herbicides				
Concentration Level	Medium (SW-846 8151A)				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.2	SW-846 1311, SW-846 8151A/ 2.7.6, 2.2.7.1, 2.2.7.4	contamination/bias	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries must meet criteria in SOP	Method Blank	A
		contamination/bias	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries must meet criteria in SOP	Sulfur Blank	A
		contamination/bias	all target compounds < reporting limit	Instrument Blank	A
		accuracy	surrogates must be within RT windows; surrogate and spike recoveries must be within criteria in SOP	Laboratory Control Sample	A
		accuracy	must be within RT windows; must meet % recovery criteria in SOP	Surrogate Spikes	A
		precision/accuracy	surrogates must be within RT windows; should meet advisory spike recovery and RPD criteria in SOP	Matrix spike/Matrix spike duplicate	S&A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23

RPD = Relative Percent Difference

**QAPP Worksheet #12-32
Measurement Performance Criteria Table**

Matrix	Liquid IDW				
Analytical Group	TCLP Metals				
Concentration Level	Medium (SW-846 6010B)				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.2	SW-846 1311, SW-846 6010B/ 2.7.6, 3.2.1.4, 3.2.1.6	accuracy	analyte concentration 50-150% of true value	Low Range Standard (LRS)	A
		contamination/bias	All analytes must be ≤ the reporting limit	Calibration Blank	A
		contamination/bias	All analytes must be ≤ the reporting limit	Preparation blank	A
		accuracy/bias	must be within ± 20% of the analyte's true value	Interference Check Sample (ICS)	A
		accuracy/bias	spike recovery limits are 80-120%	Matrix Spike	S&A
		accuracy	must meet the recovery limits of 20% of the true value	LCS	A
		precision/accuracy	RPD of 20%, if concentration is > 10x reporting limit	Sample Duplicate	A
precision/accuracy	should agree within 10% of the undiluted sample, If the analyte concentration is 50 times or more above the instrument detection limit in the original sample.	Serial Dilution	A		

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23
RPD = Relative Percent Difference

**QAPP Worksheet #12-33
 Measurement Performance Criteria Table**

Matrix	Liquid IDW				
Analytical Group	Reactivity				
Concentration Level	Medium (SW-846 9014, SW-846 9034)				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.2	SW-846 9014, SW-846 9034, 3.5.14.3, 3.4.4	contamination/bias	absolute values of all analyte concentrations must be ≤ the reporting limit	Preparation blank	A
		accuracy/bias	should meet spike recovery limits in SOP	Matrix Spike	S&A
		accuracy	must meet the recovery limits in SOP	LCS	A
		precision/accuracy	RPD of ± 20	Sample Duplicate	A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23

RPD = Relative Percent Difference

**QAPP Worksheet #12-34
 Measurement Performance Criteria Table**

Matrix	Liquid IDW				
Analytical Group	Reactivity				
Concentration Level	Medium (SW-846 9045C)				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.2	SW-846 9045C/ 3.5.14.3	accuracy	must agree within ± 0.10 pH unit of true value	ICV (Initial Calibration Verification)	A
		accuracy	± 0.05 pH unit of the temperature adjusted pH value	CCV(Continuing Calibration Verification)	A
		precision/accuracy	must agree within ± 0.10 pH unit of true value	Sample Duplicate	A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23

**QAPP Worksheet #12-35
 Measurement Performance Criteria Table**

Matrix	Liquid IDW				
Analytical Group	Ignitability				
Concentration Level	Medium (Pensky Martens)				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A), or both (S&A)
SA-1.2	Pensky Martens/ 3.5.9.1	accuracy	must agree within ± 0.05 pH unit of true value	ICV (Initial Calibration Verification)	A
		accuracy	must agree within $\pm 2^\circ$ F.	Sample Duplicate	A
		precision/accuracy	flash point must be $81^\circ \pm 2^\circ$ F.	Laboratory Control Sample	A

¹Reference number from QAPP Worksheet #21.

²Reference number from QAPP Worksheet #23

**QAPP Worksheet #13
 (UFP-QAPP Manual Section 2.7)
 Secondary Data Criteria and Limitations Table**

Identify all secondary data and information that will be used for the project and their originating sources. Specify how the secondary data will be used and the limitations on their use.

Worksheet Not Applicable (State Reason)

Secondary Data	Data Source (Originating Organization, Report Title, and Date)	Data Generator(s) (Originating Org., Data Types, Data Generation/ Collection Dates)	How Data Will Be Used	Limitations on Data Use
Historical surface water data from stream	NSF-IH files	NSF-IH	Site history narrative	Data will not be used for risk assessment purposes.

QAPP Worksheet #14
(UFP-QAPP Manual Section 2.8.1)
Summary of Project Tasks

Provide a brief overview of the listed project activities.

Worksheet Not Applicable (State Reason)

Sampling Tasks:

1. Conduct a debris survey using GPS and stake out proposed sample locations.
2. Subcontractor will conduct utility clearance on a 15-foot radius around each borehole location, if possible, so that boreholes can be easily relocated in the event that refusal is encountered at a proposed location. Clearance will be performed prior to conducting any subsurface intrusive work.
3. Log subsurface lithology during advancement of boreholes every 2 feet. Use an OVM to screen soils for VOCs every 6 inches.
4. Collect 10 surface soil (0 to 6 inches below ground surface [bgs]), 10 subsurface soil (sample depth interval to be determined in the field; to be collected from the interval above the water table), and 10 *in situ* groundwater samples (sample depth interval will depend on depth at which water is encountered in the surficial aquifer) using direct-push technology (Figure 3 in Attachment 1).
5. Measure static water level in each borehole.
6. Collect 10 additional surface soil samples (5 pre-determined locations based on observations made during the October 2006 site visit and 5 based on site conditions observed in the field at the time of the sampling event).
7. Collect 5 surface water and 5 sediment samples. If surface water sample and sediment sample locations are collocated, the surface water sample will be collected before collection of the sediment sample. Samples will be collected from downstream to upstream direction to ensure collection of undisturbed samples. Field measurements of dissolved oxygen (DO), pH, and conductivity will be made.
8. Collect three ash material samples from mounds observed at the site. The depth intervals of the samples will be determined in the field).

QAPP Worksheet #14
(UFP-QAPP Manual Section 2.8.1)
Summary of Project Tasks

9. Measure field parameters (pH, specific conductance, turbidity, oxidation-reduction potential, DO, and temperature) on groundwater and surface water prior to sampling.
10. Survey sample locations using GPS.
11. Document detailed field observations in a field notebook.
12. Decontaminate non-dedicated sampling equipment before sampling activities and after each use.
13. Handling and disposal of investigation-derived waste (IDW) will be performed in accordance with the Master Plans.

Analyses Tasks:

1. The laboratory will process and prepare samples for analyses.
2. The laboratory will analyze all samples for various groups of parameters: TCL VOCs, SVOCs, pesticides, PCBs, TAL total metals and cyanide, dissolved TAL metals, explosives including nitroglycerine and nitroguanidine, perchlorate, pH, and TOC.

Quality Control Tasks:

1. Implement SOPs for field and laboratory activities being performed.
2. QC samples are described on Worksheet #28.

Secondary Data:

Secondary data (Worksheet #13) provided by NSF-IH will be incorporated into the site history narrative. These data will not be used for risk assessment purposes.

QAPP Worksheet #14
(UFP-QAPP Manual Section 2.8.1)
Summary of Project Tasks

Data Management Tasks:

1. Database setup and management.
2. Data validation and reporting.
3. Incorporate validated data into CH2M HILL's EnDat database and Basewide Geographic Information System.

Documentation and Records:

See Worksheet #29

Assessment/Audit Tasks:

See Worksheets #31 and #32

Data Review Tasks:

1. See Worksheets #35 and #36 for data validation tasks.
2. See Worksheet #37 from data usability assessment tasks.

QAPP Worksheet #15
(UFP-QAPP Manual Section 2.8.1)
Reference Limits and Evaluation Table

Complete this worksheet for each matrix, analytical group, and concentration level. Identify the target analytes/contaminants of concern and project-required action limits. Next, determine the quantitation limits (QLs) that must be met to achieve the PQOs. Finally, list the published and achievable detection and QLs for each analyte.

Worksheet Not Applicable (State Reason)

QAPP Worksheet #15-1 Reference Limits and Evaluation Table

Matrix: Soil

Analytical Group: TCL Volatiles

Concentration Level: Low Soil (OLM04.3)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
Dichlorodifluoromethane	75-71-8	1600000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.63 µg/kg	10 µg/kg
Chloromethane	74-87-3	N/A	10 µg/kg	N/A	10 µg/kg	0.63 µg/kg	10 µg/kg
Vinyl Chloride	75-01-4	90 µg/kg	10 µg/kg	N/A	10 µg/kg	0.23 µg/kg	10 µg/kg
Bromomethane	74-83-9	11000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.24 µg/kg	10 µg/kg
Chloroethane	75-00-3	220000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.41 µg/kg	10 µg/kg
Trichlorofluoromethane	75-69-4	2300000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.20 µg/kg	10 µg/kg
1,1-Dichloroethene	75-35-4	390000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.23 µg/kg	10 µg/kg
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	23000000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.23 µg/kg	10 µg/kg
Acetone	67-64-1	7000000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.69 µg/kg	10 µg/kg
Carbon Disulfide	75-15-0	780000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.30 µg/kg	10 µg/kg
Methyl Acetate	79-20-9	7800000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.75 µg/kg	10 µg/kg
Methylene Chloride	75-09-2	85000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.36 µg/kg	10 µg/kg
trans-1,2-Dichloroethene	156-60-5	160000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.23 µg/kg	10 µg/kg
Methyl tert-Butyl Ether	1634-04-4	160000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.23 µg/kg	10 µg/kg
1,1-Dichloroethane	75-34-3	1600000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.36 µg/kg	10 µg/kg
cis-1,2-Dichloroethene	156-59-2	78000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.28 µg/kg	10 µg/kg
2-Butanone	78-93-3	4700000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.33 µg/kg	10 µg/kg
Chloroform	67-66-3	78000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.22 µg/kg	10 µg/kg
1,1,1-Trichloroethane	71-55-6	2200000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.34 µg/kg	10 µg/kg
Cyclohexane	110-82-7	N/A	10 µg/kg	N/A	10 µg/kg	0.19 µg/kg	10 µg/kg
Carbon Tetrachloride	56-23-5	4900 µg/kg	10 µg/kg	N/A	10 µg/kg	0.33 µg/kg	10 µg/kg
Benzene	71-43-2	12000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.30 µg/kg	10 µg/kg
1,2-Dichloroethane	107-06-2	7000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.25 µg/kg	10 µg/kg
Trichloroethene	79-01-6	1600 µg/kg	10 µg/kg	N/A	10 µg/kg	0.30 µg/kg	10 µg/kg
Methylcyclohexane	108-87-2	N/A	10 µg/kg	N/A	10 µg/kg	0.13 µg/kg	10 µg/kg
1,2-Dichloropropane	78-87-5	9400 µg/kg	10 µg/kg	N/A	10 µg/kg	0.21 µg/kg	10 µg/kg
Bromodichloromethane	75-27-4	10000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.36 µg/kg	10 µg/kg
cis-1,3-Dichloropropene	10061-01-5	6400 µg/kg	10 µg/kg	N/A	10 µg/kg	0.20 µg/kg	10 µg/kg
4-Methyl-2-pentanone	108-10-1	N/A	10 µg/kg	N/A	10 µg/kg	0.37 µg/kg	10 µg/kg
Toluene	108-88-3	630000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.31 µg/kg	10 µg/kg
trans-1,3-Dichloropropene	10061-02-6	6400 µg/kg	10 µg/kg	N/A	10 µg/kg	0.21 µg/kg	10 µg/kg
1,1,2-Trichloroethane	79-00-5	11000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.37 µg/kg	10 µg/kg
Tetrachloroethene	127-18-4	1200 µg/kg	10 µg/kg	N/A	10 µg/kg	0.20 µg/kg	10 µg/kg
2-Hexanone	591-78-6	N/A	10 µg/kg	N/A	10 µg/kg	0.31 µg/kg	10 µg/kg
Dibromochloromethane	124-48-1	7600 µg/kg	10 µg/kg	N/A	10 µg/kg	0.37 µg/kg	10 µg/kg
1,2-Dibromoethane	106-93-4	320 µg/kg	10 µg/kg	N/A	10 µg/kg	0.30 µg/kg	10 µg/kg
Chlorobenzene	108-90-7	160000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.36 µg/kg	10 µg/kg
Ethylbenzene	100-41-4	780000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.25 µg/kg	10 µg/kg
Xylenes, total	1330-20-7	1600000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.19 µg/kg	10 µg/kg
Styrene	100-42-5	1600000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.16 µg/kg	10 µg/kg
Bromoform	75-25-2	81000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.49 µg/kg	10 µg/kg
Isopropylbenzene	98-82-8	780000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.11 µg/kg	10 µg/kg
1,1,2,2-Tetrachloroethane	79-34-5	3200 µg/kg	10 µg/kg	N/A	10 µg/kg	0.37 µg/kg	10 µg/kg
1,3-Dichlorobenzene	541-73-1	23000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.22 µg/kg	10 µg/kg
1,4-Dichlorobenzene	106-46-7	27000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.18 µg/kg	10 µg/kg
1,2-Dichlorobenzene	95-50-1	700000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.21 µg/kg	10 µg/kg
1,2-Dibromo-3-chloropropane	96-12-8	200 µg/kg	10 µg/kg	N/A	10 µg/kg	0.49 µg/kg	10 µg/kg
1,2,4-Trichlorobenzene	120-82-1	78000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.21 µg/kg	10 µg/kg

¹ "RBC-Soil Residential Adjusted" is from Risk-Based Concentration Table, October 31, 2006, U.S. EPA Region III, Jennifer Hubbard and is subject to change when RBCs are updated.

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-2 Reference Limits and Evaluation Table

Matrix: Sediment

Analytical Group: TCL Volatiles

Concentration Level: Low Soil (OLM04.3)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
Dichlorodifluoromethane	75-71-8	16000000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.63 µg/kg	10 µg/kg
Chloromethane	74-87-3	N/A	10 µg/kg	N/A	10 µg/kg	0.63 µg/kg	10 µg/kg
Vinyl Chloride	75-01-4	900 µg/kg	10 µg/kg	N/A	10 µg/kg	0.23 µg/kg	10 µg/kg
Bromomethane	74-83-9	110000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.24 µg/kg	10 µg/kg
Chloroethane	75-00-3	2200000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.41 µg/kg	10 µg/kg
Trichlorofluoromethane	75-69-4	23000000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.20 µg/kg	10 µg/kg
1,1-Dichloroethene	75-35-4	39000000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.23 µg/kg	10 µg/kg
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	2300000000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.23 µg/kg	10 µg/kg
Acetone	67-64-1	70000000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.69 µg/kg	10 µg/kg
Carbon Disulfide	75-15-0	7800000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.30 µg/kg	10 µg/kg
Methyl Acetate	79-20-9	78000000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.75 µg/kg	10 µg/kg
Methylene Chloride	75-09-2	850000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.36 µg/kg	10 µg/kg
trans-1,2-Dichloroethene	156-60-5	1600000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.23 µg/kg	10 µg/kg
Methyl tert-Butyl Ether	1634-04-4	1600000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.23 µg/kg	10 µg/kg
1,1-Dichloroethane	75-34-3	16000000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.36 µg/kg	10 µg/kg
cis-1,2-Dichloroethene	156-59-2	7800000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.28 µg/kg	10 µg/kg
2-Butanone	78-93-3	47000000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.33 µg/kg	10 µg/kg
Chloroform	67-66-3	7800000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.22 µg/kg	10 µg/kg
1,1,1-Trichloroethane	71-55-6	22000000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.34 µg/kg	10 µg/kg
Cyclohexane	110-82-7	N/A	10 µg/kg	N/A	10 µg/kg	0.19 µg/kg	10 µg/kg
Carbon Tetrachloride	56-23-5	49000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.33 µg/kg	10 µg/kg
Benzene	71-43-2	120000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.30 µg/kg	10 µg/kg
1,2-Dichloroethane	107-06-2	70000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.25 µg/kg	10 µg/kg
Trichloroethene	79-01-6	16000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.30 µg/kg	10 µg/kg
Methylcyclohexane	108-87-2	N/A	10 µg/kg	N/A	10 µg/kg	0.13 µg/kg	10 µg/kg
1,2-Dichloropropane	78-87-5	94000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.21 µg/kg	10 µg/kg
Bromodichloromethane	75-27-4	100000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.36 µg/kg	10 µg/kg
cis-1,3-Dichloropropene	10061-01-5	64000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.20 µg/kg	10 µg/kg
4-Methyl-2-pentanone	108-10-1	N/A	10 µg/kg	N/A	10 µg/kg	0.37 µg/kg	10 µg/kg
Toluene	108-88-3	6300000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.31 µg/kg	10 µg/kg
trans-1,3-Dichloropropene	10061-02-6	64000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.21 µg/kg	10 µg/kg
1,1,2-Trichloroethane	79-00-5	110000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.37 µg/kg	10 µg/kg
Tetrachloroethene	127-18-4	12000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.20 µg/kg	10 µg/kg
2-Hexanone	591-78-6	N/A	10 µg/kg	N/A	10 µg/kg	0.31 µg/kg	10 µg/kg
Dibromochloromethane	124-48-1	76000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.37 µg/kg	10 µg/kg
1,2-Dibromoethane	106-93-4	3200 µg/kg	10 µg/kg	N/A	10 µg/kg	0.30 µg/kg	10 µg/kg
Chlorobenzene	108-90-7	1600000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.36 µg/kg	10 µg/kg
Ethylbenzene	100-41-4	7800000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.25 µg/kg	10 µg/kg
Xylenes, total	1330-20-7	16000000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.19 µg/kg	10 µg/kg
Styrene	100-42-5	16000000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.16 µg/kg	10 µg/kg
Bromoform	75-25-2	810000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.49 µg/kg	10 µg/kg
Isopropylbenzene	98-82-8	7800000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.11 µg/kg	10 µg/kg
1,1,2,2-Tetrachloroethane	79-34-5	32000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.37 µg/kg	10 µg/kg
1,3-Dichlorobenzene	541-73-1	230000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.22 µg/kg	10 µg/kg
1,4-Dichlorobenzene	106-46-7	270000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.18 µg/kg	10 µg/kg
1,2-Dichlorobenzene	95-50-1	7000000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.21 µg/kg	10 µg/kg
1,2-Dibromo-3-chloropropane	96-12-8	2000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.49 µg/kg	10 µg/kg
1,2,4-Trichlorobenzene	120-82-1	780000 µg/kg	10 µg/kg	N/A	10 µg/kg	0.21 µg/kg	10 µg/kg

¹ "RBC-Soil Residential Adj X 10 for SD" is from Risk-Based Concentration Table, October 31, 2006, U.S. EPA Region III, Jennifer Hubbard and is subject to change when RBCs are updated.

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-3
Reference Limits and Evaluation Table

Matrix: Soil

Analytical Group: TCL Semivolatiles

Concentration Level: Low Soil (OLM04.3)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
Benzaldehyde	100-52-7	780000 µg/kg	330 µg/kg	N/A	330 µg/kg	15.37 µg/kg	330 µg/kg
Phenol	108-95-2	2300000 µg/kg	330 µg/kg	N/A	330 µg/kg	91.87 µg/kg	330 µg/kg
bis-(2-Chloroethyl) ether	111-44-4	580 µg/kg	330 µg/kg	N/A	330 µg/kg	75.47 µg/kg	330 µg/kg
2-Chlorophenol	95-57-8	39000 µg/kg	330 µg/kg	N/A	330 µg/kg	79.77 µg/kg	330 µg/kg
2-Methylphenol	95-48-7	390000 µg/kg	330 µg/kg	N/A	330 µg/kg	50.81 µg/kg	330 µg/kg
2,2'-oxybis(1-Chloropropane)	108-60-1	9100 µg/kg	330 µg/kg	N/A	330 µg/kg	81.04 µg/kg	330 µg/kg
Acetophenone	98-86-2	780000 µg/kg	330 µg/kg	N/A	330 µg/kg	152.86 µg/kg	330 µg/kg
4-Methylphenol	106-44-5	39000 µg/kg	330 µg/kg	N/A	330 µg/kg	160.38 µg/kg	330 µg/kg
N-Nitroso-di-n propylamine	621-64-7	91 µg/kg	330 µg/kg	N/A	330 µg/kg	86.34 µg/kg	330 µg/kg
Hexachloroethane	67-72-1	7800 µg/kg	330 µg/kg	N/A	330 µg/kg	61.52 µg/kg	330 µg/kg
Nitrobenzene	98-95-3	3900 µg/kg	330 µg/kg	N/A	330 µg/kg	73.51 µg/kg	330 µg/kg
Isophorone	78-59-1	670000 µg/kg	330 µg/kg	N/A	330 µg/kg	83.55 µg/kg	330 µg/kg
2-Nitrophenol	88-75-5	39000 µg/kg	330 µg/kg	N/A	330 µg/kg	74.83 µg/kg	330 µg/kg
2,4-Dimethylphenol	105-67-9	160000 µg/kg	330 µg/kg	N/A	330 µg/kg	8.31 µg/kg	330 µg/kg
bis(2-Chloroethoxy) methane	111-91-1	N/A	330 µg/kg	N/A	330 µg/kg	76.00 µg/kg	330 µg/kg
2,4-Dichlorophenol	120-83-2	23000 µg/kg	330 µg/kg	N/A	330 µg/kg	77.96 µg/kg	330 µg/kg
Naphthalene	91-20-3	160000 µg/kg	330 µg/kg	N/A	330 µg/kg	70.73 µg/kg	330 µg/kg
4-Chloroaniline	106-47-8	31000 µg/kg	330 µg/kg	N/A	330 µg/kg	96.01 µg/kg	330 µg/kg
Hexachlorobutadiene	87-68-3	1600 µg/kg	330 µg/kg	N/A	330 µg/kg	64.11 µg/kg	330 µg/kg
Caprolactam	105-60-2	3900000 µg/kg	330 µg/kg	N/A	330 µg/kg	84.28 µg/kg	330 µg/kg
4-Chloro-3-methylphenol	59-50-7	39000 µg/kg	330 µg/kg	N/A	330 µg/kg	84.99 µg/kg	330 µg/kg
2-Methylnaphthalene	91-57-6	31000 µg/kg	330 µg/kg	N/A	330 µg/kg	73.16 µg/kg	330 µg/kg
Hexachlorocyclopentadiene	77-47-4	47000 µg/kg	330 µg/kg	N/A	330 µg/kg	56.47 µg/kg	330 µg/kg
2,4,6-Trichlorophenol	88-06-2	58000 µg/kg	330 µg/kg	N/A	330 µg/kg	71.54 µg/kg	330 µg/kg
2,4,5-Trichlorophenol	95-95-4	780000 µg/kg	830 µg/kg	N/A	830 µg/kg	86.47 µg/kg	830 µg/kg
1,1'-Biphenyl	92-52-4	390000 µg/kg	330 µg/kg	N/A	330 µg/kg	77.00 µg/kg	330 µg/kg
2-Chloronaphthalene	91-58-7	630000 µg/kg	330 µg/kg	N/A	330 µg/kg	78.89 µg/kg	330 µg/kg
2-Nitroaniline	88-74-4	23000 µg/kg	830 µg/kg	N/A	830 µg/kg	95.91 µg/kg	830 µg/kg
Dimethylphthalate	131-11-3	7800000 µg/kg	330 µg/kg	N/A	330 µg/kg	90.11 µg/kg	330 µg/kg
2,6-Dinitrotoluene	606-20-2	7800 µg/kg	330 µg/kg	N/A	330 µg/kg	87.22 µg/kg	330 µg/kg
Acenaphthylene	208-96-8	160000 µg/kg	330 µg/kg	N/A	330 µg/kg	83.38 µg/kg	330 µg/kg
3-Nitroaniline	99-09-2	2300 µg/kg	830 µg/kg	N/A	830 µg/kg	66.25 µg/kg	830 µg/kg
Acenaphthene	83-32-9	470000 µg/kg	330 µg/kg	N/A	330 µg/kg	85.75 µg/kg	330 µg/kg
2,4-Dinitrophenol	51-28-5	16000 µg/kg	830 µg/kg	N/A	830 µg/kg	61.10 µg/kg	830 µg/kg
4-Nitrophenol	100-02-7	N/A	830 µg/kg	N/A	830 µg/kg	98.74 µg/kg	830 µg/kg
Dibenzofuran	132-64-9	16000 µg/kg	330 µg/kg	N/A	330 µg/kg	86.83 µg/kg	330 µg/kg
2,4-Dinitrotoluene	121-14-2	16000 µg/kg	330 µg/kg	N/A	330 µg/kg	86.36 µg/kg	330 µg/kg
Diethylphthalate	84-66-2	6300000 µg/kg	330 µg/kg	N/A	330 µg/kg	87.78 µg/kg	330 µg/kg
Fluorene	86-73-7	310000 µg/kg	330 µg/kg	N/A	330 µg/kg	85.43 µg/kg	330 µg/kg
4-Chlorophenyl-phenyl ether	7005-72-3	39000 µg/kg	330 µg/kg	N/A	330 µg/kg	86.74 µg/kg	330 µg/kg
4-Nitroaniline	100-01-6	24000 µg/kg	830 µg/kg	N/A	830 µg/kg	73.98 µg/kg	830 µg/kg
4,6-Dinitro-2-methylphenol	534-52-1	780 µg/kg	830 µg/kg	N/A	830 µg/kg	89.06 µg/kg	830 µg/kg
N-Nitroso diphenylamine	86-30-6	130000 µg/kg	330 µg/kg	N/A	330 µg/kg	184.30 µg/kg	330 µg/kg
4-Bromophenyl-phenylether	101-55-3	N/A	330 µg/kg	N/A	330 µg/kg	90.05 µg/kg	330 µg/kg
Hexachlorobenzene	118-74-1	400 µg/kg	330 µg/kg	N/A	330 µg/kg	83.98 µg/kg	330 µg/kg
Atrazine	1912-24-9	2900 µg/kg	330 µg/kg	N/A	330 µg/kg	23.49 µg/kg	330 µg/kg
Pentachlorophenol	87-86-5	5300 µg/kg	830 µg/kg	N/A	830 µg/kg	82.19 µg/kg	830 µg/kg
Phenanthrene	85-01-8	230000 µg/kg	330 µg/kg	N/A	330 µg/kg	87.28 µg/kg	330 µg/kg
Anthracene	120-12-7	2300000 µg/kg	330 µg/kg	N/A	330 µg/kg	86.75 µg/kg	330 µg/kg
Carbazole	86-74-8	32000 µg/kg	330 µg/kg	N/A	330 µg/kg	101.57 µg/kg	330 µg/kg
Di-n-butylphthalate	84-74-2	780000 µg/kg	330 µg/kg	N/A	330 µg/kg	91.64 µg/kg	330 µg/kg

QAPP Worksheet #15-3
Reference Limits and Evaluation Table

Matrix: Soil
 Analytical Group: TCL Semivolatiles
 Concentration Level: Low Soil (OLM04.3)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
Fluoranthene	206-44-0	310000 µg/kg	330 µg/kg	N/A	330 µg/kg	90.45 µg/kg	330 µg/kg
Pyrene	129-00-0	230000 µg/kg	330 µg/kg	N/A	330 µg/kg	87.41 µg/kg	330 µg/kg
Butylbenzylphthalate	85-68-7	1600000 µg/kg	330 µg/kg	N/A	330 µg/kg	90.46 µg/kg	330 µg/kg
3,3'-Dichlorobenzidine	91-94-1	1400 µg/kg	330 µg/kg	N/A	330 µg/kg	39.86 µg/kg	330 µg/kg
Benzo(a)anthracene	56-55-3	220 µg/kg	330 µg/kg	N/A	330 µg/kg	88.88 µg/kg	330 µg/kg
Chrysene	218-01-9	22000 µg/kg	330 µg/kg	N/A	330 µg/kg	90.12 µg/kg	330 µg/kg
bis(2-Ethylhexyl) phthalate	117-81-7	46000 µg/kg	330 µg/kg	N/A	330 µg/kg	95.21 µg/kg	330 µg/kg
Di-n-octylphthalate	117-84-0	310000 µg/kg	330 µg/kg	N/A	330 µg/kg	65.41 µg/kg	330 µg/kg
Benzo(b)fluoranthene	205-99-2	220 µg/kg	330 µg/kg	N/A	330 µg/kg	89.76 µg/kg	330 µg/kg
Benzo(k)fluoranthene	207-08-9	2200 µg/kg	330 µg/kg	N/A	330 µg/kg	52.87 µg/kg	330 µg/kg
Benzo(a)pyrene	50-32-8	22 µg/kg	330 µg/kg	N/A	330 µg/kg	77.26 µg/kg	330 µg/kg
Indeno(1,2,3-cd)-pyrene	193-39-5	220 µg/kg	330 µg/kg	N/A	330 µg/kg	58.93 µg/kg	330 µg/kg
Dibenzo(a,h)-anthracene	53-70-3	22 µg/kg	330 µg/kg	N/A	330 µg/kg	63.93 µg/kg	330 µg/kg
Benzo(g,h,i)perylene	191-24-2	230000 µg/kg	330 µg/kg	N/A	330 µg/kg	55.09 µg/kg	330 µg/kg

¹ "RBC-Soil Residential Adjusted" is from Risk-Based Concentration Table, October 31, 2006, U.S. EPA Region III, Jennifer Hubbard and is subject to change when RBCs are updated.

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-4
Reference Limits and Evaluation Table

Matrix: Sediment
Analytical Group: TCL Semivolatiles
Concentration Level: Low Soil (OLM04.3)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
Benzaldehyde	100-52-7	7800000 µg/kg	330 µg/kg	N/A	330 µg/kg	15.37 µg/kg	330 µg/kg
Phenol	108-95-2	23000000 µg/kg	330 µg/kg	N/A	330 µg/kg	91.87 µg/kg	330 µg/kg
bis-(2-Chloroethyl) ether	111-44-4	5800 µg/kg	330 µg/kg	N/A	330 µg/kg	75.47 µg/kg	330 µg/kg
2-Chlorophenol	95-57-8	390000 µg/kg	330 µg/kg	N/A	330 µg/kg	79.77 µg/kg	330 µg/kg
2-Methylphenol	95-48-7	3900000 µg/kg	330 µg/kg	N/A	330 µg/kg	50.81 µg/kg	330 µg/kg
2,2'-oxybis(1-Chloropropane)	108-60-1	91000 µg/kg	330 µg/kg	N/A	330 µg/kg	81.04 µg/kg	330 µg/kg
Acetophenone	98-86-2	7800000 µg/kg	330 µg/kg	N/A	330 µg/kg	152.86 µg/kg	330 µg/kg
4-Methylphenol	106-44-5	390000 µg/kg	330 µg/kg	N/A	330 µg/kg	160.38 µg/kg	330 µg/kg
N-Nitroso-di-n propylamine	621-64-7	910 µg/kg	330 µg/kg	N/A	330 µg/kg	86.34 µg/kg	330 µg/kg
Hexachloroethane	67-72-1	78000 µg/kg	330 µg/kg	N/A	330 µg/kg	61.52 µg/kg	330 µg/kg
Nitrobenzene	98-95-3	39000 µg/kg	330 µg/kg	N/A	330 µg/kg	73.51 µg/kg	330 µg/kg
Isophorone	78-59-1	6700000 µg/kg	330 µg/kg	N/A	330 µg/kg	83.55 µg/kg	330 µg/kg
2-Nitrophenol	88-75-5	390000 µg/kg	330 µg/kg	N/A	330 µg/kg	74.83 µg/kg	330 µg/kg
2,4-Dimethylphenol	105-67-9	1600000 µg/kg	330 µg/kg	N/A	330 µg/kg	8.31 µg/kg	330 µg/kg
bis(2-Chloroethoxy) methane	111-91-1	N/A	330 µg/kg	N/A	330 µg/kg	76.00 µg/kg	330 µg/kg
2,4-Dichlorophenol	120-83-2	230000 µg/kg	330 µg/kg	N/A	330 µg/kg	77.96 µg/kg	330 µg/kg
Naphthalene	91-20-3	1600000 µg/kg	330 µg/kg	N/A	330 µg/kg	70.73 µg/kg	330 µg/kg
4-Chloroaniline	106-47-8	310000 µg/kg	330 µg/kg	N/A	330 µg/kg	96.01 µg/kg	330 µg/kg
Hexachlorobutadiene	87-68-3	16000 µg/kg	330 µg/kg	N/A	330 µg/kg	64.11 µg/kg	330 µg/kg
Caprolactam	105-60-2	39000000 µg/kg	330 µg/kg	N/A	330 µg/kg	84.28 µg/kg	330 µg/kg
4-Chloro-3-methylphenol	59-50-7	390000 µg/kg	330 µg/kg	N/A	330 µg/kg	84.99 µg/kg	330 µg/kg
2-Methylnaphthalene	91-57-6	310000 µg/kg	330 µg/kg	N/A	330 µg/kg	73.16 µg/kg	330 µg/kg
Hexachlorocyclopentadiene	77-47-4	470000 µg/kg	330 µg/kg	N/A	330 µg/kg	56.47 µg/kg	330 µg/kg
2,4,6-Trichlorophenol	88-06-2	580000 µg/kg	330 µg/kg	N/A	330 µg/kg	71.54 µg/kg	330 µg/kg
2,4,5-Trichlorophenol	95-95-4	7800000 µg/kg	830 µg/kg	N/A	830 µg/kg	86.47 µg/kg	830 µg/kg
1,1'-Biphenyl	92-52-4	3900000 µg/kg	330 µg/kg	N/A	330 µg/kg	77.00 µg/kg	330 µg/kg
2-Chloronaphthalene	91-58-7	6300000 µg/kg	330 µg/kg	N/A	330 µg/kg	78.89 µg/kg	330 µg/kg
2-Nitroaniline	88-74-4	230000 µg/kg	830 µg/kg	N/A	830 µg/kg	95.91 µg/kg	830 µg/kg
Dimethylphthalate	131-11-3	78000000 µg/kg	330 µg/kg	N/A	330 µg/kg	90.11 µg/kg	330 µg/kg
2,6-Dinitrotoluene	606-20-2	78000 µg/kg	330 µg/kg	N/A	330 µg/kg	87.22 µg/kg	330 µg/kg
Acenaphthylene	208-96-8	1600000 µg/kg	330 µg/kg	N/A	330 µg/kg	83.38 µg/kg	330 µg/kg
3-Nitroaniline	99-09-2	23000 µg/kg	830 µg/kg	N/A	830 µg/kg	66.25 µg/kg	830 µg/kg
Acenaphthene	83-32-9	4700000 µg/kg	330 µg/kg	N/A	330 µg/kg	85.75 µg/kg	330 µg/kg
2,4-Dinitrophenol	51-28-5	160000 µg/kg	830 µg/kg	N/A	830 µg/kg	61.10 µg/kg	830 µg/kg
4-Nitrophenol	100-02-7	N/A	830 µg/kg	N/A	830 µg/kg	98.74 µg/kg	830 µg/kg
Dibenzofuran	132-64-9	160000 µg/kg	330 µg/kg	N/A	330 µg/kg	86.83 µg/kg	330 µg/kg
2,4-Dinitrotoluene	121-14-2	160000 µg/kg	330 µg/kg	N/A	330 µg/kg	86.36 µg/kg	330 µg/kg
Diethylphthalate	84-66-2	63000000 µg/kg	330 µg/kg	N/A	330 µg/kg	87.78 µg/kg	330 µg/kg
Fluorene	86-73-7	3100000 µg/kg	330 µg/kg	N/A	330 µg/kg	85.43 µg/kg	330 µg/kg
4-Chlorophenyl-phenyl ether	7005-72-3	390000 µg/kg	330 µg/kg	N/A	330 µg/kg	86.74 µg/kg	330 µg/kg
4-Nitroaniline	100-01-6	240000 µg/kg	830 µg/kg	N/A	830 µg/kg	73.98 µg/kg	830 µg/kg
4,6-Dinitro-2-methylphenol	534-52-1	7800 µg/kg	830 µg/kg	N/A	830 µg/kg	89.06 µg/kg	830 µg/kg
N-Nitroso diphenylamine	86-30-6	1300000 µg/kg	330 µg/kg	N/A	330 µg/kg	184.30 µg/kg	330 µg/kg
4-Bromophenyl-phenylether	101-55-3	N/A	330 µg/kg	N/A	330 µg/kg	90.05 µg/kg	330 µg/kg
Hexachlorobenzene	118-74-1	4000 µg/kg	330 µg/kg	N/A	330 µg/kg	83.98 µg/kg	330 µg/kg
Atrazine	1912-24-9	29000 µg/kg	330 µg/kg	N/A	330 µg/kg	23.49 µg/kg	330 µg/kg
Pentachlorophenol	87-86-5	53000 µg/kg	830 µg/kg	N/A	830 µg/kg	82.19 µg/kg	830 µg/kg
Phenanthrene	85-01-8	2300000 µg/kg	330 µg/kg	N/A	330 µg/kg	87.28 µg/kg	330 µg/kg
Anthracene	120-12-7	23000000 µg/kg	330 µg/kg	N/A	330 µg/kg	86.75 µg/kg	330 µg/kg
Carbazole	86-74-8	320000 µg/kg	330 µg/kg	N/A	330 µg/kg	101.57 µg/kg	330 µg/kg
Di-n-butylphthalate	84-74-2	7800000 µg/kg	330 µg/kg	N/A	330 µg/kg	91.64 µg/kg	330 µg/kg

QAPP Worksheet #15-4
Reference Limits and Evaluation Table

Matrix: Sediment
 Analytical Group: TCL Semivolatiles
 Concentration Level: Low Soil (OLM04.3)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
Fluoranthene	206-44-0	3100000 µg/kg	330 µg/kg	N/A	330 µg/kg	90.45 µg/kg	330 µg/kg
Pyrene	129-00-0	2300000 µg/kg	330 µg/kg	N/A	330 µg/kg	87.41 µg/kg	330 µg/kg
Butylbenzylphthalate	85-68-7	16000000 µg/kg	330 µg/kg	N/A	330 µg/kg	90.46 µg/kg	330 µg/kg
3,3'-Dichlorobenzidine	91-94-1	14000 µg/kg	330 µg/kg	N/A	330 µg/kg	39.86 µg/kg	330 µg/kg
Benzo(a)anthracene	56-55-3	2200 µg/kg	330 µg/kg	N/A	330 µg/kg	88.88 µg/kg	330 µg/kg
Chrysene	218-01-9	220000 µg/kg	330 µg/kg	N/A	330 µg/kg	90.12 µg/kg	330 µg/kg
bis(2-Ethylhexyl) phthalate	117-81-7	460000 µg/kg	330 µg/kg	N/A	330 µg/kg	95.21 µg/kg	330 µg/kg
Di-n-octylphthalate	117-84-0	3100000 µg/kg	330 µg/kg	N/A	330 µg/kg	65.41 µg/kg	330 µg/kg
Benzo(b)fluoranthene	205-99-2	2200 µg/kg	330 µg/kg	N/A	330 µg/kg	89.76 µg/kg	330 µg/kg
Benzo(k)fluoranthene	207-08-9	22000 µg/kg	330 µg/kg	N/A	330 µg/kg	52.87 µg/kg	330 µg/kg
Benzo(a)pyrene	50-32-8	220 µg/kg	330 µg/kg	N/A	330 µg/kg	77.26 µg/kg	330 µg/kg
Indeno(1,2,3-cd)-pyrene	193-39-5	2200 µg/kg	330 µg/kg	N/A	330 µg/kg	58.93 µg/kg	330 µg/kg
Dibenzo(a,h)-anthracene	53-70-3	220 µg/kg	330 µg/kg	N/A	330 µg/kg	63.93 µg/kg	330 µg/kg
Benzo(g,h,i)perylene	191-24-2	2300000 µg/kg	330 µg/kg	N/A	330 µg/kg	55.09 µg/kg	330 µg/kg

¹ "RBC-Soil Residential Adj X 10 for SD" is from [Risk-Based Concentration Table, October 31, 2006, U.S. EPA Region III, Jennifer Hubbard](#) and is subject to change when RBCs are updated.

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-5
Reference Limits and Evaluation Table

Matrix: Soil
 Analytical Group: TCL Pesticides/ Aroclors
 Concentration Level: Soil (OLM04.3)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
alpha-BHC	319-84-6	100 µg/kg	1.7 µg/kg	N/A	1.7 µg/kg	0.43 µg/kg	1.7 µg/kg
beta-BHC	319-85-7	350 µg/kg	1.7 µg/kg	N/A	1.7 µg/kg	0.39 µg/kg	1.7 µg/kg
delta-BHC	319-86-8	350 µg/kg	1.7 µg/kg	N/A	1.7 µg/kg	0.28 µg/kg	1.7 µg/kg
gamma-BHC (Lindane)	58-89-9	490 µg/kg	1.7 µg/kg	N/A	1.7 µg/kg	0.19 µg/kg	1.7 µg/kg
Heptachlor	76-44-8	140 µg/kg	1.7 µg/kg	N/A	1.7 µg/kg	0.69 µg/kg	1.7 µg/kg
Aldrin	309-00-2	38 µg/kg	1.7 µg/kg	N/A	1.7 µg/kg	0.54 µg/kg	1.7 µg/kg
Heptachlor epoxide	1024-57-3	70 µg/kg	1.7 µg/kg	N/A	1.7 µg/kg	0.40 µg/kg	1.7 µg/kg
Endosulfan I	959-98-8	47000 µg/kg	1.7 µg/kg	N/A	1.7 µg/kg	0.53 µg/kg	1.7 µg/kg
Dieldrin	60-57-1	40 µg/kg	3.3 µg/kg	N/A	3.3 µg/kg	1.02 µg/kg	3.3 µg/kg
4,4'-DDE	72-55-9	1900 µg/kg	3.3 µg/kg	N/A	3.3 µg/kg	0.73 µg/kg	3.3 µg/kg
Endrin	72-20-8	2300 µg/kg	3.3 µg/kg	N/A	3.3 µg/kg	0.53 µg/kg	3.3 µg/kg
Endosulfan II	33213-65-9	47000 µg/kg	3.3 µg/kg	N/A	3.3 µg/kg	0.56 µg/kg	3.3 µg/kg
4,4'-DDD	72-54-8	2700 µg/kg	3.3 µg/kg	N/A	3.3 µg/kg	0.51 µg/kg	3.3 µg/kg
Endosulfan sulfate	1031-07-8	47000 µg/kg	3.3 µg/kg	N/A	3.3 µg/kg	0.57 µg/kg	3.3 µg/kg
4,4'-DDT	50-29-3	1900 µg/kg	3.3 µg/kg	N/A	3.3 µg/kg	0.48 µg/kg	3.3 µg/kg
Methoxychlor	72-43-5	39000 µg/kg	17 µg/kg	N/A	17 µg/kg	3.00 µg/kg	17 µg/kg
Endrin ketone	53494-70-5	2300 µg/kg	3.3 µg/kg	N/A	3.3 µg/kg	0.40 µg/kg	3.3 µg/kg
Endrin aldehyde	7421-93-4	2300 µg/kg	3.3 µg/kg	N/A	3.3 µg/kg	0.99 µg/kg	3.3 µg/kg
alpha-Chlordane	5103-71-9	1800 µg/kg	1.7 µg/kg	N/A	1.7 µg/kg	0.48 µg/kg	1.7 µg/kg
gamma-Chlordane	5103-74-2	1800 µg/kg	1.7 µg/kg	N/A	1.7 µg/kg	0.55 µg/kg	1.7 µg/kg
Toxaphene	8001-35-2	580 µg/kg	170 µg/kg	N/A	170 µg/kg	22.64 µg/kg	170 µg/kg
Aroclor-1016	12674-11-2	550 µg/kg	33 µg/kg	N/A	33 µg/kg	3.48 µg/kg	33 µg/kg
Aroclor-1221	11104-28-2	320 µg/kg	67 µg/kg	N/A	67 µg/kg	13.09 µg/kg	67 µg/kg
Aroclor-1232	11141-16-5	320 µg/kg	33 µg/kg	N/A	33 µg/kg	9.47 µg/kg	33 µg/kg
Aroclor-1242	53469-21-9	320 µg/kg	33 µg/kg	N/A	33 µg/kg	4.21 µg/kg	33 µg/kg
Aroclor-1248	12672-29-6	320 µg/kg	33 µg/kg	N/A	33 µg/kg	7.90 µg/kg	33 µg/kg
Aroclor-1254	11097-69-1	160 µg/kg	33 µg/kg	N/A	33 µg/kg	5.79 µg/kg	33 µg/kg
Aroclor-1260	11096-82-5	320 µg/kg	33 µg/kg	N/A	33 µg/kg	4.34 µg/kg	33 µg/kg

¹ "RBC-Soil Residential Adjusted" is from Risk-Based Concentration Table, October 31, 2006, U.S. EPA Region III, Jennifer Hubbard and is subject to change when RBCs are updated.

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-6
Reference Limits and Evaluation Table

Matrix: Sediment
Analytical Group: TCL Pesticides/ Aroclors
Concentration Level: Soil (OLM04.3)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
alpha-BHC	319-84-6	1000 µg/kg	1.7 µg/kg	N/A	1.7 µg/kg	0.43 µg/kg	1.7 µg/kg
beta-BHC	319-85-7	3500 µg/kg	1.7 µg/kg	N/A	1.7 µg/kg	0.39 µg/kg	1.7 µg/kg
delta-BHC	319-86-8	3500 µg/kg	1.7 µg/kg	N/A	1.7 µg/kg	0.28 µg/kg	1.7 µg/kg
gamma-BHC (Lindane)	58-89-9	4900 µg/kg	1.7 µg/kg	N/A	1.7 µg/kg	0.19 µg/kg	1.7 µg/kg
Heptachlor	76-44-8	1400 µg/kg	1.7 µg/kg	N/A	1.7 µg/kg	0.69 µg/kg	1.7 µg/kg
Aldrin	309-00-2	380 µg/kg	1.7 µg/kg	N/A	1.7 µg/kg	0.54 µg/kg	1.7 µg/kg
Heptachlor epoxide	1024-57-3	700 µg/kg	1.7 µg/kg	N/A	1.7 µg/kg	0.40 µg/kg	1.7 µg/kg
Endosulfan I	959-98-8	470000 µg/kg	1.7 µg/kg	N/A	1.7 µg/kg	0.53 µg/kg	1.7 µg/kg
Dieldrin	60-57-1	400 µg/kg	3.3 µg/kg	N/A	3.3 µg/kg	1.02 µg/kg	3.3 µg/kg
4,4'-DDE	72-55-9	19000 µg/kg	3.3 µg/kg	N/A	3.3 µg/kg	0.73 µg/kg	3.3 µg/kg
Endrin	72-20-8	23000 µg/kg	3.3 µg/kg	N/A	3.3 µg/kg	0.53 µg/kg	3.3 µg/kg
Endosulfan II	33213-65-9	470000 µg/kg	3.3 µg/kg	N/A	3.3 µg/kg	0.56 µg/kg	3.3 µg/kg
4,4'-DDD	72-54-8	27000 µg/kg	3.3 µg/kg	N/A	3.3 µg/kg	0.51 µg/kg	3.3 µg/kg
Endosulfan sulfate	1031-07-8	470000 µg/kg	3.3 µg/kg	N/A	3.3 µg/kg	0.57 µg/kg	3.3 µg/kg
4,4'-DDT	50-29-3	19000 µg/kg	3.3 µg/kg	N/A	3.3 µg/kg	0.48 µg/kg	3.3 µg/kg
Methoxychlor	72-43-5	390000 µg/kg	17 µg/kg	N/A	17 µg/kg	3.00 µg/kg	17 µg/kg
Endrin ketone	53494-70-5	23000 µg/kg	3.3 µg/kg	N/A	3.3 µg/kg	0.40 µg/kg	3.3 µg/kg
Endrin aldehyde	7421-93-4	23000 µg/kg	3.3 µg/kg	N/A	3.3 µg/kg	0.99 µg/kg	3.3 µg/kg
alpha-Chlordane	5103-71-9	18000 µg/kg	1.7 µg/kg	N/A	1.7 µg/kg	0.48 µg/kg	1.7 µg/kg
gamma-Chlordane	5103-74-2	18000 µg/kg	1.7 µg/kg	N/A	1.7 µg/kg	0.55 µg/kg	1.7 µg/kg
Toxaphene	8001-35-2	5800 µg/kg	170 µg/kg	N/A	170 µg/kg	22.64 µg/kg	170 µg/kg
Aroclor-1016	12674-11-2	5500 µg/kg	33 µg/kg	N/A	33 µg/kg	3.48 µg/kg	33 µg/kg
Aroclor-1221	11104-28-2	3200 µg/kg	67 µg/kg	N/A	67 µg/kg	13.09 µg/kg	67 µg/kg
Aroclor-1232	11141-16-5	3200 µg/kg	33 µg/kg	N/A	33 µg/kg	9.47 µg/kg	33 µg/kg
Aroclor-1242	53469-21-9	3200 µg/kg	33 µg/kg	N/A	33 µg/kg	4.21 µg/kg	33 µg/kg
Aroclor-1248	12672-29-6	3200 µg/kg	33 µg/kg	N/A	33 µg/kg	7.90 µg/kg	33 µg/kg
Aroclor-1254	11097-69-1	1600 µg/kg	33 µg/kg	N/A	33 µg/kg	5.79 µg/kg	33 µg/kg
Aroclor-1260	11096-82-5	3200 µg/kg	33 µg/kg	N/A	33 µg/kg	4.34 µg/kg	33 µg/kg

¹ "RBC-Soil Residential Adj X 10 for SD" is from Risk-Based Concentration Table, October 31, 2006, U.S. EPA Region III, Jennifer Hubbard and is subject to change when RBCs are updated.

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-7
Reference Limits and Evaluation Table

Matrix: Soil
Analytical Group: TAL Metals/ Cyanide
Concentration Level: Soil (ILM04.1)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits		
				MDLs	Method QLs	IDLs ²	IDLs ²	QLs
Aluminum	7429-90-5	7800 mg/kg	200 mg/kg	N/A	40 mg/kg	30.300 µg/L	15.247 µg/L	200 mg/kg
Antimony	7440-36-0	3.1 mg/kg	1.0 mg/kg	N/A	12 mg/kg	1.663 µg/L	2.133 µg/L	1.0 mg/kg
Arsenic	7440-38-2	0.43 mg/kg	1.0 mg/kg	N/A	2 mg/kg	2.104 µg/L	2.807 µg/L	1.0 mg/kg
Barium	7440-39-3	1600 mg/kg	20.0 mg/kg	N/A	40 mg/kg	0.072 µg/L	0.111 µg/L	20.0 mg/kg
Beryllium	7440-41-7	16 mg/kg	0.5 mg/kg	N/A	1 mg/kg	0.255 µg/L	0.273 µg/L	0.5 mg/kg
Cadmium	7440-43-9	7.8 mg/kg	0.5 mg/kg	N/A	1 mg/kg	0.163 µg/L	0.425 µg/L	0.5 mg/kg
Calcium	7440-70-2	N/A	500.0 mg/kg	N/A	1000 mg/kg	10.343 µg/L	2.362 µg/L	500.0 mg/kg
Chromium	7440-47-3	23 mg/kg	1.0 mg/kg	N/A	2 mg/kg	0.501 µg/L	0.499 µg/L	1.0 mg/kg
Cobalt	7440-48-4	160 mg/kg	0.5 mg/kg	N/A	10 mg/kg	0.369 µg/L	0.917 µg/L	0.5 mg/kg
Copper	7440-50-8	310 mg/kg	0.5 mg/kg	N/A	5 mg/kg	0.470 µg/L	0.491 µg/L	0.5 mg/kg
Iron	7439-89-6	2300 mg/kg	10.0 mg/kg	N/A	20 mg/kg	9.089 µg/L	15.276 µg/L	10.0 mg/kg
Lead	7439-92-1	400 mg/kg	0.3 mg/kg	N/A	0.6 mg/kg	1.199 µg/L	1.879 µg/L	0.3 mg/kg
Magnesium	7439-95-4	N/A	500.0 mg/kg	N/A	1000 mg/kg	2.792 µg/L	4.206 µg/L	500.0 mg/kg
Manganese	7439-96-5	160 mg/kg	1.0 mg/kg	N/A	3 mg/kg	0.080 µg/L	0.138 µg/L	1.0 mg/kg
Mercury	7439-97-6	2.3 mg/kg	0.20 mg/kg	N/A	0.1 mg/kg	0.116 µg/L	N/A	0.20 mg/kg
Nickel	7440-02-0	160 mg/kg	4.0 mg/kg	N/A	8 mg/kg	.600 µg/L	1.30 µg/L	4.0 mg/kg
Potassium	7440-09-7	N/A	500.0 mg/kg	N/A	1000 mg/kg	8.299 µg/L	4.36 µg/L	500.0 mg/kg
Selenium	7782-49-2	39 mg/kg	0.5 mg/kg	N/A	1 mg/kg	2.081 µg/L	2.136 µg/L	0.5 mg/kg
Silver	7440-22-4	39 mg/kg	0.5 mg/kg	N/A	2 mg/kg	0.380 µg/L	0.492 µg/L	0.5 mg/kg
Sodium	7440-23-5	N/A	500.0 mg/kg	N/A	1000 mg/kg	123.96 µg/L	78.495 µg/L	500.0 mg/kg
Thallium	7440-28-0	0.55 mg/kg	1.0 mg/kg	N/A	2 mg/kg	3.350 µg/L	4.240 µg/L	1.0 mg/kg
Vanadium	7440-62-2	7.8 mg/kg	2.0 mg/kg	N/A	10 mg/kg	0.356 µg/L	0.385 µg/L	2.0 mg/kg
Zinc	7440-66-6	2300 mg/kg	2.0 mg/kg	N/A	4 mg/kg	0.322 µg/L	0.696 µg/L	2.0 mg/kg
Cyanide	57-12-5	160 mg/kg	10 mg/kg	N/A	2.5 mg/kg	2.49 µg/L	N/A	10 mg/kg

¹ "RBC-Soil Residential Adjusted" is from Risk-Based Concentration Table, October 31, 2006, U.S. EPA Region III. Jennifer Hubbard and is subject to change when RBCs are updated.

² Two different instruments may be used to report results. IDLs are provided instead of MDLs.

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-8
Reference Limits and Evaluation Table

Matrix: Sediment
Analytical Group: TAL Metals/ Cyanide
Concentration Level: Soil (ILM04.1)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits		
				MDLs	Method QLs	IDLs ²	IDLs ²	QLs
Aluminum	7429-90-5	78000 mg/kg	200 mg/kg	N/A	40 mg/kg	30.300 µg/L	15.247 µg/L	200 mg/kg
Antimony	7440-36-0	31 mg/kg	1.0 mg/kg	N/A	12 mg/kg	1.663 µg/L	2.133 µg/L	1.0 mg/kg
Arsenic	7440-38-2	4.3 mg/kg	1.0 mg/kg	N/A	2 mg/kg	2.104 µg/L	2.807 µg/L	1.0 mg/kg
Barium	7440-39-3	16000 mg/kg	20.0 mg/kg	N/A	40 mg/kg	0.072 µg/L	0.111 µg/L	20.0 mg/kg
Beryllium	7440-41-7	160 mg/kg	0.5 mg/kg	N/A	1 mg/kg	0.255 µg/L	0.273 µg/L	0.5 mg/kg
Cadmium	7440-43-9	78 mg/kg	0.5 mg/kg	N/A	1 mg/kg	0.163 µg/L	0.425 µg/L	0.5 mg/kg
Calcium	7440-70-2	N/A	500.0 mg/kg	N/A	1000 mg/kg	10.343 µg/L	2.362 µg/L	500.0 mg/kg
Chromium	7440-47-3	230 mg/kg	1.0 mg/kg	N/A	2 mg/kg	0.501 µg/L	0.499 µg/L	1.0 mg/kg
Cobalt	7440-48-4	1600 mg/kg	0.5 mg/kg	N/A	10 mg/kg	0.369 µg/L	0.917 µg/L	0.5 mg/kg
Copper	7440-50-8	3100 mg/kg	0.5 mg/kg	N/A	5 mg/kg	0.470 µg/L	0.491 µg/L	0.5 mg/kg
Iron	7439-89-6	23000 mg/kg	10.0 mg/kg	N/A	20 mg/kg	9.089 µg/L	15.276 µg/L	10.0 mg/kg
Lead	7439-92-1	400 mg/kg	0.3 mg/kg	N/A	0.6 mg/kg	1.199 µg/L	1.879 µg/L	0.3 mg/kg
Magnesium	7439-95-4	N/A	500.0 mg/kg	N/A	1000 mg/kg	2.792 µg/L	4.206 µg/L	500.0 mg/kg
Manganese	7439-96-5	1600 mg/kg	1.0 mg/kg	N/A	3 mg/kg	0.080 µg/L	0.138 µg/L	1.0 mg/kg
Mercury	7439-97-6	23 mg/kg	0.20 mg/kg	N/A	0.1 mg/kg	0.116 µg/L	N/A	0.20 mg/kg
Nickel	7440-02-0	1600 mg/kg	4.0 mg/kg	N/A	8 mg/kg	.600 µg/L	1.30 µg/L	4.0 mg/kg
Potassium	7440-09-7	N/A	500.0 mg/kg	N/A	1000 mg/kg	8.299 µg/L	4.36 µg/L	500.0 mg/kg
Selenium	7782-49-2	390 mg/kg	0.5 mg/kg	N/A	1 mg/kg	2.081 µg/L	2.136 µg/L	0.5 mg/kg
Silver	7440-22-4	390 mg/kg	0.5 mg/kg	N/A	2 mg/kg	0.380 µg/L	0.492 µg/L	0.5 mg/kg
Sodium	7440-23-5	N/A	500.0 mg/kg	N/A	1000 mg/kg	123.96 µg/L	78.495 µg/L	500.0 mg/kg
Thallium	7440-28-0	5.5 mg/kg	1.0 mg/kg	N/A	2 mg/kg	3.350 µg/L	4.240 µg/L	1.0 mg/kg
Vanadium	7440-62-2	78 mg/kg	2.0 mg/kg	N/A	10 mg/kg	0.356 µg/L	0.385 µg/L	2.0 mg/kg
Zinc	7440-66-6	23000 mg/kg	2.0 mg/kg	N/A	4 mg/kg	0.322 µg/L	0.696 µg/L	2.0 mg/kg
Cyanide	57-12-5	1600 mg/kg	10 mg/kg	N/A	2.5 mg/kg	2.49 µg/L	N/A	10 mg/kg

¹ "RBC-Soil Residential Adj X 10 for SD" is from Risk-Based Concentration Table, October 31, 2006, U.S. EPA Region III. Jennifer Hubbard and is subject to change when RBCs are updated.

² Two different instruments may be used to report results. IDLs are provided instead of MDLs.

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-9
Reference Limits and Evaluation Table

Matrix: Soil
Analytical Group: Explosives
Concentration Level: Medium (various)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	390 mg/kg	0.625 mg/kg	N/A	2.2 mg/kg	0.12 mg/kg	0.625 mg/kg
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	5.8 mg/kg	0.625 mg/kg	N/A	1.0 mg/kg	0.45 mg/kg	0.625 mg/kg
1,3,5-Trinitrobenzene (1,3,5-TNB)	99-35-4	230 mg/kg	0.625 mg/kg	N/A	0.25 mg/kg	0.61 mg/kg	0.625 mg/kg
1,3-Dinitrobenzene (1,3-DNB)	99-65-0	0.78 mg/kg	0.625 mg/kg	N/A	0.25 mg/kg	0.60 mg/kg	0.625 mg/kg
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	479-45-8	31 mg/kg	1.25 mg/kg	N/A	0.65 mg/kg	0.85 mg/kg	1.25 mg/kg
Nitrobenzene (NB)	98-95-3	3.9 mg/kg	0.625 mg/kg	N/A	0.26 mg/kg	0.42 mg/kg	0.625 mg/kg
2,4,6-Trinitrotoluene (2,4,6-TNT)	118-96-7	3.9 mg/kg	0.625 mg/kg	N/A	0.25 mg/kg	0.57 mg/kg	0.625 mg/kg
4-Amino-2,6-dinitrotoluene (4-Am-DNT)	1946-51-0	N/A	1.25 mg/kg	N/A	N/A	0.84 mg/kg	1.25 mg/kg
2-Amino-4,6-dinitrotoluene (2-Am-DNT)	35572-78-2	N/A	1.25 mg/kg	N/A	N/A	0.79 mg/kg	1.25 mg/kg
2,4-Dinitrotoluene (2,4-DNT)	121-14-2	16 mg/kg	1.25 mg/kg	N/A	0.25 mg/kg	0.65 mg/kg	1.25 mg/kg
2,6-Dinitrotoluene (2,6-DNT)	606-20-2	7.8 mg/kg	1.25 mg/kg	N/A	0.26 mg/kg	0.82 mg/kg	1.25 mg/kg
2-Nitrotoluene (2-NT)	88-72-2	78 mg/kg	1.25 mg/kg	N/A	0.25 mg/kg	0.86 mg/kg	1.25 mg/kg
3-Nitrotoluene (3-NT)	99-08-1	160 mg/kg	1.25 mg/kg	N/A	0.25 mg/kg	0.86 mg/kg	1.25 mg/kg
4-Nitrotoluene (4-NT)	99-99-0	38 mg/kg	1.25 mg/kg	N/A	0.25 mg/kg	0.91 mg/kg	1.25 mg/kg
Nitroglycerin	55-63-0	130 mg/kg	4 mg/kg	N/A	N/A	0.49 mg/kg	4 mg/kg
Nitroguanidine	556-88-7	N/A	0.100 mg/kg	N/A	N/A	0.045 mg/kg	0.100 mg/kg
Perchlorate	7601-90-3	N/A	0.000100 mg/kg	N/A	N/A	0.000031 mg/kg	0.000100 mg/kg

¹ "RBC-Soil Residential Adjusted" is from Risk-Based Concentration Table, October 31, 2006, U.S. EPA Region III, Jennifer Hubbard and is subject to change when RBCs are updated.

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-10
Reference Limits and Evaluation Table

Matrix: Sediment
Analytical Group: Explosives
Concentration Level: Medium (various)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLS	MDLs	QLs
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	3900 mg/kg	0.625 mg/kg	N/A	2.2 mg/kg	0.12 mg/kg	0.625 mg/kg
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	58 mg/kg	0.625 mg/kg	N/A	1.0 mg/kg	0.45 mg/kg	0.625 mg/kg
1,3,5-Trinitrobenzene (1,3,5-TNB)	99-35-4	2300 mg/kg	0.625 mg/kg	N/A	0.25 mg/kg	0.61 mg/kg	0.625 mg/kg
1,3-Dinitrobenzene (1,3-DNB)	99-65-0	7.8 mg/kg	0.625 mg/kg	N/A	0.25 mg/kg	0.60 mg/kg	0.625 mg/kg
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	479-45-8	310 mg/kg	1.25 mg/kg	N/A	0.65 mg/kg	0.85 mg/kg	1.25 mg/kg
Nitrobenzene (NB)	98-95-3	39 mg/kg	0.625 mg/kg	N/A	0.26 mg/kg	0.42 mg/kg	0.625 mg/kg
2,4,6-Trinitrotoluene (2,4,6-TNT)	118-96-7	39 mg/kg	0.625 mg/kg	N/A	0.25 mg/kg	0.57 mg/kg	0.625 mg/kg
4-Amino-2,6-dinitrotoluene (4-Am-DNT)	1946-51-0	N/A	1.25 mg/kg	N/A	N/A	0.84 mg/kg	1.25 mg/kg
2-Amino-4,6-dinitrotoluene (2-Am-DNT)	35572-78-2	N/A	1.25 mg/kg	N/A	N/A	0.79 mg/kg	1.25 mg/kg
2,4-Dinitrotoluene (2,4-DNT)	121-14-2	160 mg/kg	1.25 mg/kg	N/A	0.25 mg/kg	0.65 mg/kg	1.25 mg/kg
2,6-Dinitrotoluene (2,6-DNT)	606-20-2	78 mg/kg	1.25 mg/kg	N/A	0.26 mg/kg	0.82 mg/kg	1.25 mg/kg
2-Nitrotoluene (2-NT)	88-72-2	780 mg/kg	1.25 mg/kg	N/A	0.25 mg/kg	0.86 mg/kg	1.25 mg/kg
3-Nitrotoluene (3-NT)	99-08-1	1600 mg/kg	1.25 mg/kg	N/A	0.25 mg/kg	0.86 mg/kg	1.25 mg/kg
4-Nitrotoluene (4-NT)	99-99-0	380 mg/kg	1.25 mg/kg	N/A	0.25 mg/kg	0.91 mg/kg	1.25 mg/kg
Nitroglycerin	55-63-0	1300 mg/kg	4 mg/kg	N/A	N/A	0.49 mg/kg	4 mg/kg
Nitroguanidine	556-88-7	N/A	0.100 mg/kg	N/A	N/A	0.045 mg/kg	0.100 mg/kg
Perchlorate	7601-90-3	N/A	0.000100 mg/kg	N/A	N/A	0.000031 mg/kg	0.000100 mg/kg

¹ "RBC-Soil Residential Adj X 10 for SD" is from Risk-Based Concentration Table, October 31, 2006, U.S. EPA Region III, Jennifer Hubbard and is subject to change when RBCs are updated.

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-11
Reference Limits and Evaluation Table

Matrix: Soil
 Analytical Group: Wet Chemistry
 Concentration Level: Medium (various)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
Total organic carbon (TOC)	TOC	N/A	100.00 mg/kg	N/A	N/A	41.19 mg/lg	100.00 mg/kg
pH	PH	N/A	N/A	N/A	N/A	N/A	N/A

¹ "RBC-Soil Residential Adjusted" is from [Risk-Based Concentration Table, October 31, 2006, U.S. EPA Region III, Jennifer Hubbard](#) and is subject to change when RBCs are updated.

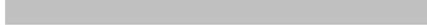
Shading represents Project Action Limits which are below Project Quantitation Limits.

**QAPP Worksheet #15-12
 Reference Limits and Evaluation Table**

Matrix: Sediment
 Analytical Group: Wet Chemistry
 Concentration Level: Medium (various)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
Total organic carbon (TOC)	TOC	N/A	100.00 mg/kg	N/A	N/A	41.19 mg/lg	100.00 mg/kg
pH	PH	N/A	N/A	N/A	N/A	N/A	N/A

¹ "RBC-Soil Residential Adj X 10 for SD" is from Risk-Based Concentration Table, October 31, 2006, U.S. EPA Region III, Jennifer Hubbard and is subject to change when RBCs are updated.

 Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-13 Reference Limits and Evaluation Table

Matrix: Groundwater
Analytical Group: TCL Volatiles
Concentration Level: Water (OLM04.3)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
Dichlorodifluoromethane	75-71-8	35 µg/L	10 µg/L	N/A	10 µg/L	0.34 µg/L	10 µg/L
Chloromethane	74-87-3	19 µg/L	10 µg/L	N/A	10 µg/L	0.43 µg/L	10 µg/L
Vinyl Chloride	75-01-4	0.015 µg/L	10 µg/L	N/A	10 µg/L	0.42 µg/L	10 µg/L
Bromomethane	74-83-9	0.85 µg/L	10 µg/L	N/A	10 µg/L	0.35 µg/L	10 µg/L
Chloroethane	75-00-3	3.6 µg/L	10 µg/L	N/A	10 µg/L	4.62 µg/L	10 µg/L
Trichlorofluoromethane	75-69-4	130 µg/L	10 µg/L	N/A	10 µg/L	0.36 µg/L	10 µg/L
1,1-Dichloroethene	75-35-4	35 µg/L	10 µg/L	N/A	10 µg/L	0.57 µg/L	10 µg/L
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	5900 µg/L	10 µg/L	N/A	10 µg/L	0.40 µg/L	10 µg/L
Acetone	67-64-1	550 µg/L	10 µg/L	N/A	10 µg/L	1.18 µg/L	10 µg/L
Carbon Disulfide	75-15-0	100 µg/L	10 µg/L	N/A	10 µg/L	0.41 µg/L	10 µg/L
Methyl Acetate	79-20-9	610 µg/L	10 µg/L	N/A	10 µg/L	0.49 µg/L	10 µg/L
Methylene Chloride	75-09-2	4.1 µg/L	10 µg/L	N/A	10 µg/L	0.21 µg/L	10 µg/L
trans-1,2-Dichloroethene	156-60-5	12 µg/L	10 µg/L	N/A	10 µg/L	0.34 µg/L	10 µg/L
Methyl tert-Butyl Ether	1634-04-4	2.6 µg/L	10 µg/L	N/A	10 µg/L	0.18 µg/L	10 µg/L
1,1-Dichloroethane	75-34-3	90 µg/L	10 µg/L	N/A	10 µg/L	0.38 µg/L	10 µg/L
cis-1,2-Dichloroethene	156-59-2	6.1 µg/L	10 µg/L	N/A	10 µg/L	0.13 µg/L	10 µg/L
2-Butanone	78-93-3	700 µg/L	10 µg/L	N/A	10 µg/L	0.53 µg/L	10 µg/L
Chloroform	67-66-3	0.15 µg/L	10 µg/L	N/A	10 µg/L	0.27 µg/L	10 µg/L
1,1,1-Trichloroethane	71-55-6	170 µg/L	10 µg/L	N/A	10 µg/L	0.26 µg/L	10 µg/L
Cyclohexane	110-82-7	1200 µg/L	10 µg/L	N/A	10 µg/L	0.21 µg/L	10 µg/L
Carbon Tetrachloride	56-23-5	0.16 µg/L	10 µg/L	N/A	10 µg/L	0.29 µg/L	10 µg/L
Benzene	71-43-2	0.34 µg/L	10 µg/L	N/A	10 µg/L	0.20 µg/L	10 µg/L
1,2-Dichloroethane	107-06-2	0.12 µg/L	10 µg/L	N/A	10 µg/L	0.17 µg/L	10 µg/L
Trichloroethene	79-01-6	0.026 µg/L	10 µg/L	N/A	10 µg/L	0.24 µg/L	10 µg/L
Methylcyclohexane	108-87-2	630 µg/L	10 µg/L	N/A	10 µg/L	0.25 µg/L	10 µg/L
1,2-Dichloropropane	78-87-5	0.16 µg/L	10 µg/L	N/A	10 µg/L	0.23 µg/L	10 µg/L
Bromodichloromethane	75-27-4	0.17 µg/L	10 µg/L	N/A	10 µg/L	0.16 µg/L	10 µg/L
cis-1,3-Dichloropropene	10061-01-5	0.44 µg/L	10 µg/L	N/A	10 µg/L	0.14 µg/L	10 µg/L
4-Methyl-2-pentanone	108-10-1	630 µg/L	10 µg/L	N/A	10 µg/L	0.32 µg/L	10 µg/L
Toluene	108-88-3	230 µg/L	10 µg/L	N/A	10 µg/L	0.20 µg/L	10 µg/L
trans-1,3-Dichloropropene	10061-02-6	0.44 µg/L	10 µg/L	N/A	10 µg/L	0.12 µg/L	10 µg/L
1,1,2-Trichloroethane	79-00-5	0.19 µg/L	10 µg/L	N/A	10 µg/L	0.25 µg/L	10 µg/L
Tetrachloroethene	127-18-4	0.1 µg/L	10 µg/L	N/A	10 µg/L	0.32 µg/L	10 µg/L
2-Hexanone	591-78-6	630 µg/L	10 µg/L	N/A	10 µg/L	0.26 µg/L	10 µg/L
Dibromochloromethane	124-48-1	0.13 µg/L	10 µg/L	N/A	10 µg/L	0.15 µg/L	10 µg/L
1,2-Dibromoethane	106-93-4	0.0053 µg/L	10 µg/L	N/A	10 µg/L	0.22 µg/L	10 µg/L
Chlorobenzene	108-90-7	9 µg/L	10 µg/L	N/A	10 µg/L	0.26 µg/L	10 µg/L
Ethylbenzene	100-41-4	130 µg/L	10 µg/L	N/A	10 µg/L	0.22 µg/L	10 µg/L
Xylenes, total	1330-20-7	21 µg/L	10 µg/L	N/A	10 µg/L	0.37 µg/L	10 µg/L
Styrene	100-42-5	160 µg/L	10 µg/L	N/A	10 µg/L	0.13 µg/L	10 µg/L
Bromoform	75-25-2	8.5 µg/L	10 µg/L	N/A	10 µg/L	0.21 µg/L	10 µg/L
Isopropylbenzene	98-82-8	66 µg/L	10 µg/L	N/A	10 µg/L	0.18 µg/L	10 µg/L
1,1,2,2-Tetrachloroethane	79-34-5	0.053 µg/L	10 µg/L	N/A	10 µg/L	0.22 µg/L	10 µg/L
1,3-Dichlorobenzene	541-73-1	1.8 µg/L	10 µg/L	N/A	10 µg/L	0.46 µg/L	10 µg/L
1,4-Dichlorobenzene	106-46-7	0.47 µg/L	10 µg/L	N/A	10 µg/L	0.39 µg/L	10 µg/L
1,2-Dichlorobenzene	95-50-1	27 µg/L	10 µg/L	N/A	10 µg/L	0.35 µg/L	10 µg/L
1,2-Dibromo-3-chloropropane	96-12-8	0.0002 µg/L	10 µg/L	N/A	10 µg/L	0.47 µg/L	10 µg/L
1,2,4-Trichlorobenzene	120-82-1	6.1 µg/L	10 µg/L	N/A	10 µg/L	0.46 µg/L	10 µg/L

¹ "RBC-Tap Water Adjusted" is from Risk-Based Concentration Table, October 31, 2006, U.S. EPA Region III, Jennifer Hubbard and is subject to change when RBCs are updated.

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-14 Reference Limits and Evaluation Table

Matrix: Surface Water
Analytical Group: TCL Volatiles
Concentration Level: Water (OLM04.3)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
Dichlorodifluoromethane	75-71-8	350 µg/L	10 µg/L	N/A	10 µg/L	0.34 µg/L	10 µg/L
Chloromethane	74-87-3	190 µg/L	10 µg/L	N/A	10 µg/L	0.43 µg/L	10 µg/L
Vinyl Chloride	75-01-4	0.15 µg/L	10 µg/L	N/A	10 µg/L	0.42 µg/L	10 µg/L
Bromomethane	74-83-9	8.5 µg/L	10 µg/L	N/A	10 µg/L	0.35 µg/L	10 µg/L
Chloroethane	75-00-3	36 µg/L	10 µg/L	N/A	10 µg/L	4.62 µg/L	10 µg/L
Trichlorofluoromethane	75-69-4	1300 µg/L	10 µg/L	N/A	10 µg/L	0.36 µg/L	10 µg/L
1,1-Dichloroethene	75-35-4	350 µg/L	10 µg/L	N/A	10 µg/L	0.57 µg/L	10 µg/L
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	59000 µg/L	10 µg/L	N/A	10 µg/L	0.40 µg/L	10 µg/L
Acetone	67-64-1	5500 µg/L	10 µg/L	N/A	10 µg/L	1.18 µg/L	10 µg/L
Carbon Disulfide	75-15-0	1000 µg/L	10 µg/L	N/A	10 µg/L	0.41 µg/L	10 µg/L
Methyl Acetate	79-20-9	6100 µg/L	10 µg/L	N/A	10 µg/L	0.49 µg/L	10 µg/L
Methylene Chloride	75-09-2	41 µg/L	10 µg/L	N/A	10 µg/L	0.21 µg/L	10 µg/L
trans-1,2-Dichloroethene	156-60-5	120 µg/L	10 µg/L	N/A	10 µg/L	0.34 µg/L	10 µg/L
Methyl tert-Butyl Ether	1634-04-4	26 µg/L	10 µg/L	N/A	10 µg/L	0.18 µg/L	10 µg/L
1,1-Dichloroethane	75-34-3	900 µg/L	10 µg/L	N/A	10 µg/L	0.38 µg/L	10 µg/L
cis-1,2-Dichloroethene	156-59-2	61 µg/L	10 µg/L	N/A	10 µg/L	0.13 µg/L	10 µg/L
2-Butanone	78-93-3	7000 µg/L	10 µg/L	N/A	10 µg/L	0.53 µg/L	10 µg/L
Chloroform	67-66-3	1.5 µg/L	10 µg/L	N/A	10 µg/L	0.27 µg/L	10 µg/L
1,1,1-Trichloroethane	71-55-6	1700 µg/L	10 µg/L	N/A	10 µg/L	0.26 µg/L	10 µg/L
Cyclohexane	110-82-7	12000 µg/L	10 µg/L	N/A	10 µg/L	0.21 µg/L	10 µg/L
Carbon Tetrachloride	56-23-5	1.6 µg/L	10 µg/L	N/A	10 µg/L	0.29 µg/L	10 µg/L
Benzene	71-43-2	3.4 µg/L	10 µg/L	N/A	10 µg/L	0.20 µg/L	10 µg/L
1,2-Dichloroethane	107-06-2	1.2 µg/L	10 µg/L	N/A	10 µg/L	0.17 µg/L	10 µg/L
Trichloroethene	79-01-6	0.26 µg/L	10 µg/L	N/A	10 µg/L	0.24 µg/L	10 µg/L
Methylcyclohexane	108-87-2	6300 µg/L	10 µg/L	N/A	10 µg/L	0.25 µg/L	10 µg/L
1,2-Dichloropropane	78-87-5	1.6 µg/L	10 µg/L	N/A	10 µg/L	0.23 µg/L	10 µg/L
Bromodichloromethane	75-27-4	1.7 µg/L	10 µg/L	N/A	10 µg/L	0.16 µg/L	10 µg/L
cis-1,3-Dichloropropene	10061-01-5	4.4 µg/L	10 µg/L	N/A	10 µg/L	0.14 µg/L	10 µg/L
4-Methyl-2-pentanone	108-10-1	6300 µg/L	10 µg/L	N/A	10 µg/L	0.32 µg/L	10 µg/L
Toluene	108-88-3	2300 µg/L	10 µg/L	N/A	10 µg/L	0.20 µg/L	10 µg/L
trans-1,3-Dichloropropene	10061-02-6	4.4 µg/L	10 µg/L	N/A	10 µg/L	0.12 µg/L	10 µg/L
1,1,2-Trichloroethane	79-00-5	1.9 µg/L	10 µg/L	N/A	10 µg/L	0.25 µg/L	10 µg/L
Tetrachloroethene	127-18-4	1 µg/L	10 µg/L	N/A	10 µg/L	0.32 µg/L	10 µg/L
2-Hexanone	591-78-6	6300 µg/L	10 µg/L	N/A	10 µg/L	0.26 µg/L	10 µg/L
Dibromochloromethane	124-48-1	1.3 µg/L	10 µg/L	N/A	10 µg/L	0.15 µg/L	10 µg/L
1,2-Dibromoethane	106-93-4	0.053 µg/L	10 µg/L	N/A	10 µg/L	0.22 µg/L	10 µg/L
Chlorobenzene	108-90-7	90 µg/L	10 µg/L	N/A	10 µg/L	0.26 µg/L	10 µg/L
Ethylbenzene	100-41-4	1300 µg/L	10 µg/L	N/A	10 µg/L	0.22 µg/L	10 µg/L
Xylenes, total	1330-20-7	210 µg/L	10 µg/L	N/A	10 µg/L	0.37 µg/L	10 µg/L
Styrene	100-42-5	1600 µg/L	10 µg/L	N/A	10 µg/L	0.13 µg/L	10 µg/L
Bromoform	75-25-2	85 µg/L	10 µg/L	N/A	10 µg/L	0.21 µg/L	10 µg/L
Isopropylbenzene	98-82-8	660 µg/L	10 µg/L	N/A	10 µg/L	0.18 µg/L	10 µg/L
1,1,2,2-Tetrachloroethane	79-34-5	0.53 µg/L	10 µg/L	N/A	10 µg/L	0.22 µg/L	10 µg/L
1,3-Dichlorobenzene	541-73-1	18 µg/L	10 µg/L	N/A	10 µg/L	0.46 µg/L	10 µg/L
1,4-Dichlorobenzene	106-46-7	4.7 µg/L	10 µg/L	N/A	10 µg/L	0.39 µg/L	10 µg/L
1,2-Dichlorobenzene	95-50-1	270 µg/L	10 µg/L	N/A	10 µg/L	0.35 µg/L	10 µg/L
1,2-Dibromo-3-chloropropane	96-12-8	0.002 µg/L	10 µg/L	N/A	10 µg/L	0.47 µg/L	10 µg/L
1,2,4-Trichlorobenzene	120-82-1	61 µg/L	10 µg/L	N/A	10 µg/L	0.46 µg/L	10 µg/L

¹ "RBC-Tap Water Adj X 10 for SW" is from Risk-Based Concentration Table, October 31, 2006, U.S. EPA Region III, Jennifer Hubbard and is subject to change when RBCs are updated.

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-15 Reference Limits and Evaluation Table

Matrix: Groundwater
Analytical Group: TCL Semivolatiles
Concentration Level: Water (OLM04.3)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
Benzaldehyde	100-52-7	370 µg/L	10 µg/L	N/A	10 µg/L	1.32 µg/L	10 µg/L
Phenol	108-95-2	1100 µg/L	10 µg/L	N/A	10 µg/L	0.52 µg/L	10 µg/L
bis-(2-Chloroethyl) ether	111-44-4	0.0096 µg/L	10 µg/L	N/A	10 µg/L	0.67 µg/L	10 µg/L
2-Chlorophenol	95-57-8	3 µg/L	10 µg/L	N/A	10 µg/L	0.83 µg/L	10 µg/L
2-Methylphenol	95-48-7	180 µg/L	10 µg/L	N/A	10 µg/L	0.50 µg/L	10 µg/L
2,2'-oxybis(1-Chloropropane)	108-60-1	0.26 µg/L	10 µg/L	N/A	10 µg/L	0.57 µg/L	10 µg/L
Acetophenone	98-86-2	61 µg/L	10 µg/L	N/A	10 µg/L	0.68 µg/L	10 µg/L
4-Methylphenol	106-44-5	18 µg/L	10 µg/L	N/A	10 µg/L	1.54 µg/L	10 µg/L
N-Nitroso-di-n propylamine	621-64-7	0.0096 µg/L	10 µg/L	N/A	10 µg/L	0.57 µg/L	10 µg/L
Hexachloroethane	67-72-1	3.7 µg/L	10 µg/L	N/A	10 µg/L	0.98 µg/L	10 µg/L
Nitrobenzene	98-95-3	0.35 µg/L	10 µg/L	N/A	10 µg/L	1.16 µg/L	10 µg/L
Isophorone	78-59-1	70 µg/L	10 µg/L	N/A	10 µg/L	0.53 µg/L	10 µg/L
2-Nitrophenol	88-75-5	3 µg/L	10 µg/L	N/A	10 µg/L	0.64 µg/L	10 µg/L
2,4-Dimethylphenol	105-67-9	73 µg/L	10 µg/L	N/A	10 µg/L	0.62 µg/L	10 µg/L
bis(2-Chloroethoxy) methane	111-91-1	N/A	10 µg/L	N/A	10 µg/L	0.48 µg/L	10 µg/L
2,4-Dichlorophenol	120-83-2	11 µg/L	10 µg/L	N/A	10 µg/L	0.55 µg/L	10 µg/L
Naphthalene	91-20-3	0.65 µg/L	10 µg/L	N/A	10 µg/L	0.59 µg/L	10 µg/L
4-Chloroaniline	106-47-8	15 µg/L	10 µg/L	N/A	10 µg/L	0.90 µg/L	10 µg/L
Hexachlorobutadiene	87-68-3	0.73 µg/L	10 µg/L	N/A	10 µg/L	1.08 µg/L	10 µg/L
Caprolactam	105-60-2	1800 µg/L	10 µg/L	N/A	10 µg/L	1.61 µg/L	10 µg/L
4-Chloro-3-methylphenol	59-50-7	3 µg/L	10 µg/L	N/A	10 µg/L	0.61 µg/L	10 µg/L
2-Methylnaphthalene	91-57-6	2.4 µg/L	10 µg/L	N/A	10 µg/L	0.69 µg/L	10 µg/L
Hexachlorocyclopentadiene	77-47-4	22 µg/L	10 µg/L	N/A	10 µg/L	7.96 µg/L	10 µg/L
2,4,6-Trichlorophenol	88-06-2	6.1 µg/L	10 µg/L	N/A	10 µg/L	0.71 µg/L	10 µg/L
2,4,5-Trichlorophenol	95-95-4	370 µg/L	25 µg/L	N/A	25 µg/L	1.89 µg/L	25 µg/L
1,1'-Biphenyl	92-52-4	30 µg/L	10 µg/L	N/A	10 µg/L	0.83 µg/L	10 µg/L
2-Chloronaphthalene	91-58-7	49 µg/L	10 µg/L	N/A	10 µg/L	0.79 µg/L	10 µg/L
2-Nitroaniline	88-74-4	11 µg/L	25 µg/L	N/A	25 µg/L	1.37 µg/L	25 µg/L
Dimethylphthalate	131-11-3	37000 µg/L	10 µg/L	N/A	10 µg/L	0.61 µg/L	10 µg/L
2,6-Dinitrotoluene	606-20-2	3.7 µg/L	10 µg/L	N/A	10 µg/L	0.50 µg/L	10 µg/L
Acenaphthylene	208-96-8	0.65 µg/L	10 µg/L	N/A	10 µg/L	0.61 µg/L	10 µg/L
3-Nitroaniline	99-09-2	1.1 µg/L	25 µg/L	N/A	25 µg/L	1.50 µg/L	25 µg/L
Acenaphthene	83-32-9	37 µg/L	10 µg/L	N/A	10 µg/L	0.68 µg/L	10 µg/L
2,4-Dinitrophenol	51-28-5	7.3 µg/L	25 µg/L	N/A	25 µg/L	6.67 µg/L	25 µg/L
4-Nitrophenol	100-02-7	N/A	25 µg/L	N/A	25 µg/L	1.98 µg/L	25 µg/L
Dibenzofuran	132-64-9	1.2 µg/L	10 µg/L	N/A	10 µg/L	0.72 µg/L	10 µg/L
2,4-Dinitrotoluene	121-14-2	7.3 µg/L	10 µg/L	N/A	10 µg/L	0.64 µg/L	10 µg/L
Diethylphthalate	84-66-2	2900 µg/L	10 µg/L	N/A	10 µg/L	0.67 µg/L	10 µg/L
Fluorene	86-73-7	24 µg/L	10 µg/L	N/A	10 µg/L	0.70 µg/L	10 µg/L
4-Chlorophenyl-phenyl ether	7005-72-3	18 µg/L	10 µg/L	N/A	10 µg/L	0.52 µg/L	10 µg/L
4-Nitroaniline	100-01-6	3.3 µg/L	25 µg/L	N/A	25 µg/L	1.79 µg/L	25 µg/L
4,6-Dinitro-2-methylphenol	534-52-1	0.37 µg/L	25 µg/L	N/A	25 µg/L	2.56 µg/L	25 µg/L
N-Nitroso diphenylamine	86-30-6	14 µg/L	10 µg/L	N/A	10 µg/L	0.50 µg/L	10 µg/L
4-Bromophenyl-phenylether	101-55-3	N/A	10 µg/L	N/A	10 µg/L	0.74 µg/L	10 µg/L
Hexachlorobenzene	118-74-1	0.042 µg/L	10 µg/L	N/A	10 µg/L	0.50 µg/L	10 µg/L
Atrazine	1912-24-9	0.3 µg/L	10 µg/L	N/A	10 µg/L	0.82 µg/L	10 µg/L
Pentachlorophenol	87-86-5	0.56 µg/L	25 µg/L	N/A	25 µg/L	2.05 µg/L	25 µg/L
Phenanthrene	85-01-8	18 µg/L	10 µg/L	N/A	10 µg/L	0.45 µg/L	10 µg/L
Anthracene	120-12-7	180 µg/L	10 µg/L	N/A	10 µg/L	0.61 µg/L	10 µg/L
Carbazole	86-74-8	3.3 µg/L	10 µg/L	N/A	10 µg/L	0.59 µg/L	10 µg/L
Di-n-butylphthalate	84-74-2	370 µg/L	10 µg/L	N/A	10 µg/L	0.59 µg/L	10 µg/L

QAPP Worksheet #15-15 Reference Limits and Evaluation Table

Matrix: Groundwater
Analytical Group: TCL Semivolatiles
Concentration Level: Water (OLM04.3)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
Fluoranthene	206-44-0	150 µg/L	10 µg/L	N/A	10 µg/L	0.52 µg/L	10 µg/L
Pyrene	129-00-0	18 µg/L	10 µg/L	N/A	10 µg/L	0.65 µg/L	10 µg/L
Butylbenzylphthalate	85-68-7	730 µg/L	10 µg/L	N/A	10 µg/L	0.71 µg/L	10 µg/L
3,3'-Dichlorobenzidine	91-94-1	0.15 µg/L	10 µg/L	N/A	10 µg/L	0.87 µg/L	10 µg/L
Benzo(a)anthracene	56-55-3	0.03 µg/L	10 µg/L	N/A	10 µg/L	0.54 µg/L	10 µg/L
Chrysene	218-01-9	3 µg/L	10 µg/L	N/A	10 µg/L	0.62 µg/L	10 µg/L
bis(2-Ethylhexyl) phthalate	117-81-7	4.8 µg/L	10 µg/L	N/A	10 µg/L	7.68 µg/L	10 µg/L
Di-n-octylphthalate	117-84-0	150 µg/L	10 µg/L	N/A	10 µg/L	0.83 µg/L	10 µg/L
Benzo(b)fluoranthene	205-99-2	0.03 µg/L	10 µg/L	N/A	10 µg/L	0.93 µg/L	10 µg/L
Benzo(k)fluoranthene	207-08-9	0.3 µg/L	10 µg/L	N/A	10 µg/L	0.58 µg/L	10 µg/L
Benzo(a)pyrene	50-32-8	0.003 µg/L	10 µg/L	N/A	10 µg/L	0.69 µg/L	10 µg/L
Indeno(1,2,3-cd)-pyrene	193-39-5	0.03 µg/L	10 µg/L	N/A	10 µg/L	0.86 µg/L	10 µg/L
Dibenzo(a,h)-anthracene	53-70-3	0.003 µg/L	10 µg/L	N/A	10 µg/L	1.10 µg/L	10 µg/L
Benzo(g,h,i)perylene	191-24-2	18 µg/L	10 µg/L	N/A	10 µg/L	0.68 µg/L	10 µg/L

¹ "RBC-Tap Water Adjusted" is from Risk-Based Concentration Table, October 31, 2006, U.S. EPA Region III, Jennifer Hubbard and is subject to change when RBCs are updated.

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-16
Reference Limits and Evaluation Table

Matrix: Surface Water
Analytical Group: TCL Semivolatiles
Concentration Level: Water (OLM04.3)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
Benzaldehyde	100-52-7	3700 µg/L	10 µg/L	N/A	10 µg/L	1.32 µg/L	10 µg/L
Phenol	108-95-2	11000 µg/L	10 µg/L	N/A	10 µg/L	0.52 µg/L	10 µg/L
bis-(2-Chloroethyl) ether	111-44-4	0.096 µg/L	10 µg/L	N/A	10 µg/L	0.67 µg/L	10 µg/L
2-Chlorophenol	95-57-8	30 µg/L	10 µg/L	N/A	10 µg/L	0.83 µg/L	10 µg/L
2-Methylphenol	95-48-7	1800 µg/L	10 µg/L	N/A	10 µg/L	0.50 µg/L	10 µg/L
2,2'-oxybis(1-Chloropropane)	108-60-1	2.6 µg/L	10 µg/L	N/A	10 µg/L	0.57 µg/L	10 µg/L
Acetophenone	98-86-2	610 µg/L	10 µg/L	N/A	10 µg/L	0.68 µg/L	10 µg/L
4-Methylphenol	106-44-5	180 µg/L	10 µg/L	N/A	10 µg/L	1.54 µg/L	10 µg/L
N-Nitroso-di-n propylamine	621-64-7	0.096 µg/L	10 µg/L	N/A	10 µg/L	0.57 µg/L	10 µg/L
Hexachloroethane	67-72-1	37 µg/L	10 µg/L	N/A	10 µg/L	0.98 µg/L	10 µg/L
Nitrobenzene	98-95-3	3.5 µg/L	10 µg/L	N/A	10 µg/L	1.16 µg/L	10 µg/L
Isophorone	78-59-1	700 µg/L	10 µg/L	N/A	10 µg/L	0.53 µg/L	10 µg/L
2-Nitrophenol	88-75-5	30 µg/L	10 µg/L	N/A	10 µg/L	0.64 µg/L	10 µg/L
2,4-Dimethylphenol	105-67-9	730 µg/L	10 µg/L	N/A	10 µg/L	0.62 µg/L	10 µg/L
bis(2-Chloroethoxy) methane	111-91-1	N/A	10 µg/L	N/A	10 µg/L	0.48 µg/L	10 µg/L
2,4-Dichlorophenol	120-83-2	110 µg/L	10 µg/L	N/A	10 µg/L	0.55 µg/L	10 µg/L
Naphthalene	91-20-3	6.5 µg/L	10 µg/L	N/A	10 µg/L	0.59 µg/L	10 µg/L
4-Chloroaniline	106-47-8	150 µg/L	10 µg/L	N/A	10 µg/L	0.90 µg/L	10 µg/L
Hexachlorobutadiene	87-68-3	7.3 µg/L	10 µg/L	N/A	10 µg/L	1.08 µg/L	10 µg/L
Caprolactam	105-60-2	18000 µg/L	10 µg/L	N/A	10 µg/L	1.61 µg/L	10 µg/L
4-Chloro-3-methylphenol	59-50-7	30 µg/L	10 µg/L	N/A	10 µg/L	0.61 µg/L	10 µg/L
2-Methylnaphthalene	91-57-6	24 µg/L	10 µg/L	N/A	10 µg/L	0.69 µg/L	10 µg/L
Hexachlorocyclopentadiene	77-47-4	220 µg/L	10 µg/L	N/A	10 µg/L	7.96 µg/L	10 µg/L
2,4,6-Trichlorophenol	88-06-2	61 µg/L	10 µg/L	N/A	10 µg/L	0.71 µg/L	10 µg/L
2,4,5-Trichlorophenol	95-95-4	3700 µg/L	25 µg/L	N/A	25 µg/L	1.89 µg/L	25 µg/L
1,1'-Biphenyl	92-52-4	300 µg/L	10 µg/L	N/A	10 µg/L	0.83 µg/L	10 µg/L
2-Chloronaphthalene	91-58-7	490 µg/L	10 µg/L	N/A	10 µg/L	0.79 µg/L	10 µg/L
2-Nitroaniline	88-74-4	110 µg/L	25 µg/L	N/A	25 µg/L	1.37 µg/L	25 µg/L
Dimethylphthalate	131-11-3	370000 µg/L	10 µg/L	N/A	10 µg/L	0.61 µg/L	10 µg/L
2,6-Dinitrotoluene	606-20-2	37 µg/L	10 µg/L	N/A	10 µg/L	0.50 µg/L	10 µg/L
Acenaphthylene	208-96-8	6.5 µg/L	10 µg/L	N/A	10 µg/L	0.61 µg/L	10 µg/L
3-Nitroaniline	99-09-2	11 µg/L	25 µg/L	N/A	25 µg/L	1.50 µg/L	25 µg/L
Acenaphthene	83-32-9	370 µg/L	10 µg/L	N/A	10 µg/L	0.68 µg/L	10 µg/L
2,4-Dinitrophenol	51-28-5	73 µg/L	25 µg/L	N/A	25 µg/L	6.67 µg/L	25 µg/L
4-Nitrophenol	100-02-7	N/A	25 µg/L	N/A	25 µg/L	1.98 µg/L	25 µg/L
Dibenzofuran	132-64-9	12 µg/L	10 µg/L	N/A	10 µg/L	0.72 µg/L	10 µg/L
2,4-Dinitrotoluene	121-14-2	73 µg/L	10 µg/L	N/A	10 µg/L	0.64 µg/L	10 µg/L
Diethylphthalate	84-66-2	29000 µg/L	10 µg/L	N/A	10 µg/L	0.67 µg/L	10 µg/L
Fluorene	86-73-7	240 µg/L	10 µg/L	N/A	10 µg/L	0.70 µg/L	10 µg/L
4-Chlorophenyl-phenyl ether	7005-72-3	180 µg/L	10 µg/L	N/A	10 µg/L	0.52 µg/L	10 µg/L
4-Nitroaniline	100-01-6	33 µg/L	25 µg/L	N/A	25 µg/L	1.79 µg/L	25 µg/L
4,6-Dinitro-2-methylphenol	534-52-1	3.7 µg/L	25 µg/L	N/A	25 µg/L	2.56 µg/L	25 µg/L
N-Nitroso diphenylamine	86-30-6	140 µg/L	10 µg/L	N/A	10 µg/L	0.50 µg/L	10 µg/L
4-Bromophenyl-phenylether	101-55-3	N/A	10 µg/L	N/A	10 µg/L	0.74 µg/L	10 µg/L
Hexachlorobenzene	118-74-1	0.42 µg/L	10 µg/L	N/A	10 µg/L	0.50 µg/L	10 µg/L
Atrazine	1912-24-9	3 µg/L	10 µg/L	N/A	10 µg/L	0.82 µg/L	10 µg/L
Pentachlorophenol	87-86-5	5.6 µg/L	25 µg/L	N/A	25 µg/L	2.05 µg/L	25 µg/L
Phenanthrene	85-01-8	180 µg/L	10 µg/L	N/A	10 µg/L	0.45 µg/L	10 µg/L
Anthracene	120-12-7	1800 µg/L	10 µg/L	N/A	10 µg/L	0.61 µg/L	10 µg/L
Carbazole	86-74-8	33 µg/L	10 µg/L	N/A	10 µg/L	0.59 µg/L	10 µg/L
Di-n-butylphthalate	84-74-2	3700 µg/L	10 µg/L	N/A	10 µg/L	0.59 µg/L	10 µg/L

QAPP Worksheet #15-16
Reference Limits and Evaluation Table

Matrix: Surface Water
Analytical Group: TCL Semivolatiles
Concentration Level: Water (OLM04.3)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
Fluoranthene	206-44-0	1500 µg/L	10 µg/L	N/A	10 µg/L	0.52 µg/L	10 µg/L
Pyrene	129-00-0	180 µg/L	10 µg/L	N/A	10 µg/L	0.65 µg/L	10 µg/L
Butylbenzylphthalate	85-68-7	7300 µg/L	10 µg/L	N/A	10 µg/L	0.71 µg/L	10 µg/L
3,3'-Dichlorobenzidine	91-94-1	1.5 µg/L	10 µg/L	N/A	10 µg/L	0.87 µg/L	10 µg/L
Benzo(a)anthracene	56-55-3	0.3 µg/L	10 µg/L	N/A	10 µg/L	0.54 µg/L	10 µg/L
Chrysene	218-01-9	30 µg/L	10 µg/L	N/A	10 µg/L	0.62 µg/L	10 µg/L
bis(2-Ethylhexyl) phthalate	117-81-7	48 µg/L	10 µg/L	N/A	10 µg/L	7.68 µg/L	10 µg/L
Di-n-octylphthalate	117-84-0	1500 µg/L	10 µg/L	N/A	10 µg/L	0.83 µg/L	10 µg/L
Benzo(b)fluoranthene	205-99-2	0.3 µg/L	10 µg/L	N/A	10 µg/L	0.93 µg/L	10 µg/L
Benzo(k)fluoranthene	207-08-9	3 µg/L	10 µg/L	N/A	10 µg/L	0.58 µg/L	10 µg/L
Benzo(a)pyrene	50-32-8	0.03 µg/L	10 µg/L	N/A	10 µg/L	0.69 µg/L	10 µg/L
Indeno(1,2,3-cd)-pyrene	193-39-5	0.3 µg/L	10 µg/L	N/A	10 µg/L	0.86 µg/L	10 µg/L
Dibenzo(a,h)-anthracene	53-70-3	0.03 µg/L	10 µg/L	N/A	10 µg/L	1.10 µg/L	10 µg/L
Benzo(g,h,i)perylene	191-24-2	180 µg/L	10 µg/L	N/A	10 µg/L	0.68 µg/L	10 µg/L

¹ "RBC-Tap Water Adj X 10 for SW" is from [Risk-Based Concentration Table, October 31, 2006, U.S. EPA Region III, Jennifer Hubbard](#) and is subject to change when RBCs are updated.

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-17
Reference Limits and Evaluation Table

Matrix: Groundwater
 Analytical Group: TCL Pesticides/ Aroclors
 Concentration Level: Water (OLM04.3)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
alpha-BHC	319-84-6	0.011 µg/L	0.050 µg/L	N/A	0.050 µg/L	0.0077 µg/L	0.050 µg/L
beta-BHC	319-85-7	0.037 µg/L	0.050 µg/L	N/A	0.050 µg/L	0.0041 µg/L	0.050 µg/L
delta-BHC	319-86-8	0.037 µg/L	0.050 µg/L	N/A	0.050 µg/L	0.025 µg/L	0.050 µg/L
gamma-BHC (Lindane)	58-89-9	0.052 µg/L	0.050 µg/L	N/A	0.050 µg/L	0.0042 µg/L	0.050 µg/L
Heptachlor	76-44-8	0.015 µg/L	0.050 µg/L	N/A	0.050 µg/L	0.0036 µg/L	0.050 µg/L
Aldrin	309-00-2	0.0039 µg/L	0.050 µg/L	N/A	0.050 µg/L	0.0099 µg/L	0.050 µg/L
Heptachlor epoxide	1024-57-3	0.0074 µg/L	0.050 µg/L	N/A	0.050 µg/L	0.0044 µg/L	0.050 µg/L
Endosulfan I	959-98-8	22 µg/L	0.050 µg/L	N/A	0.050 µg/L	0.0036 µg/L	0.050 µg/L
Dieldrin	60-57-1	0.0042 µg/L	0.10 µg/L	N/A	0.10 µg/L	0.0087 µg/L	0.10 µg/L
4,4'-DDE	72-55-9	0.2 µg/L	0.10 µg/L	N/A	0.10 µg/L	0.0051 µg/L	0.10 µg/L
Endrin	72-20-8	1.1 µg/L	0.10 µg/L	N/A	0.10 µg/L	0.0072 µg/L	0.10 µg/L
Endosulfan II	33213-65-9	22 µg/L	0.10 µg/L	N/A	0.10 µg/L	0.0044 µg/L	0.10 µg/L
4,4'-DDD	72-54-8	0.28 µg/L	0.10 µg/L	N/A	0.10 µg/L	0.0067 µg/L	0.10 µg/L
Endosulfan sulfate	1031-07-8	22 µg/L	0.10 µg/L	N/A	0.10 µg/L	0.0057 µg/L	0.10 µg/L
4,4'-DDT	50-29-3	0.2 µg/L	0.10 µg/L	N/A	0.10 µg/L	0.007 µg/L	0.10 µg/L
Methoxychlor	72-43-5	18 µg/L	0.50 µg/L	N/A	0.50 µg/L	0.3633 µg/L	0.50 µg/L
Endrin ketone	53494-70-5	1.1 µg/L	0.10 µg/L	N/A	0.10 µg/L	0.0037 µg/L	0.10 µg/L
Endrin aldehyde	7421-93-4	1.1 µg/L	0.10 µg/L	N/A	0.10 µg/L	0.0046 µg/L	0.10 µg/L
alpha-Chlordane	5103-71-9	0.19 µg/L	0.050 µg/L	N/A	0.050 µg/L	0.006 µg/L	0.050 µg/L
gamma-Chlordane	5103-74-2	0.19 µg/L	0.050 µg/L	N/A	0.050 µg/L	0.0034 µg/L	0.050 µg/L
Toxaphene	8001-35-2	0.061 µg/L	5.0 µg/L	N/A	5.0 µg/L	0.071 µg/L	5.0 µg/L
Aroclor-1016	12674-11-2	0.26 µg/L	1.0 µg/L	N/A	1.0 µg/L	0.17 µg/L	1.0 µg/L
Aroclor-1221	11104-28-2	0.033 µg/L	2.0 µg/L	N/A	2.0 µg/L	0.56 µg/L	2.0 µg/L
Aroclor-1232	11141-16-5	0.033 µg/L	1.0 µg/L	N/A	1.0 µg/L	0.17 µg/L	1.0 µg/L
Aroclor-1242	53469-21-9	0.033 µg/L	1.0 µg/L	N/A	1.0 µg/L	0.16 µg/L	1.0 µg/L
Aroclor-1248	12672-29-6	0.033 µg/L	1.0 µg/L	N/A	1.0 µg/L	0.29 µg/L	1.0 µg/L
Aroclor-1254	11097-69-1	0.033 µg/L	1.0 µg/L	N/A	1.0 µg/L	0.2 µg/L	1.0 µg/L
Aroclor-1260	11096-82-5	0.033 µg/L	1.0 µg/L	N/A	1.0 µg/L	0.17 µg/L	1.0 µg/L

¹ "RBC-Tap Water Adjusted" is from Risk-Based Concentration Table, October 31, 2006, U.S. EPA Region III, Jennifer Hubbard and is subject to change when RBCs are updated.

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-18
Reference Limits and Evaluation Table

Matrix: Surface Water
Analytical Group: TCL Pesticides/ Aroclors
Concentration Level: Water (OLM04.3)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
alpha-BHC	319-84-6	0.11 µg/L	0.050 µg/L	N/A	0.050 µg/L	0.0077 µg/L	0.050 µg/L
beta-BHC	319-85-7	0.37 µg/L	0.050 µg/L	N/A	0.050 µg/L	0.0041 µg/L	0.050 µg/L
delta-BHC	319-86-8	0.37 µg/L	0.050 µg/L	N/A	0.050 µg/L	0.025 µg/L	0.050 µg/L
gamma-BHC (Lindane)	58-89-9	0.52 µg/L	0.050 µg/L	N/A	0.050 µg/L	0.0042 µg/L	0.050 µg/L
Heptachlor	76-44-8	0.15 µg/L	0.050 µg/L	N/A	0.050 µg/L	0.0036 µg/L	0.050 µg/L
Aldrin	309-00-2	0.039 µg/L	0.050 µg/L	N/A	0.050 µg/L	0.0099 µg/L	0.050 µg/L
Heptachlor epoxide	1024-57-3	0.074 µg/L	0.050 µg/L	N/A	0.050 µg/L	0.0044 µg/L	0.050 µg/L
Endosulfan I	959-98-8	220 µg/L	0.050 µg/L	N/A	0.050 µg/L	0.0036 µg/L	0.050 µg/L
Dieldrin	60-57-1	0.042 µg/L	0.10 µg/L	N/A	0.10 µg/L	0.0087 µg/L	0.10 µg/L
4,4'-DDE	72-55-9	2 µg/L	0.10 µg/L	N/A	0.10 µg/L	0.0051 µg/L	0.10 µg/L
Endrin	72-20-8	11 µg/L	0.10 µg/L	N/A	0.10 µg/L	0.0072 µg/L	0.10 µg/L
Endosulfan II	33213-65-9	220 µg/L	0.10 µg/L	N/A	0.10 µg/L	0.0044 µg/L	0.10 µg/L
4,4'-DDD	72-54-8	2.8 µg/L	0.10 µg/L	N/A	0.10 µg/L	0.0067 µg/L	0.10 µg/L
Endosulfan sulfate	1031-07-8	220 µg/L	0.10 µg/L	N/A	0.10 µg/L	0.0057 µg/L	0.10 µg/L
4,4'-DDT	50-29-3	2 µg/L	0.10 µg/L	N/A	0.10 µg/L	0.007 µg/L	0.10 µg/L
Methoxychlor	72-43-5	180 µg/L	0.50 µg/L	N/A	0.50 µg/L	0.3633 µg/L	0.50 µg/L
Endrin ketone	53494-70-5	11 µg/L	0.10 µg/L	N/A	0.10 µg/L	0.0037 µg/L	0.10 µg/L
Endrin aldehyde	7421-93-4	11 µg/L	0.10 µg/L	N/A	0.10 µg/L	0.0046 µg/L	0.10 µg/L
alpha-Chlordane	5103-71-9	1.9 µg/L	0.050 µg/L	N/A	0.050 µg/L	0.006 µg/L	0.050 µg/L
gamma-Chlordane	5103-74-2	1.9 µg/L	0.050 µg/L	N/A	0.050 µg/L	0.0034 µg/L	0.050 µg/L
Toxaphene	8001-35-2	0.61 µg/L	5.0 µg/L	N/A	5.0 µg/L	0.071 µg/L	5.0 µg/L
Aroclor-1016	12674-11-2	2.6 µg/L	1.0 µg/L	N/A	1.0 µg/L	0.17 µg/L	1.0 µg/L
Aroclor-1221	11104-28-2	0.33 µg/L	2.0 µg/L	N/A	2.0 µg/L	0.56 µg/L	2.0 µg/L
Aroclor-1232	11141-16-5	0.33 µg/L	1.0 µg/L	N/A	1.0 µg/L	0.17 µg/L	1.0 µg/L
Aroclor-1242	53469-21-9	0.33 µg/L	1.0 µg/L	N/A	1.0 µg/L	0.16 µg/L	1.0 µg/L
Aroclor-1248	12672-29-6	0.33 µg/L	1.0 µg/L	N/A	1.0 µg/L	0.29 µg/L	1.0 µg/L
Aroclor-1254	11097-69-1	0.33 µg/L	1.0 µg/L	N/A	1.0 µg/L	0.2 µg/L	1.0 µg/L
Aroclor-1260	11096-82-5	0.33 µg/L	1.0 µg/L	N/A	1.0 µg/L	0.17 µg/L	1.0 µg/L

¹ "RBC-Tap Water Adj X 10 for SW" is from Risk-Based Concentration Table, October 31, 2006, U.S. EPA Region III, Jennifer Hubbard and is subject to change when RBCs are updated.

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-19
Reference Limits and Evaluation Table

Matrix: Groundwater
 Analytical Group: TAL Metals/ Cyanide
 Concentration Level: Water (ILM04.1)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits		
				MDLs	Method QLs	IDLs ²	IDLs ²	QLs
Aluminum	7429-90-5	3700 µg/L	200 µg/L	N/A	200 µg/L	30.300 µg/L	15.247 µg/L	200 µg/L
Antimony	7440-36-0	1.5 µg/L	10 µg/L	N/A	60 µg/L	1.663 µg/L	2.133 µg/L	10 µg/L
Arsenic	7440-38-2	0.045 µg/L	10 µg/L	N/A	10 µg/L	2.104 µg/L	2.807 µg/L	10 µg/L
Barium	7440-39-3	730 µg/L	10 µg/L	N/A	200 µg/L	0.072 µg/L	0.111 µg/L	10 µg/L
Beryllium	7440-41-7	7.3 µg/L	5 µg/L	N/A	5 µg/L	0.255 µg/L	0.273 µg/L	5 µg/L
Cadmium	7440-43-9	1.8 µg/L	5 µg/L	N/A	5 µg/L	0.163 µg/L	0.425 µg/L	5 µg/L
Calcium	7440-70-2	N/A	5000 µg/L	N/A	5000 µg/L	10.343 µg/L	2.362 µg/L	5000 µg/L
Chromium	7440-47-3	11 µg/L	5 µg/L	N/A	10 µg/L	0.501 µg/L	0.499 µg/L	5 µg/L
Cobalt	7440-48-4	73 µg/L	5 µg/L	N/A	50 µg/L	0.369 µg/L	0.917 µg/L	5 µg/L
Copper	7440-50-8	150 µg/L	5 µg/L	N/A	25 µg/L	0.470 µg/L	0.491 µg/L	5 µg/L
Iron	7439-89-6	1100 µg/L	100 µg/L	N/A	100 µg/L	9.089 µg/L	15.276 µg/L	100 µg/L
Lead	7439-92-1	15 µg/L	3 µg/L	N/A	3 µg/L	1.199 µg/L	1.879 µg/L	3 µg/L
Magnesium	7439-95-4	N/A	5000 µg/L	N/A	5000 µg/L	2.792 µg/L	4.206 µg/L	5000 µg/L
Manganese	7439-96-5	73 µg/L	10 µg/L	N/A	15 µg/L	0.080 µg/L	0.138 µg/L	10 µg/L
Mercury	7439-97-6	1.1 µg/L	0.20 µg/L	N/A	0.2 µg/L	0.116 µg/L	N/A	0.20 µg/L
Nickel	7440-02-0	73 µg/L	5 µg/L	N/A	40 µg/L	.600 µg/L	1.30 µg/L	5 µg/L
Potassium	7440-09-7	N/A	5000 µg/L	N/A	5000 µg/L	8.299 µg/L	4.36 µg/L	5000 µg/L
Selenium	7782-49-2	18 µg/L	5 µg/L	N/A	5 µg/L	2.081 µg/L	2.136 µg/L	5 µg/L
Silver	7440-22-4	18 µg/L	5 µg/L	N/A	10 µg/L	0.380 µg/L	0.492 µg/L	5 µg/L
Sodium	7440-23-5	N/A	5000 µg/L	N/A	5000 µg/L	123.96 µg/L	78.495 µg/L	5000 µg/L
Thallium	7440-28-0	0.26 µg/L	10 µg/L	N/A	10 µg/L	3.350 µg/L	4.240 µg/L	10 µg/L
Vanadium	7440-62-2	3.7 µg/L	20 µg/L	N/A	50 µg/L	0.356 µg/L	0.385 µg/L	20 µg/L
Zinc	7440-66-6	1100 µg/L	20 µg/L	N/A	20 µg/L	0.322 µg/L	0.696 µg/L	20 µg/L
Cyanide	57-12-5	73 µg/L	10 µg/L	N/A	10 µg/L	2.49 µg/L	N/A	10 µg/L

¹ "RBC-Tap Water Adjusted" is from Risk-Based Concentration Table, October 31, 2006, U.S. EPA Region III, Jennifer Hubbard and is subject to change when RBCs are updated.

² Two different instruments may be used to report results. IDLs are provided instead of MDLs.

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-20
Reference Limits and Evaluation Table

Matrix: Surface Water
Analytical Group: TAL Metals/ Cyanide
Concentration Level: Water (ILM04.1)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits		
				MDLs	Method QLs	IDLs ²	IDLs ²	QLs
Aluminum	7429-90-5	37000 µg/L	200 µg/L	N/A	200 µg/L	30.300 µg/L	15.247 µg/L	200 µg/L
Antimony	7440-36-0	15 µg/L	10 µg/L	N/A	60 µg/L	1.663 µg/L	2.133 µg/L	10 µg/L
Arsenic	7440-38-2	0.45 µg/L	10 µg/L	N/A	10 µg/L	2.104 µg/L	2.807 µg/L	10 µg/L
Barium	7440-39-3	7300 µg/L	10 µg/L	N/A	200 µg/L	0.072 µg/L	0.111 µg/L	10 µg/L
Beryllium	7440-41-7	73 µg/L	5 µg/L	N/A	5 µg/L	0.255 µg/L	0.273 µg/L	5 µg/L
Cadmium	7440-43-9	18 µg/L	5 µg/L	N/A	5 µg/L	0.163 µg/L	0.425 µg/L	5 µg/L
Calcium	7440-70-2	N/A	5000 µg/L	N/A	5000 µg/L	10.343 µg/L	2.362 µg/L	5000 µg/L
Chromium	7440-47-3	110 µg/L	5 µg/L	N/A	10 µg/L	0.501 µg/L	0.499 µg/L	5 µg/L
Cobalt	7440-48-4	730 µg/L	5 µg/L	N/A	50 µg/L	0.369 µg/L	0.917 µg/L	5 µg/L
Copper	7440-50-8	1500 µg/L	5 µg/L	N/A	25 µg/L	0.470 µg/L	0.491 µg/L	5 µg/L
Iron	7439-89-6	11000 µg/L	100 µg/L	N/A	100 µg/L	9.089 µg/L	15.276 µg/L	100 µg/L
Lead	7439-92-1	15 µg/L	3 µg/L	N/A	3 µg/L	1.199 µg/L	1.879 µg/L	3 µg/L
Magnesium	7439-95-4	N/A	5000 µg/L	N/A	5000 µg/L	2.792 µg/L	4.206 µg/L	5000 µg/L
Manganese	7439-96-5	730 µg/L	10 µg/L	N/A	15 µg/L	0.080 µg/L	0.138 µg/L	10 µg/L
Mercury	7439-97-6	11 µg/L	0.20 µg/L	N/A	0.2 µg/L	0.116 µg/L	N/A	0.20 µg/L
Nickel	7440-02-0	730 µg/L	5 µg/L	N/A	40 µg/L	.600 µg/L	1.30 µg/L	5 µg/L
Potassium	7440-09-7	N/A	5000 µg/L	N/A	5000 µg/L	8.299 µg/L	4.36 µg/L	5000 µg/L
Selenium	7782-49-2	180 µg/L	5 µg/L	N/A	5 µg/L	2.081 µg/L	2.136 µg/L	5 µg/L
Silver	7440-22-4	180 µg/L	5 µg/L	N/A	10 µg/L	0.380 µg/L	0.492 µg/L	5 µg/L
Sodium	7440-23-5	N/A	5000 µg/L	N/A	5000 µg/L	123.96 µg/L	78.495 µg/L	5000 µg/L
Thallium	7440-28-0	2.6 µg/L	10 µg/L	N/A	10 µg/L	3.350 µg/L	4.240 µg/L	10 µg/L
Vanadium	7440-62-2	37 µg/L	20 µg/L	N/A	50 µg/L	0.356 µg/L	0.385 µg/L	20 µg/L
Zinc	7440-66-6	11000 µg/L	20 µg/L	N/A	20 µg/L	0.322 µg/L	0.696 µg/L	20 µg/L
Cyanide	57-12-5	730 µg/L	10 µg/L	N/A	10 µg/L	2.49 µg/L	N/A	10 µg/L

¹ "RBC-Tap Water Adj X 10 for SW" is from Risk-Based Concentration Table, October 31, 2006, U.S. EPA Region III. Jennifer Hubbard and is subject to change when RBCs are updated.

² Two different instruments may be used to report results. IDLs are provided instead of MDLs.

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-21
Reference Limits and Evaluation Table

Matrix: Groundwater
Analytical Group: Explosives
Concentration Level: Medium (various)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	180 µg/L	2.5 µg/L	N/A	13.0 µg/L	2.11 µg/L	2.5 µg/L
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	0.61 µg/L	2.5 µg/L	N/A	0.84 µg/L	0.95 µg/L	2.5 µg/L
1,3,5-Trinitrobenzene (1,3,5-TNB)	99-35-4	110 µg/L	2.5 µg/L	N/A	0.26 µg/L	1.3 µg/L	2.5 µg/L
1,3-Dinitrobenzene (1,3-DNB)	99-65-0	0.37 µg/L	2.5 µg/L	N/A	0.11 µg/L	1.19 µg/L	2.5 µg/L
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	479-45-8	15 µg/L	2.5 µg/L	N/A	4.0 µg/L	2.42 µg/L	2.5 µg/L
Nitrobenzene (NB)	98-95-3	0.35 µg/L	2.5 µg/L	N/A	6.4 µg/L	0.99 µg/L	2.5 µg/L
2,4,6-Trinitrotoluene (2,4,6-TNT)	118-96-7	1.8 µg/L	5 µg/L	N/A	0.11 µg/L	1.18 µg/L	5 µg/L
4-Amino-2,6-dinitrotoluene (4-Am-DNT)	1946-51-0	N/A	5 µg/L	N/A	0.060 µg/L	2.13 µg/L	5 µg/L
2-Amino-4,6-dinitrotoluene (2-Am-DNT)	35572-78-2	N/A	2.5 µg/L	N/A	0.035 µg/L	2.13 µg/L	2.5 µg/L
2,4-Dinitrotoluene (2,4-DNT)	121-14-2	7.3 µg/L	5 µg/L	N/A	0.020 µg/L	1.18 µg/L	5 µg/L
2,6-Dinitrotoluene (2,6-DNT)	606-20-2	3.7 µg/L	5 µg/L	N/A	0.31 µg/L	1.67 µg/L	5 µg/L
2-Nitrotoluene (2-NT)	88-72-2	6.1 µg/L	5 µg/L	N/A	12.0 µg/L	0.81 µg/L	5 µg/L
3-Nitrotoluene (3-NT)	99-08-1	12 µg/L	5 µg/L	N/A	8.5 µg/L	2.41 µg/L	5 µg/L
4-Nitrotoluene (4-NT)	99-99-0	0.62 µg/L	5 µg/L	N/A	7.9 µg/L	0.75 µg/L	5 µg/L
Nitroglycerin	55-63-0	62 µg/L	16 µg/L	N/A	N/A	0.53 µg/L	16 µg/L
Nitroguanidine	556-88-7	N/A	5 µg/L	N/A	N/A	1.9 µg/L	5 µg/L
Perchlorate	7601-90-3	N/A	0.10 µg/L	N/A	N/A	0.051 µg/L	0.10 µg/L

¹ "RBC-Tap Water Adjusted" is from Risk-Based Concentration Table, October 31, 2006, U.S. EPA Region III, Jennifer Hubbard and is subject to change when RBCs are updated.

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-22
Reference Limits and Evaluation Table

Matrix: Surface Water
Analytical Group: Explosives
Concentration Level: Medium (various)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	1800 µg/L	2.5 µg/L	N/A	13.0 µg/L	2.11 µg/L	2.5 µg/L
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	6.1 µg/L	2.5 µg/L	N/A	0.84 µg/L	0.95 µg/L	2.5 µg/L
1,3,5-Trinitrobenzene (1,3,5-TNB)	99-35-4	1100 µg/L	2.5 µg/L	N/A	0.26 µg/L	1.3 µg/L	2.5 µg/L
1,3-Dinitrobenzene (1,3-DNB)	99-65-0	3.7 µg/L	2.5 µg/L	N/A	0.11 µg/L	1.19 µg/L	2.5 µg/L
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	479-45-8	150 µg/L	2.5 µg/L	N/A	4.0 µg/L	2.42 µg/L	2.5 µg/L
Nitrobenzene (NB)	98-95-3	3.5 µg/L	2.5 µg/L	N/A	6.4 µg/L	0.99 µg/L	2.5 µg/L
2,4,6-Trinitrotoluene (2,4,6-TNT)	118-96-7	18 µg/L	5 µg/L	N/A	0.11 µg/L	1.18 µg/L	5 µg/L
4-Amino-2,6-dinitrotoluene (4-Am-DNT)	1946-51-0	N/A	5 µg/L	N/A	0.060 µg/L	2.13 µg/L	5 µg/L
2-Amino-4,6-dinitrotoluene (2-Am-DNT)	35572-78-2	N/A	2.5 µg/L	N/A	0.035 µg/L	2.13 µg/L	2.5 µg/L
2,4-Dinitrotoluene (2,4-DNT)	121-14-2	73 µg/L	5 µg/L	N/A	0.020 µg/L	1.18 µg/L	5 µg/L
2,6-Dinitrotoluene (2,6-DNT)	606-20-2	37 µg/L	5 µg/L	N/A	0.31 µg/L	1.67 µg/L	5 µg/L
2-Nitrotoluene (2-NT)	88-72-2	61 µg/L	5 µg/L	N/A	12.0 µg/L	0.81 µg/L	5 µg/L
3-Nitrotoluene (3-NT)	99-08-1	120 µg/L	5 µg/L	N/A	8.5 µg/L	2.41 µg/L	5 µg/L
4-Nitrotoluene (4-NT)	99-99-0	6.2 µg/L	5 µg/L	N/A	7.9 µg/L	0.75 µg/L	5 µg/L
Nitroglycerin	55-63-0	620 µg/L	16 µg/L	N/A	N/A	0.53 µg/L	16 µg/L
Nitroguanidine	556-88-7	N/A	5 µg/L	N/A	N/A	1.9 µg/L	5 µg/L
Perchlorate	7601-90-3	N/A	0.10 µg/L	N/A	N/A	0.051 µg/L	0.10 µg/L

¹ "RBC-Tap Water Adj X 10 for SW" is from Risk-Based Concentration Table, October 31, 2006, U.S. EPA Region III, Jennifer Hubbard and is subject to change when RBCs are updated.

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-23
Reference Limits and Evaluation Table

Matrix: Groundwater
 Analytical Group: Wet Chemistry
 Concentration Level: Medium (various)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
Hardness	HARDNESS	N/A	5.00 mg/L	N/A	N/A	1.034 mg/L	5.00 mg/L

¹ "RBC-Tap Water Adjusted" is from Risk-Based Concentration Table, October 31, 2006, U.S. EPA Region III, Jennifer Hubbard and is subject to change when RBCs are updated.

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-24
Reference Limits and Evaluation Table

Matrix: Surface Water
 Analytical Group: Wet Chemistry
 Concentration Level: Medium (various)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
Hardness	HARDNESS	N/A	5.00 mg/L	N/A	N/A	1.034 mg/L	5.00 mg/L

¹ "RBC-Tap Water Adj X 10 for SW" is from Risk-Based Concentration Table, October 31, 2006, U.S. EPA Region III, Jennifer Hubbard and is subject to change when RBCs are updated.

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-25
Reference Limits and Evaluation Table

Matrix: Ash
 Analytical Group: Dioxins/ Furans
 Concentration Level: Medium (various)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs ²	QLs
Total Tetrachlorodibenzo-p-dioxin (TCDD)	41903-57-5	N/A	1.0 µg/kg	N/A	1.0 µg/kg	N/A	1.0 µg/kg
Total Pentachlorodibenzo-p-dioxin (PeCDD)	36088-22-9	N/A	2.5 µg/kg	N/A	2.5 µg/kg	N/A	2.5 µg/kg
Total Hexachlorodibenzo-p-dioxin (HxCDD)	34465-46-8	N/A	2.5 µg/kg	N/A	2.5 µg/kg	N/A	2.5 µg/kg
Total Heptachlorodibenzo-p-dioxin (HpCDD)	37871-00-4	N/A	2.5 µg/kg	N/A	2.5 µg/kg	N/A	2.5 µg/kg
Total Tetrachlorodibenzofuran (TCDF)	55722-27-5	N/A	1.0 µg/kg	N/A	1.0 µg/kg	N/A	1.0 µg/kg
Total Pentachlorodibenzofuran (PeCDF)	30402-15-4	N/A	2.5 µg/kg	N/A	2.5 µg/kg	N/A	2.5 µg/kg
Total Hexachlorodibenzofuran (HxCDF)	55684-94-1	N/A	2.5 µg/kg	N/A	2.5 µg/kg	N/A	2.5 µg/kg
Total Heptachlorodibenzofuran (HpCDF)	38998-75-3	N/A	2.5 µg/kg	N/A	2.5 µg/kg	N/A	2.5 µg/kg

¹ "RBC-Soil Residential Adjusted" is from Risk-Based Concentration Table, October 31, 2006, U.S. EPA Region III, Jennifer Hubbard and is subject to change when RBCs are updated.

² MDLs are not applicable for Total Dioxins/Furans.

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-26
Reference Limits and Evaluation Table

Matrix: Water (QC)

Analytical Group: Dioxins/ Furans

Concentration Level: Medium (various)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs ²	QLs
Total Tetrachlorodibenzo-p-dioxin (TCDD)	41903-57-5	N/A	10 ng/L	N/A	10 ng/L	N/A	10 ng/L
Total Pentachlorodibenzo-p-dioxin (PeCDD)	36088-22-9	N/A	25 ng/L	N/A	25 ng/L	N/A	25 ng/L
Total Hexachlorodibenzo-p-dioxin (HxCDD)	34465-46-8	N/A	25 ng/L	N/A	25 ng/L	N/A	25 ng/L
Total Heptachlorodibenzo-p-dioxin (HpCDD)	37871-00-4	N/A	25 ng/L	N/A	25 ng/L	N/A	25 ng/L
Total Tetrachlorodibenzofuran (TCDF)	55722-27-5	N/A	10 ng/L	N/A	10 ng/L	N/A	10 ng/L
Total Pentachlorodibenzofuran (PeCDF)	30402-15-4	N/A	25 ng/L	N/A	25 ng/L	N/A	25 ng/L
Total Hexachlorodibenzofuran (HxCDF)	55684-94-1	N/A	25 ng/L	N/A	25 ng/L	N/A	25 ng/L
Total Heptachlorodibenzofuran (HpCDF)	38998-75-3	N/A	25 ng/L	N/A	25 ng/L	N/A	25 ng/L

¹ "RBC-Soil Residential Adjusted" is from Risk-Based Concentration Table, October 31, 2006, U.S. EPA Region III, Jennifer Hubbard and is subject to change when RBCs are updated.

² MDLs are not applicable for Total Dioxins/Furans.

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-27
Reference Limits and Evaluation Table

Matrix: Solid and Liquid IDW

Analytical Group: TCLP Volatiles

Concentration Level: Medium (SW-846 1311, SW-846 8260B)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
1,1-Dichloroethene	75-35-4	0.7 mg/L	0.025 mg/L	N/A	N/A	0.00027 mg/L	0.025 mg/L
1,2-Dichloroethane	107-06-2	0.5 mg/L	0.025 mg/L	N/A	N/A	0.00025 mg/L	0.025 mg/L
1,4-Dichlorobenzene	106-46-7	7.5 mg/L	0.025 mg/L	N/A	N/A	0.00072 mg/L	0.025 mg/L
2-Butanone	78-93-3	200 mg/L	0.0625 mg/L	N/A	N/A	0.00182 mg/L	0.0625 mg/L
Benzene	71-43-2	0.5 mg/L	0.025 mg/L	N/A	N/A	0.0012 mg/L	0.025 mg/L
Carbon Tetrachloride	56-23-5	0.5 mg/L	0.025 mg/L	N/A	N/A	0.0037 mg/L	0.025 mg/L
Chlorobenzene	108-90-7	100 mg/L	0.025 mg/L	N/A	N/A	0.00024 mg/L	0.025 mg/L
Chloroform	67-66-3	6 mg/L	0.025 mg/L	N/A	N/A	0.00021 mg/L	0.025 mg/L
Tetrachloroethene	127-18-4	0.5 mg/L	0.025 mg/L	N/A	N/A	0.00044 mg/L	0.025 mg/L
Trichloroethene	79-01-6	0.5 mg/L	0.025 mg/L	N/A	N/A	0.00036 mg/L	0.025 mg/L
Vinyl Chloride	75-01-4	0.2 mg/L	0.025 mg/L	N/A	N/A	0.00051 mg/L	0.025 mg/L

¹ Toxicity Characteristic Level is from 40 CFR 261.24

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-28
Reference Limits and Evaluation Table

Matrix: Solid and Liquid IDW

Analytical Group: TCLP Semivolatiles

Concentration Level: Medium (SW-846 1311, SW-846 8270C)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
1,4-Dichlorobenzene	106-46-7	7.5 mg/L	1.65 mg/L	N/A	N/A	0.22239 mg/L	1.65 mg/L
2,4,5-Trichlorophenol	95-95-4	400 mg/L	1.65 mg/L	N/A	N/A	0.03173 mg/L	1.65 mg/L
2,4,6-Trichlorophenol	88-06-2	2 mg/L	1.65 mg/L	N/A	N/A	0.05443 mg/L	1.65 mg/L
2,4-Dinitrotoluene	121-14-2	0.13 mg/L	3.30 mg/L	N/A	N/A	0.55227 mg/L	3.30 mg/L
2-Methylphenol	95-48-7	200 mg/L	1.65 mg/L	N/A	N/A	0.03962 mg/L	1.65 mg/L
3&4-Methylphenol	106-44-5	200 mg/L	3.30 mg/L	N/A	N/A	0.09235 mg/L	3.30 mg/L
Hexachlorobenzene	118-74-1	0.13 mg/L	1.65 mg/L	N/A	N/A	0.05394 mg/L	1.65 mg/L
Hexachlorobutadiene	87-68-3	0.5 mg/L	1.65 mg/L	N/A	N/A	0.03031 mg/L	1.65 mg/L
Hexachloroethane	67-72-1	3 mg/L	1.65 mg/L	N/A	N/A	0.02093 mg/L	1.65 mg/L
Nitrobenzene	98-95-3	2 mg/L	1.65 mg/L	N/A	N/A	0.04300 mg/L	1.65 mg/L
Pentachlorophenol	87-86-5	100 mg/L	3.30 mg/L	N/A	N/A	0.03091 mg/L	3.30 mg/L
Pyridine	110-86-1	5 mg/L	1.65 mg/L	N/A	N/A	0.15192 mg/L	1.65 mg/L

¹ Toxicity Characteristic Level is from 40 CFR 261.24

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-29
Reference Limits and Evaluation Table

Matrix: Solid and Liquid IDW

Analytical Group: TCLP Pesticides

Concentration Level: Medium (SW-846 1311, SW-846 8081A)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
Chlordane	57-74-0	0.03 mg/L	0.004 mg/L	N/A	N/A	TBD	0.004 mg/L
Endrin	72-20-8	0.02 mg/L	0.00025 mg/L	N/A	N/A	0.000056 mg/L	0.00025 mg/L
gamma-BHC (Lindane)	58-89-9	0.4 mg/L	0.000625 mg/L	N/A	N/A	0.000058 mg/L	0.000625 mg/L
Heptachlor	76-44-8	0.008 mg/L	0.000625 mg/L	N/A	N/A	0.000045 mg/L	0.000625 mg/L
Methoxychlor	72-43-5	10 mg/L	0.000625 mg/L	N/A	N/A	0.0000302 mg/L	0.000625 mg/L
Toxaphene	8001-35-2	0.5 mg/L	0.0125 mg/L	N/A	N/A	TBD	0.0125 mg/L

¹ Toxicity Characteristic Level is from 40 CFR 261.24

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-30
Reference Limits and Evaluation Table

Matrix: Solid and Liquid IDW

Analytical Group: TCLP Herbicides

Concentration Level: Medium (SW-846 1311, SW-846 8151A)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
2,4,5-TP (Silvex)	93-72-1	1 mg/L	0.0005 mg/L	N/A	N/A	0.00019 mg/L	0.0005 mg/L
2,4-D	94-75-7	10 mg/L	0.025 mg/L	N/A	N/A	0.00065 mg/L	0.025 mg/L

¹ Toxicity Characteristic Level is from 40 CFR 261.24

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-31
Reference Limits and Evaluation Table

Matrix: Solid and Liquid IDW
 Analytical Group: TCLP Metals
 Concentration Level: Medium (SW-846 1311, SW-846 6010B)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	IDLs ²	QLs
Arsenic	7440-38-2	5 mg/L	2.5 mg/L	N/A	N/A	0.0029 mg/L	2.5 mg/L
Barium	7440-39-3	100 mg/L	50 mg/L	N/A	N/A	0.0002 mg/L	50 mg/L
Cadmium	7440-43-9	1 mg/L	0.5 mg/L	N/A	N/A	0.0005 mg/L	0.5 mg/L
Chromium	7440-47-3	5 mg/L	2.5 mg/L	N/A	N/A	0.0005 mg/L	2.5 mg/L
Lead	7439-92-1	5 mg/L	2.5 mg/L	N/A	N/A	0.0019 mg/L	2.5 mg/L
Selenium	7782-49-2	1 mg/L	0.5 mg/L	N/A	N/A	0.0022 mg/L	0.5 mg/L
Silver	7440-22-4	5 mg/L	0.5 mg/L	N/A	N/A	0.0005 mg/L	0.5 mg/L
Mercury	7439-97-6	0.2 mg/L	0.1 mg/L	N/A	N/A	0.0001 mg/L	0.1 mg/L

¹ Toxicity Characteristic Level is from 40 CFR 261.24

² IDLs are provided instead of MDLs.

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-32
Reference Limits and Evaluation Table

Matrix: Solid and Liquid IDW

Analytical Group: Reactivity

Concentration Level: Medium (SW-846 1311, SW-846 9014, SW-846 9034)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
Reactive Cyanide	57-12-5	250 mg/kg	125 mg/kg	N/A	N/A	TBD	125 mg/kg
Reactive Sulfide	18496-25-8	500 mg/kg	62.5 mg/kg	N/A	N/A	TBD	62.5 mg/kg

¹ Reactivity limit is from 40 CFR 261.23

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-33
Reference Limits and Evaluation Table

Matrix: Solid and Liquid IDW

Analytical Group: Corrosivity

Concentration Level: Medium (SW-846 9045C)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
pH	PH	2<pH<12.5	0<pH<14	N/A	N/A	N/A	0<pH<14

¹ Corrosivity limit is from 40 CFR 261.23

Shading represents Project Action Limits which are below Project Quantitation Limits.

QAPP Worksheet #15-34
Reference Limits and Evaluation Table

Matrix: Solid and Liquid IDW

Analytical Group: Ignitability

Concentration Level: Medium (Pensky Martens)

Analyte	CAS Number	Project Action Limit ¹	Project Quantitation Limit	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs	MDLs	QLs
Ignitability	IGN	140°F	140°F	N/A	N/A	N/A	140°F

¹ Ignitability limit is from 40 CFR 261.23

Shading represents Project Action Limits which are below Project Quantitation Limits.

**QAPP Worksheet #16
 (UFP-QAPP Manual Section 2.8.2)
 Project Schedule/Timeline Table**

List all project activities as well as the QA assessments that will be performed during the course of the project. Include the anticipated start and completion dates.

Worksheet Not Applicable (State Reason)

Project Schedule Timeline Table					
Dates (MM/DD/YYYY)					
Activities	Organization	Anticipated Date(s) of Initiation	Anticipated Date of Completion	Deliverable	Deliverable Due Date
Subcontracting/ Field Work Preparation	CH2M HILL	02/26/2007	03/16/2007	N/A	N/A
Field Sampling	CH2M HILL	03/19/2007	04/21/2007	N/A	N/A
Laboratory Analysis / Data Validation / Data Loading	Subcontracted Laboratory and CH2M HILL	04/23/2007	07/30/2007	Laboratory Analytical Results	07/30/2007

This project schedule is based on the February 5, 2007, Microsoft Project schedule, which is tentative and subject to change. As the project progresses, this schedule will be updated, as necessary.

QAPP Worksheet #17 (UFP-QAPP Section 3.1.1) Sampling Design and Rationale

Describe the project sampling approach. Provide the rationale for selecting sample locations and matrices for each analytical group and concentration level.

Worksheet Not Applicable (State Reason)

Describe and provide a rationale for choosing the sampling approach (e.g., grid system, biased statistical approach):

The sampling design and rationale was based on observations made during the October 11, 2006, site visit and also discussed during the November 8, 2006, Project Scoping Session (Worksheet #9). Sample locations are based on materials observed at the site; additional samples will be collected based on field observations. See Worksheets #18 and #19 for details of sample locations, and Figure 3, Proposed Sample Locations, in Attachment 1.

Describe the sampling design and rationale in terms of what matrices will be sampled, what analytical groups will be analyzed and at what concentration levels, the sampling locations (including QC, critical, and background samples), the number of samples to be taken, and the sampling frequency (including seasonal considerations) [May refer to map or Worksheet #18 for details]:

The information is provided in Worksheet #18.

QAPP Worksheet #18
(UFP-QAPP Manual Section 3.1.1)
Sampling Locations and Methods/SOP Requirements Table

List all site locations that will be sampled and include sample/ID number, if available. (Provide a range of sampling locations or ID numbers if a site has a large number.) Specify matrix and, if applicable, depth at which samples will be taken. Only a short reference for the sampling location rationale is necessary for the table. The text of the QAPP should clearly identify the detailed rationale associated with each reference. Complete all required information, using additional worksheets if necessary.

Worksheet Not Applicable (State Reason)

Sampling Locations and Methods/SOP Requirements Table							
Sampling Location/ID Number	Matrix	Depth (ft bgs)	Analytical Group	Concentration Level	Number of Samples (identify field duplicates)	Sampling SOP Reference ¹	Rationale for Sampling Location
IS66SS01 IS66SB01 IS66GW01	Surface Soil, Subsurface soil and Groundwater	Depends on site conditions	See Worksheet #19	See Worksheet #19	See Worksheets #14 and #20	SOPs SA-1.1, SA-1.3 and SA-2.5	October 2006 site visit observations; upgradient location
IS66SS02 IS66SB02 IS66GW02	Surface Soil, Subsurface soil and Groundwater	Depends on site conditions	See Worksheet #19	See Worksheet #19	See Worksheets #14 and #20	SOPs SA-1.1, SA-1.3 and SA-2.5	October 2006 site visit and field determinations (tires, bottles, appliances, copper, transite)
IS66SS03 IS66SB03 IS66GW03	Surface Soil, Subsurface soil and Groundwater	Depends on site conditions	See Worksheet #19	See Worksheet #19	See Worksheets #14 and #20	SOPs SA-1.1, SA-1.3 and SA-2.5	October 2006 site visit and field determinations (concrete, metal sheeting, lead flooring, creosote telephone poles)
IS66SS04 IS66SB04 IS66GW04	Surface Soil, Subsurface soil and Groundwater	Depends on site conditions	See Worksheet #19	See Worksheet #19	See Worksheets #14 and #20	SOPs SA-1.1, SA-1.3 and SA-2.5	October 2006 site visit and field determinations (piles of copper debris)

QAPP Worksheet #18
(UFP-QAPP Manual Section 3.1.1)
Sampling Locations and Methods/SOP Requirements Table

Sampling Locations and Methods/SOP Requirements Table							
Sampling Location/ID Number	Matrix	Depth (ft bgs)	Analytical Group	Concentration Level	Number of Samples (identify field duplicates)	Sampling SOP Reference¹	Rationale for Sampling Location
IS66SS05 IS66SB05 IS66GW05	Surface Soil, Subsurface soil and Groundwater	Depends on site conditions	See Worksheet #19	See Worksheet #19	See Worksheets #14 and #20	SOPs SA-1.1, SA-1.3 and SA-2.5	October 2006 site visit and field determinations (ash)
IS66SS06 IS66SB06 IS66GW06	Surface Soil, Subsurface soil and Groundwater	Depends on site conditions	See Worksheet #19	See Worksheet #19	See Worksheets #14 and #20	SOPs SA-1.1, SA-1.3 and SA-2.5	October 2006 site visit and field determinations (laboratory bottles)
IS66SS07 IS66SB07 IS66GW07	Surface Soil, Subsurface soil and Groundwater	Depends on site conditions	See Worksheet #19	See Worksheet #19	See Worksheets #14 and #20	SOPs SA-1.1, SA-1.3 and SA-2.5	October 2006 site visit and field determinations (downgradient)
IS66SS08 IS66SB08 IS66GW08	Surface Soil, Subsurface soil and Groundwater	Depends on site conditions	See Worksheet #19	See Worksheet #19	See Worksheets #14 and #20	SOPs SA-1.1, SA-1.3 and SA-2.5	October 2006 site visit and field determinations (metal debris, ash)
IS66SS09 IS66SB09 IS66GW09	Surface Soil, Subsurface soil and Groundwater	Depends on site conditions	See Worksheet #19	See Worksheet #19	See Worksheets #14 and #20	SOPs SA-1.1, SA-1.3 and SA-2.5	October 2006 site visit and field determinations (downgradient)
IS66SS10 IS66SB10 IS66GW10	Surface Soil, Subsurface soil and Groundwater	Depends on site conditions	See Worksheet #19	See Worksheet #19	See Worksheets #14 and #20	SOPs SA-1.1, SA-1.3 and SA-2.5	October 2006 site visit and field determinations (undisturbed area)

QAPP Worksheet #18
(UFP-QAPP Manual Section 3.1.1)
Sampling Locations and Methods/SOP Requirements Table

Sampling Locations and Methods/SOP Requirements Table							
Sampling Location/ID Number	Matrix	Depth (ft bgs)	Analytical Group	Concentration Level	Number of Samples (identify field duplicates)	Sampling SOP Reference¹	Rationale for Sampling Location
IS66SS11	Surface Soil	0-0.5 ft bgs or depends on site conditions	See Worksheet #19	See Worksheet #19	See Worksheets #14 and #20	SOP SA-2.5	October 2006 site visit and field determinations (concrete rubble)
IS66SS12	Surface Soil	0-0.5 ft bgs or depends on site conditions	See Worksheet #19	See Worksheet #19	See Worksheets #14 and #20	SOP SA-2.5	October 2006 site visit and field determinations (land clearing debris, concrete, trash cans)
IS66SS13	Surface Soil	0-0.5 ft bgs or depends on site conditions	See Worksheet #19	See Worksheet #19	See Worksheets #14 and #20	SOP SA-2.5	October 2006 site visit and field determinations (empty 5-gallon containers)
IS66SS14	Surface Soil	0-0.5 ft bgs or depends on site conditions	See Worksheet #19	See Worksheet #19	See Worksheets #14 and #20	SOP SA-2.5	October 2006 site visit and field determinations (metal debris, ash)
IS66SS15	Surface Soil	0-0.5 ft bgs or depends on site conditions	See Worksheet #19	See Worksheet #19	See Worksheets #14 and #20	SOP SA-2.5	October 2006 site visit and field determinations (lead flooring, metal debris, tires)
IS66SS16	Surface Soil	0-0.5 ft bgs or depends on site conditions	See Worksheet #19	See Worksheet #19	See Worksheets #14 and #20	SOP SA-2.5	To be determined based on field conditions
IS66SS17	Surface Soil	0-0.5 ft bgs or depends on site conditions	See Worksheet #19	See Worksheet #19	See Worksheets #14 and #20	SOP SA-2.5	To be determined based on field conditions

QAPP Worksheet #18
(UFP-QAPP Manual Section 3.1.1)
Sampling Locations and Methods/SOP Requirements Table

Sampling Locations and Methods/SOP Requirements Table							
Sampling Location/ID Number	Matrix	Depth (ft bgs)	Analytical Group	Concentration Level	Number of Samples (identify field duplicates)	Sampling SOP Reference¹	Rationale for Sampling Location
IS66SS18	Surface Soil	0-0.5 ft bgs or depends on site conditions	See Worksheet #19	See Worksheet #19	See Worksheets #14 and #20	SOP SA-2.5	To be determined based on field conditions
IS66SS19	Surface Soil	0-0.5 ft bgs or depends on site conditions	See Worksheet #19	See Worksheet #19	See Worksheets #14 and #20	SOP SA-2.5	To be determined based on field conditions
IS66SS20	Surface Soil	0-0.5 ft bgs or depends on site conditions	See Worksheet #19	See Worksheet #19	See Worksheets #14 and #20	SOP SA-2.5	To be determined based on field conditions
IS66SW01 IS66SD01	Surface Water and Sediment	Depends on site conditions	See Worksheet #19	See Worksheet #19	See Worksheets #14 and #20	SOP SA-1.2	October 2006 site visit and field determinations (upgradient)
IS66SW02 IS66SD02	Surface Water and Sediment	Depends on site conditions	See Worksheet #19	See Worksheet #19	See Worksheets #14 and #20	SOP SA-1.2	October 2006 site visit and field determinations (see Figure 3)
IS66SW03 IS66SD03	Surface Water and Sediment	Depends on site conditions	See Worksheet #19	See Worksheet #19	See Worksheets #14 and #20	SOP SA-1.2	October 2006 site visit and field determinations (see Figure 3)
IS66SW04 IS66SD04	Surface Water and Sediment	Depends on site conditions	See Worksheet #19	See Worksheet #19	See Worksheets #14 and #20	SOP SA-1.2	October 2006 site visit and field determinations (see Figure 3)
IS66SW05 IS66SD05	Surface Water and Sediment	Depends on site conditions	See Worksheet #19	See Worksheet #19	See Worksheets #14 and #20	SOP SA-1.2	October 2006 site visit and field determinations (see Figure 3)

QAPP Worksheet #18
(UFP-QAPP Manual Section 3.1.1)
Sampling Locations and Methods/SOP Requirements Table

Sampling Locations and Methods/SOP Requirements Table							
Sampling Location/ID Number	Matrix	Depth (ft bgs)	Analytical Group	Concentration Level	Number of Samples (identify field duplicates)	Sampling SOP Reference¹	Rationale for Sampling Location
IS66AH01	Ash	Depends on site conditions	See Worksheet #19	See Worksheet #19	See Worksheets #14 and #20	SOP SA-1.3	To be determined based on field conditions
IS66AH02	Ash	Depends on site conditions	See Worksheet #19	See Worksheet #19	See Worksheets #14 and #20	SOP SA-1.3	To be determined based on field conditions
IS66AH03	Ash	Depends on site conditions	See Worksheet #19	See Worksheet #19	See Worksheets #14 and #20	SOP SA-1.3	To be determined based on field conditions

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

SOPs can be found in the *Facility Standard Operating Procedures for Installation Restoration Program Environmental Investigations at Naval District Washington, Indian Head, Indian Head, Maryland, June 2004.*

**QAPP Worksheet #19
 (UFP-QAPP Manual Section 3.1.1)
 Analytical SOP Requirements Table**

For each matrix, analytical group, and concentration level, list the analytical and preparation method/SOP and associated sample volume, container specifications, preservation requirements, and maximum holding time.

Worksheet Not Applicable (State Reason)

Matrix	Analytical Group	Concentration Level	Analytical and Preparation Method/SOP Reference ¹	Sample Volume	Containers (number, size, and type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/ analysis)
SS/SB/SD	TCL Volatiles	Low Soil (OLM04.3)	EPA CLP OLM04.3/ 1.1.4.1, 1.2.1.3, 1.2.3.2	5g	3 of 5g EnCores	Cool to 4C	48 hrs/ 14 days
SS/SB/SD	TCL Semivolatiles	Low Soil (OLM04.3)	EPA CLP OLM04.3/ 2.4.3.2, 2.4.3.4, 2.6.3	30g	1 of 8 oz glass jar	Cool to 4C	7 days/ 40 days
SS/SB/SD	TCL Pesticides/Aroclors	Soil (OLM04.3)	EPA CLP OLM04.3/ 2.1.1.2, 2.1.1.6, 2.1.1.5, 2.6.1, 2.6.5	30g	1 of 8 oz glass jar	Cool to 4C	7 days/ 40 days
SS/SB/SD	TAL Metals/Cyanide	Medium (ILM04.1)	EPA CLP ILM04.3/ 3.1.1.3, 3.1.1.4, 3.4.3, 3.4.5, 3.3.3, 3.3.4	1.0g	1 of 4 oz glass jar	Cool to 4C	6 months/ 28 days/ 14 days
SS/SB/SD	Explosives	Medium (SW-846 8330)	SW-846 8330/ 2.3.2.2, 2.3.2.4	2g	1 of 8 oz glass jar	Cool to 4C	7 days/ 40 days
SS/SB/SD	Explosives	Medium (SW-846 8332)	SW-846 8332, 2.3.2.5, 2.3.2.2	2g	1 of 8 oz glass jar	Cool to 4C	7 days/ 40 days
SS/SB/SD	Explosives	Medium (USACOE 89-35)	USACOE 89-35/ SOC-NITG	2g	1 of 8 oz glass jar	Cool to 4C	7 days/ 40 days
SS/SB/SD	Explosives	Medium (SW-846 6850)	SW-846 6850/ HPLC-DoD Perchlorate	1g	1 of 4 oz glass jar	Cool to 4C	28 days
SS/SB/SD	Wet Chemistry	Medium (Lloyd Kahn)	Lloyd Kahn/ 3.6.2.2	0.010g	1 of 4 oz glass jar	Cool to 4C	28 days
SS/SB/SD	Wet Chemistry	Medium (SW-846 9045C)	SW-846 9045C/ 3.5.14.3	0.010g	1 of 4 oz glass jar	Cool to 4C	28 days

QAPP Worksheet #19
(UFP-QAPP Manual Section 3.1.1)
Analytical SOP Requirements Table

Matrix	Analytical Group	Concentration Level	Analytical and Preparation Method/SOP Reference ¹	Sample Volume	Containers (number, size, and type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/ analysis)
GW/SW	TCL Volatiles	Water (OLM04.3)	EPA CLP OLM04.3/ 1.2.3.3	5mL	3 of 40 mL VOA vial	HCL to pH<2, Cool to 4C	14 days
GW/SW	TCL Semivolatiles	Water (OLM04.3)	EPA CLP OLM04.3/ 2.4.3.1, 2.4.3.4	1000mL	2 of 1L amber	Cool to 4C	7 days/ 40 days
GW/SW	TCL Pesticides/Aroclors	Water (OLM04.3)	EPA CLP OLM04.3/ 2.2.1.1, 2.1.1.6, 2.6.1, 2.6.5	1000mL	2 of 1L amber	Cool to 4C	7 days 40 days
GW/SW	TAL Metals/Cyanide	Water (ILM04.1)	EPA CLP ILM04.1/ 3.1.1.2, 3.1.1.4, 3.4.1, 3.4.5, 3.3.1, 3.3.4	50mL	1 of 1L poly	HNO3 to pH<2, Cool to 4C	6 months/28 days
GW/SW	TAL Metals/Cyanide	Water (ILM04.1)	EPA CLP ILM04.1/ 3.1.1.2, 3.1.1.4, 3.4.1, 3.4.5, 3.3.1, 3.3.4	50mL	1 of 1L poly	NaOH to pH>12, Cool to 4C	14 days
GW/SW	TAL Filtered Metals	Water (ILM04.1)	EPA CLP ILM04.1/ 3.1.1.2, 3.1.1.4, 3.3.1, 3.3.4	50mL	1 of 1L poly	HNO3 to pH<2, Cool to 4C	6 months/28 days
GW/SW	Explosives	Medium (SW-846 8330)	SW-846 8330/ 2.3.2.1, 2.3.2.4	500mL	1 of 1L amber	Cool to 4C	7 days/ 40 days
GW/SW	Explosives	Medium (SW-846 8332)	SW-846 8332/ 2.3.2.5, 2.3.3.6	500mL	1 of 1L amber	Cool to 4C	7 days/ 40 days
GW/SW	Explosives	Medium (USACOE 89-35)	USACOE 89-35/ SOC-NITG	500mL	1 of 1L amber	Cool to 4C	7 days/ 40 days
GW/SW	Explosives	Medium (SW-846 6850)	SW-846 6850/ HPLC-DoD Perchlorate	10.0mL	1 of 125 mL poly	Cool to 4C	28 days
GW/SW	Wet Chemistry	Medium (EPA 130.2)	EPA 130.2/ 3.5.7.1	10mL	1 of 250 mL poly	HNO3 to pH<2, Cool to 4C	6 months

**QAPP Worksheet #19
 (UFP-QAPP Manual Section 3.1.1)
 Analytical SOP Requirements Table**

Matrix	Analytical Group	Concentration Level	Analytical and Preparation Method/SOP Reference ¹	Sample Volume	Containers (number, size, and type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/ analysis)
ASH	Dioxins/Furans	Medium (SW-846 8280A)	SW-846 8280A/ HRMS-8280A	30g	1 of 8 oz glass jar	Cool to 4C	7 days/ 40 days
Solid IDW	TCLP Volatiles	Medium (SW-846 1311, SW-846 8260B)	SW-846 1311, SW-846 8260B/ 2.7.3, 1.3.2.2	5g	1 of 2 oz glass jar	Cool to 4C	14 days
Solid IDW	TCLP Semivolatiles	Medium (SW-846 1311, SW-846 8270C)	SW-846 1311, SW-846 8270C/ 2.7.2, 2.5.2.7, 2.5.2.2)	30g	1 of 8 oz glass jar	Cool to 4C	7 days 40 days
Solid IDW	TCLP Pesticides	Medium (SW-846 1311, SW-846 8081A)	SW-846 1311, SW-846 8081A/ 2.7.2, 2.2.4.3, 2.2.4.10	30g	1 of 8 oz glass jar	Cool to 4C	7 days/ 40 days
Solid IDW	TCLP Herbicides	Medium (SW-846 1311, SW-846 8151A)	SW-846 1311, SW-846 8151A/ 2.7.2, 2.2.7.3, 2.2.7.4	30g	1 of 8 oz glass jar	Cool to 4C	7 days 40 days
Solid IDW	TCLP Metals	Medium (SW-846 1311, SW-846 6010B)	SW-846 1311, SW-846 6010B/ 2.7.2, 3.2.1.4, 3.2.1.6	30g	1 of 4 oz glass jar	Cool to 4C	6 months/ 28 days/ 14 days
Solid IDW	Reactivity	Medium (SW-846 9014, SW-846 9034)	SW-846 9014, SW-846 9034, 3.5.18.1, 3.4.4	30g	1 of 8 oz glass jar	Cool to 4C	28 days
Solid IDW	Corrosivity	Medium (SW-846 9045C)	SW-846 9045C/ 3.5.14.3	30g	1 of 8 oz glass jar	Cool to 4C	ASAP
Solid IDW	Ignitability	Medium (Pensky Martens)	Pensky Martens/ 3.5.9.1	30g	1 of 8 oz glass jar	Cool to 4C	ASAP
Liquid IDW	TCLP Volatiles	Medium (SW-846 1311, SW-846 8260B)	SW-846 1311, SW-846 8260B/ 2.7.3, 1.3.2.2	5g	1 of 1L amber	Cool to 4C	14 days

QAPP Worksheet #19
(UFP-QAPP Manual Section 3.1.1)
Analytical SOP Requirements Table

Matrix	Analytical Group	Concentration Level	Analytical and Preparation Method/SOP Reference ¹	Sample Volume	Containers (number, size, and type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/analysis)
Liquid IDW	TCLP Semivolatiles	Medium (SW-846 1311, SW-846 8270C)	SW-846 1311, SW-846 8270C/ 2.7.6, 2.5.2.2, 2.5.2.7	30g	1 of 1L amber	Cool to 4C	7 days/ 40 days
Liquid IDW	TCLP Pesticides	Medium (SW-846 1311, SW-846 8081A)	SW-846 1311, SW-846 8081A/ 2.7.6, 2.2.4.3, 2.2.4.10	30g	1 of 1L amber	Cool to 4C	7 days/ 40 days
Liquid IDW	TCLP Herbicides	Medium (SW-846 1311, SW-846 8151A)	SW-846 1311, SW-846 8151A/ 2.7.6, 2.2.7.1, 2.2.7.4	30g	1 of 1L amber	Cool to 4C	7 days/ 40 days
Liquid IDW	TCLP Metals	Medium (SW-846 1311, SW-846 6010B)	SW-846 1311, SW-846 6010B, 2.7.6, 3.2.1.4, 3.2.1.7	30g	1 of 1L amber	Cool to 4C	6 months/ 28 days/ 14 days
Liquid IDW	Reactivity	Medium (SW-846 9014, SW-846 9034)	SW-846 9014, SW-846 9034/ 3.5.18.1, 3.4.4	30g	1 of 500 mL poly	Cool to 4C	28 days
Liquid IDW	Corrosivity	Medium (SW-846 9045C)	SW-846 9045C/ 3.5.14.3	30g	1 of 250 mL poly	Cool to 4C	ASAP
Liquid IDW	Ignitability	Medium (Pensky Martens)	Pensky Martens/ 3.5.9.1	30g	1 of 500 mL poly	Cool to 4C	ASAP

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

QAPP Worksheet #20
(UFP-QAPP Manual Section 3.1.1)
Field Quality Control Sample Summary Table

Summarize by matrix, analytical group, and concentration level the number of field QC samples that will be collected and sent to the laboratory.

Worksheet Not Applicable (State Reason)

Matrix	Analytical Group	Concentration Level	Analytical and Preparation SOP Reference ¹	No. of Sampling Locations	No. of Field Duplicates	No. of MS/MSDs	No. of Field Blanks	No. of Equip. Blanks	No. of Trip Blanks	Total No. of Samples to Lab
SS/SB/SD	TCL Volatiles	Low Soil (OLM04.3)	EPA CLP OLM04.3 / 1.1.4.1, 1.2.1.3, 1.2.3.2	35	4	3/3	1	5	4	55
SS/SB/SD	TCL Semivolatiles	Low Soil (OLM04.3)	EPA CLP OLM04.3 / 2.4.3.2, 2.4.3.4, 2.6.3	35	4	3/3	1	5	0	51
SS/SB/SD	TCL Pesticides/Aroclors	Soil (OLM04.3)	EPA CLP OLM04.3 / 2.1.1.2, 2.1.1.6, 2.1.1.5, 2.6.1, 2.6.5	35	4	3/3	1	5	0	51
SS/SB/SD	TAL Metals/Cyanide	Soil (ILM04.1)	EPA CLP ILM04.1 / 3.1.1.3, 3.1.1.4, 3.4.3, 3.4.5, 3.3.3, 3.3.4	35	4	3/3	1	5	0	51
SS/SB/SD	Explosives	Medium (SW-846 8330)	SW-846 8330 / 2.3.2.2, 2.3.2.4	35	4	3/3	1	5	0	51
SS/SB/SD	Explosives	Medium (SW-846 8332)	SW-846 8332 / 2.3.2.5, 2.3.2.2	35	4	3/3	1	5	0	51
SS/SB/SD	Explosives	Medium (USACOE 89-35)	USACOE 89-35 / SOC-NITG	35	4	3/3	1	5	0	51

QAPP Worksheet #20
(UFP-QAPP Manual Section 3.1.1)
Field Quality Control Sample Summary Table

Matrix	Analytical Group	Concentration Level	Analytical and Preparation SOP Reference¹	No. of Sampling Locations	No. of Field Duplicates	No. of MS/MSDs	No. of Field Blanks	No. of Equip. Blanks	No. of Trip Blanks	Total No. of Samples to Lab
SS/SB/SD	Explosives	Medium (SW-846 6850)	SW-846 6850 / HPLC-DoD Perchlorate	35	4	3/3	1	5	0	51
SS/SB/SD	Wet Chemistry	Medium (Lloyd Kahn)	Lloyd Kahn / 3.6.2.2	35	4	3/3	0	0	0	45
SS/SB/SD	Wet Chemistry	Medium (SW-846 9045C)	SW-846 9045C / 3.5.14.3	35	0	0	0	0	0	35
GW/SW	TCL Volatiles	Water (OLM04.3)	EPA CLP OLM04.3 / 1.2.3.3	15	2	2/2	0	2	2	25
GW/SW	TCL Semivolatiles	Water (OLM04.3)	EPA CLP OLM04.3 / 2.4.3.1, 2.4.3.4	15	2	2/2	0	2	0	23
GW/SW	TCL Pesticides/Aroclors	Water (OLM04.3)	EPA CLP OLM04.3 / 2.2.1.1, 2.1.1.6, 2.6.1, 2.6.5	15	2	2/2	0	2	0	23
GW/SW	TAL Metals/Cyanide	Water (ILM04.1)	EPA CLP ILM04.1 / 3.1.1.2, 3.1.1.4, 3.4.1, 3.4.5, 3.3.1, 3.3.4	30	4	4/4	0	4	0	46
GW/SW	Explosives	Medium (SW-846 8330)	SW-846 8330 / 2.3.2.1, 2.3.2.4	15	2	2/2	0	2	0	23
GW/SW	Explosives	Medium (SW-846 8332)	SW-846 8332 / 2.3.2.5, 2.3.2.6	15	2	2/2	0	2	0	23
GW/SW	Explosives	Medium (USACOE 89-35)	USACOE 89-35 / SOC-NITG	15	2	2/2	0	2	0	23

QAPP Worksheet #20
(UFP-QAPP Manual Section 3.1.1)
Field Quality Control Sample Summary Table

Matrix	Analytical Group	Concentration Level	Analytical and Preparation SOP Reference ¹	No. of Sampling Locations	No. of Field Duplicates	No. of MS/MSDs	No. of Field Blanks	No. of Equip. Blanks	No. of Trip Blanks	Total No. of Samples to Lab
GW/S W	Explosives	Medium (SW-846 6850)	SW-846 6850 / HPLC-DoD Perchlorate	15	2	2/2	0	2	0	23
GW/S W	Wet Chemistry	Medium (EPA 130.2)	EPA 130.2 / 3.5.7.1	15	2	2/2	0	0	0	21
ASH	Dioxins/Furans	Medium (SW-846 8280A)	SW-846 8280A / HRMS-8280A	3	1	1/1	1	1	0	8
IDW	TCLP Volatiles	Medium (1311/8260B)	SW-846 1311, SW-846 8260B / 2.7.3, 1.3.2.2	2	0	0/0	0	0	0	2
IDW	TCLP Semivolatiles	Medium (1311/8270C)	SW-846 1311, SW-846 8270C / 2.7.2, 2.7.6, 2.5.2.7, 2.5.2.2	2	0	0/0	0	0	0	2
IDW	TCLP Pesticides	Medium (1311/8081A)	SW-846 1311, SW-846 8081A / 2.7.2, 2.7.6, 2.2.4.3, 2.2.4.10	2	0	0/0	0	0	0	2
IDW	TCLP Herbicides	Medium (1311/8151A)	SW-846 1311, SW-846 8151A / 2.7.2, 2.7.6, 2.2.7.1, 2.2.7.4, 2.2.4.3, 2.2.4.10	2	0	0/0	0	0	0	2
IDW	TCLP Metals	Medium (1311/6010B)	SW-846 1311, SW-846 6010B / 2.7.2, 2.7.6, 3.2.1.4, 3.2.1.6, 3.2.1.7	2	0	0/0	0	0	0	2

QAPP Worksheet #20
(UFP-QAPP Manual Section 3.1.1)
Field Quality Control Sample Summary Table

Matrix	Analytical Group	Concentration Level	Analytical and Preparation SOP Reference¹	No. of Sampling Locations	No. of Field Duplicates	No. of MS/MSDs	No. of Field Blanks	No. of Equip. Blanks	No. of Trip Blanks	Total No. of Samples to Lab
IDW	Reactivity	Medium (9014/9034)	SW-846 9014, SW-846 9034 / 3.5.18.1, 3.4.4	2	0	0/0	0	0	0	2
IDW	Corrosivity	Medium (SW-846 9045C)	SW-846 9045C / 3.5.14.3	2	0	0/0	0	0	0	2
IDW	Ignitability	Medium (Pensky Martens)	Pensky Martens / 3.5.9.1	2	0	0/0	0	0	0	2

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

QAPP Worksheet #21
(UFP-QAPP Manual Section 3.1.2)
Project Sampling SOP References Table

List all SOPs associated with project sampling including, but not limited to, sample collection, sample preservation, equipment cleaning and decontamination, equipment testing, inspection and maintenance, supply inspection and acceptance, and sample handling and custody. Include copies of the SOPs as attachments or reference all in the QAPP. Sequentially number sampling SOP references in the Reference Number column. The reference number can be used throughout the QAPP to refer to a specific SOP.

Worksheet Not Applicable (State Reason)

Reference Number	Title, Revision Date and/or Number	Originating Organization	Equipment Type	Modified for Project Work? (Check if yes)	Comments
N/A	See Table of Contents of the <i>Facility Standard Operating Procedures for Installation Restoration Program Environmental Investigations at Naval District Washington, Indian Head, Indian Head, Maryland, June 2004</i>	Tetra Tech NUS, Inc.	N/A	<input type="checkbox"/>	N/A

QAPP Worksheet #22
(UFP-QAPP Manual Section 3.1.2.4)
Field Equipment Calibration, Maintenance, Testing, and Inspection Table

Identify all field equipment and instruments (other than analytical instrumentation) that require calibration, maintenance, testing, or inspection and provide the SOP reference number for each type of equipment. In addition, document the frequency of activity, acceptance criteria, and corrective action requirements on the worksheet.

Worksheet Not Applicable (State Reason)

Field Equipment	Calibration Activity	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference ¹
Horiba® U-22 pH Probe	Calibrate probe using Horiba® U-22 Auto-Calibration Standard Solution				Daily, before use	pH reads 4.0 +/- 3%	Clean probe with deionized water and calibrate again. Do not use this instrument if unable to calibrate properly.	Field Team Lead	SA-6.3
Horiba® U-22 Specific conductance Probe	Calibrate probe using Horiba® U-22 Auto-Calibration Standard Solution				Daily, before use	conductivity reads 4.49 +/- 3%	Clean probe with deionized water and calibrate again. Do not use this instrument if unable to calibrate properly.	Field Team Lead	SA-6.3

QAPP Worksheet #22
(UFP-QAPP Manual Section 3.1.2.4)
Field Equipment Calibration, Maintenance, Testing, and Inspection Table

Field Equipment	Calibration Activity	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference ¹
Horiba® U-22 Turbidity Probe	Calibrate probe using Horiba® U-22 Auto-Calibration Standard Solution				Daily, before use	turbidity reads 0 +/- 3%	Clean probe with deionized water and calibrate again. Do not use this instrument if unable to calibrate properly.	Field Team Lead	SA-6.3
Horiba® U-22 Dissolved oxygen and Temperature Probes	Calibrate probe using Horiba® U-22 Auto-Calibration Standard Solution		During calibration of other probes, check these readings against the day's atmospheric pressure and ambient temperature		Daily, before use	Consistent with the current atmospheric pressure and ambient temperature	Clean probe with deionized water and calibrate again. Do not use this instrument if unable to calibrate properly.	Field Team Lead	SA-6.3
Horiba® U-22	Calibrate probe using Horiba® U-22 Auto-Calibration Standard Solution	Check mechanical and electronic parts, verify system continuity, check battery, and clean probes. Calibration check.	Visual inspection		Daily before use, at the end of the day, and when unstable readings occur.	Stable readings after 3 minutes pH reads 4.0 +/- 3% conductivity reads 4.49 +/- 3% turbidity reads 0 +/- 3%	Clean probe with deionized water and calibrate again. Do not use this instrument if unable to calibrate properly.	Field Team Lead	SA-6.3

QAPP Worksheet #22
(UFP-QAPP Manual Section 3.1.2.4)
Field Equipment Calibration, Maintenance, Testing, and Inspection Table

Field Equipment	Calibration Activity	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference ¹
Dräger Gas Detector		Leak testing Clean the metal screen Flush the pump with air			Prior to use Monthly (if used frequently) After each use	If the bellows has not completely expanded after 30 seconds. Metal screen is no longer blocked	For Model 31, any leak can usually be eliminated by cleaning the valve.	Field Team Lead	SA-6.3
Miniram Model PDM-3	Zero the Miniram using a Z-Bag TM Calibrator which provides a clean-air environment	Recharge and the outside of the instruments should be wiped clean with a soft cloth			Daily, before use After each use	A zero value less than 3 mg/m ²	When the zero value exceeds 3 mg/m ³ , the sensing chamber may need to be cleaned following the instructions provided in the manufacturer's operating manual.	Field Team Lead	SA-6.3
OVM	Calibrate for organic vapors using compressed gas cylinders	Charge batteries Allow the batteries to totally discharge before recharging to prevent battery memory from occurring			Daily, before each use Daily Occasionally, as needed	Check operations manual for acceptable range of calibrated probe for the specific lamp model	If meter fails to calibrate, do not use this meter.	Field Team Lead	SA-6.3

QAPP Worksheet #22
(UFP-QAPP Manual Section 3.1.2.4)
Field Equipment Calibration, Maintenance, Testing, and Inspection Table

Field Equipment	Calibration Activity	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference¹
Groundwater sampling pumps and tubing				Inspect pumps, tubing and air/sample line quick-connects	Regularly	Maintained in good working order per manufacturer's recommendations	Replace items	Field Team Lead	SA-1.1

¹ SOP reference numbers refer to the *Facility Standard Operating Procedures for Installation Restoration Program Environmental Investigations at Naval District Washington, Indian Head, Indian Head, Maryland, June 2004*. The Table of Contents identifies the SOP reference numbers with the associated Field SOP.

Note that not all equipment listed in this table will necessarily be utilized during the Site 66 – Turkey Run Disposal Area SI.

QAPP Worksheet #23
(UFP-QAPP Manual Section 3.2.1)
Analytical SOP References Table

List all SOPs that will be used to perform onsite or offsite analysis. Indicate whether the procedure produces screening or definitive data. Sequentially number analytical SOP reference in the Reference Number column. Include copies of the SOPs as attachments or reference in the QAPP. The reference number can be used throughout the QAPP to refer to a specific SOP.

Worksheet Not Applicable (State Reason)

QAPP Worksheet #23 Analytical SOP References Table

Reference Number	Title	Revision Date	Revision No.	Definitive or Screening Data	Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work (Y/N)
1.1.4.1	Preparation of Soil/Sediment/Sludge Samples for the Analysis of Volatile Organic Compounds by Closed-System Purge and Trap using SW846 Method 5035 (Also Applicable to EPA CLP SOW Document OLM04.3)	11/17/06	5	Definitive	TCL Volatiles	GCMS	CompuChem	No
1.2.1.3	Methanol Extraction of Soil/Sediment Samples for the Analysis of Medium Level Volatile Organics by EPA CLP & NYSASP	09/25/01	3	Definitive	TCL Volatiles	GCMS	CompuChem	No
1.2.3.2	GC/MS Analysis of Low-Level Volatiles in Solid Samples by EPA CLP and NYSASP	03/21/03	2	Definitive	TCL Volatiles	GCMS	CompuChem	No
1.2.3.3	GC/MS Analysis of Volatile Organic Compounds in Aqueous Samples and Medium-Level Volatiles in Solid Samples by EPA CLP SOW plus NYSASP	03/21/03	2	Definitive	TCL Volatiles	GCMS	CompuChem	No
2.4.3.3	Preparation of S/S/S Samples for Analysis of Medium Level Semivolatiles (EPA CLP SOW plus NYSASP)	02/20/03	2	Definitive	TCL Semivolatiles	GCMS	CompuChem	No
2.4.3.2	Preparation of S/S/S Samples for Analysis of Low Level Semivolatiles (EPA CLP SOW plus NYSASP)	02/02/04	2	Definitive	TCL Semivolatiles	GCMS	CompuChem	No
2.4.3.4	Analysis of Semivolatile Organic Compounds in Aqueous and Solid Sample Extracts by EPA CLP and NYSASP	12/18/06	3	Definitive	TCL Semivolatiles	GCMS	CompuChem	No
2.6.3	Gel Permeation Chromatography (GPC) Cleanup of Semivolatile Soil Sample Extracts by CLP, SW-846 and NYSASP	10/13/06	9	Definitive	TCL Semivolatiles	GCMS	CompuChem	No
2.4.3.1	Preparation of Water Samples for the Analysis of Semivolatiles by EPA CLP and NYSASP	02/02/04	7	Definitive	TCL Semivolatiles	GCMS	CompuChem	No
2.1.1.1	Preparation of Water Samples for the Analysis of Pesticide/PCB by CLP & NYSASP	02/04/04	13	Definitive	TCL Pesticides/PCBs	GC	CompuChem	No
2.1.1.6	GC/ECD Analysis of Pesticides/PCBs in Aqueous and Solid Sample Extracts by EPA CLP and NYSASP	02/13/06	5	Definitive	TCL Pesticides/PCBs	GC	CompuChem	No
2.6.1	Gel Permeation Chromatography (GPC) Cleanup of Soil and Water Extracts for GC/ECD Analysis for Pesticides/PCBs by EPA CLP	07/11/06	9	Definitive	TCL Pesticides/PCBs	GC	CompuChem	No
2.6.5	Manual Florisil Cartridge Cleanup of Water and Soil Extracts for the Analysis of Pesticide/PCB by CLP and SW-846	06/30/05	5	Definitive	TCL Pesticides/PCBs	GC	CompuChem	No
2.1.1.2	Preparation of Soil/Sediment/Sludge Samples for the Analysis of Pesticides/PCBs by EPA CLP plus NYSASP	01/30/03	7	Definitive	TCL Pesticides/PCBs	GC	CompuChem	No
2.1.1.5	Sulfur Clean-up of Pesticide and PCB Extracts by Copper or Tetrabutylammonium (TBA) Sulfite by CLP, SW846 and NYSASP	10/16/06	5	Definitive	TCL Pesticides/PCBs	GC	CompuChem	No
3.1.1.3	Digestion Block Preparation of Soil Samples for Total Metals for ICP Analysis by CLP and NYSASP	09/06/06	6	Definitive	TAL Metals	ICP/AES	CompuChem	No
3.1.1.4	Determination of Metals by Inductively Coupled Plasma (ICP) by EPA CLP and NYSASP	08/04/06	17	Definitive	TAL Metals	ICP/AES	CompuChem	No
3.1.1.2	Digestion Block Preparation of Aqueous Samples for Total Metals or dissolved Metals by CLP and NYSASP	02/13/05	5	Definitive	TAL Metals	ICP/AES	CompuChem	No
3.4.1	Aqueous Sample Cyanide Midi Distillation, by CLP, NYSASP	11/17/05	11	Definitive	TAL Metals	Spectrophometer	CompuChem	No
3.4.5	Cyanide Analysis of Water and Soil/Sediment Distillates by CLP, MCAWW, SW-846, NYSASP & Lachat	01/11/06	7	Definitive	TAL Metals	Spectrophometer	CompuChem	No
3.4.3	Solid Sample for Total Cyanide Midi-Distillation by CLP and NYSASP	11/17/05	12	Definitive	TAL Metals	Spectrophometer	CompuChem	No
3.3.1	Mercury in Water, Manual Digestion Procedure for EPA CLP, NYSASP, SW-846, and MCAWW	11/18/05	16	Definitive	TAL Metals	Cold Vapor	CompuChem	No

QAPP Worksheet #23
Analytical SOP References Table

Reference Number	Title	Revision Date	Revision No.	Definitive or Screening Data	Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work (Y/N)
3.3.4	Automated Cold Vapor Determination for Mercury by CLP, SW-846, MCAWW, and NYSASP	03/27/06	20	Definitive	TAL Metals	Cold Vapor	CompuChem	No
3.3.3	Solid Sample Mercury Digestion by CLP, NYSASP, and MCAWW	09/06/06	6	Definitive	TAL Metals	Cold Vapor	CompuChem	No
2.3.2.1	Preparation of Water Samples for the Analysis of Nitroaromatics and Nitroamines by High Performance Liquid Chromatography (HPLC) by SW-846 and NYSASP	03/19/04	8	Definitive	Explosives	HPLC	CompuChem	No
2.3.2.4	Analysis of Nitroaromatics and Nitroamines in Water and Soil Samples by HPLC in SW-846 and NYSASP	01/18/06	9	Definitive	Explosives	HPLC	CompuChem	No
2.3.2.2	Preparation of Soil/Sediment/Sludge/Biota Samples for the Analysis of Nitroaromatics and Nitramines by High Performance Liquid Chromatography (HPLC) by SW-846 and NYSASP	09/28/06	9	Definitive	Explosives	HPLC	CompuChem	No
SOC-NITG	Nitroguanidine by High Performance Liquid Chromatography (HPLC)	08/05/03	1	Definitive	GC/HPLC	HPLC	CAS-Kelso	No
2.3.2.6	Solid Phase Extraction of Water Samples for the Analysis of Nitroaromatics and Nitroamines by High Performance Liquid Chromatography (HPLC) by SW-846 and NYSASP	09/03/02	2	Definitive	Explosives	HPLC	CompuChem	No
3.6.2.2	Analysis of Soil Samples for Total Organic Carbon (TOC) by SW-846 and Lloyd Kahn	12/15/06	13	Definitive	Wet Chemistry	NDIRD'	CompuChem	No
3.6.2.1	Total Organic Carbon (TOC) in Water by MCAWW and SW-846	12/11/06	12	Definitive	Wet Chemistry	NDIRD'	CompuChem	No
3.5.7.1	Total Hardness as Calcium Carbonate in Water by Lachat and MCAWW	04/28/06	7	Definitive	Wet Chemistry	Spectrophometer	CompuChem	No
2.7.3	Zero Headspace Extraction (ZHE) / Toxicity Characteristic Leaching Procedure (TCLP) by SW846	06/27/01	8	Definitive	TCLP Volatiles		CompuChem	No
1.3.2.2	Analysis of Volatile Organic Compounds in Aqueous and Medium/High Concentration Soil Samples by SW-846	03/27/06	11	Definitive	TCLP Volatiles	GC/MS	CompuChem	No
2.7.2	Toxicity Characteristic Leaching Procedure (TCLP) by SW846	03/19/04	10	Definitive	TCLP Volatiles, Semivolatiles, Pesticides, Herbicides, Metals		CompuChem	No
2.5.2.7	GC/MS Analysis of Extractable Semivolatiles in Aqueous and Solid Samples by SW-846 and NYSASP	12/15/06	11	Definitive	TCLP Semivolatiles	GC/MS	CompuChem	No
2.5.2.2	Extraction of TCLP Leachate for Semivolatiles by SW-846 and NYSASP	04/06/06	11	Definitive	TCLP Semivolatiles	GC/MS	CompuChem	No
2.2.7.3	Extraction of TCLP Leachates for the Determination of Herbicides by SW-846 and NYSASP	02/23/05	8	Definitive	TCLP Herbicides	GC	CompuChem	No
2.2.7.4	GC/ECD Analysis of Chlorinated Herbicides in Soil and Water by Method 8151A (SW-846 & NYSASP)	02/27/06	8	Definitive	TCLP Herbicides	GC	CompuChem	No
3.2.1.4	Digestion Block Preparation of Aqueous Samples for ICP Analysis of Total or Dissolved Metals by SW-846, MCAWW, Standard Methods, and NYSASP	03/16/04	6	Definitive	TCLP Metals	ICP/AES	CompuChem	No
3.2.1.6	Inductively Coupled Plasma Atomic Emission Spectroscopy by SW-846 and NYSASP	04/02/03	8	Definitive	TCLP Metals	ICP/AES	CompuChem	No
2.2.4.3	Extraction of TCLP Leachate for Determination of Pesticides/PCBs by SW-846 and NYSASP	03/22/06	5	Definitive	TCLP Pesticides	GC	CompuChem	No
2.2.4.10	GC/ECD Analysis of Organochlorine Pesticides in Water and Soil Extracts by SW-846	09/01/05	6	Definitive	TCLP Pesticides	GC	CompuChem	No
3.5.18.1	Reactive (Total Releasable) Sulfide by SW-846	09/01/05	6	Definitive	Reactivity		CompuChem	No
3.4.4	Reactive (Total Releasable) Cyanide by SW-846	09/29/05	6	Definitive	Reactivity		CompuChem	No
3.5.14.3	Soil and Waste pH by Methods 9045C and 9045D (SW-846 plus NYSASP)	01/13/06	3	Definitive	Wet Chemistry	pH meter	CompuChem	No
3.5.9.1	Ignitability by SW-846	09/01/05	4	Definitive	Ignitability		CompuChem	No
4.1	Receiving Samples	11/0/06	32				CompuChem	No

**QAPP Worksheet #23
Analytical SOP References Table**

Reference Number	Title	Revision Date	Revision No.	Definitive or Screening Data	Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work (Y/N)
4.6	Storing Samples	11/4/05	19				CompuChem	No
4.8	Purging, Storing, and Preparing "Completed" Extracts for Disposal	4/2/03	8				CompuChem	No
HPLC-DoD Perchlorate	STANDARD OPERATING PROCEDURE for PERCHLORATE IN WATER, SOILS AND SOLID WASTES USING HIGH PERFORMANCE LIQUID CHROMATOGRAPHY/ELECTROSPRAY IONIZATION/MASS SPECTROMETRY (HPLC/ESI/MS) FOR DoD	06/30/06	1	Definitive	HPLC/ESI/MS	HPLC	CAS-Rochester	No
HRMS-8280A	Method 8280A: Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution HRGC/LRMS	05/31/06	1	Definitive	HRMS	HRMS	CAS-Houston	No

¹ - Non-dispersive Infrared Detector

QAPP Worksheet #24
(UFP-QAPP Manual Section 3.2.2)
Analytical Instrument Calibration Table

Identify all analytical instrumentation that requires calibration and provide the SOP reference number for each. In addition, document the frequency, acceptance criteria, and corrective action requirements on the worksheet.

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference¹
HRMS	Initial Calibration	Initially, and as needed	30%	Recalibrate	Xiangqiu Liang/CAS-Houston	HRMS-8280A
HPLC/1050/110 Series	Initial Calibration	Initially, and as needed	CC>=0.995; ICV 90-110%	Recalibrate	Mike Erickson/CAS-Kelso	SOC-NITG
HPLC/1050/110 Series	Continuing Calibration Verification	Opening, closing, and 1/20 samples	85-115%	Recalibrate, reanalyze	Mike Erickson/CAS-Kelso	SOC-NITG
HPLC/ESI/MS	Initial Calibration	Initially and as needed	CC>=0.995; ICV 90-110%	Recalibrate	Tom Traver/CAS Rochester	HPLC-DoD Perchlorate
HPLC/ESI/MS	Continuing Calibration Verification	Opening, closing, and 1/10 samples	85-115%	Recalibrate, reanalyze	Tom Traver/CAS Rochester	HPLC-DoD Perchlorate
GC-MS	Initial Calibration	After major instrument maintenance; upon failure of continuing calibration verification	Must meet minimum RF and maximum %RSD criteria in SOW	Recalibrate	Lab Section Manager	1.2.3.2, 1.2.3.3
GC-MS	Continuing Calibration Verification	One per 12-hour analysis period	Must meet minimum RF and maximum %D criteria in SOW	Recalibrate	Lab Section Manager	1.2.3.2, 1.2.3.3
GC-MS	Initial Calibration	After major instrument maintenance; upon failure of continuing calibration verification	Must meet minimum RF and maximum %RSD criteria in SOW	Recalibrate	Lab Section Manager	2.4.3.4

QAPP Worksheet #24
(UFP-QAPP Manual Section 3.2.2)
Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference¹
GC-MS	Continuing Calibration Verification	One per 12-hour analysis period	Must meet minimum RF and maximum %D criteria in SOW	Recalibrate	Lab Section Manager	2.4.3.4
GC	Initial Calibration	After major instrument maintenance; upon failure of continuing calibration verification	Must meet all resolution, retention time, breakdown, and %RSD criteria in SOW on both analytical columns	Recalibrate	Lab Section Manager	2.1.1.6
GC	Continuing Calibration Verification	One per 12-hour analysis period	Must meet all resolution, retention time, breakdown, and %D criteria in SOW on both analytical columns	Recalibrate	Lab Section Manager	2.1.1.6
ICP-AES	Initial Calibration Verification	Each analytical sequence	Analytes must agree within 10% of analyte true values	Recalibrate	Lab Section Manager	3.1.1.4
ICP-AES	Continuing Calibration Verification	Every 10 samples or 2 hours, whichever is more frequent and at the end of the analytical sequence	Analytes must agree within 10% of analyte true values	Recalibrate	Lab Section Manager	3.1.1.4
CVAA	Initial Calibration	Each analytical sequence	Analytes must agree within 5% of analyte true values	Recalibrate	Lab Section Manager	3.3.4
CVAA	Initial Calibration Verification	Each analytical sequence	Analyte must agree within 20% of analyte true values	Recalibrate	Lab Section Manager	3.3.4
CVAA	Continuing Calibration Verification	Every 10 samples and at the end of the analytical sequence	Analyte must agree within 20% of analyte true values	Recalibrate	Lab Section Manager	3.3.4

**QAPP Worksheet #24
 (UFP-QAPP Manual Section 3.2.2)
 Analytical Instrument Calibration Table**

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference¹
Spectrophotometer	Initial Calibration	Each analytical sequence	Correlation coefficient of curve must be ≥ 0.995	Recalibrate	Lab Section Manager	3.4.5
Spectrophotometer	Initial Calibration Verification	Each analytical sequence	Analytes must agree within 15% of analyte true values	Recalibrate	Lab Section Manager	3.4.5
Spectrophotometer	Continuing Calibration Verification	Every 10 samples or 2 hours, whichever is more frequent, and at the end of the analytical sequence	Analytes must agree within 15% of analyte true values	Recalibrate	Lab Section Manager	3.4.5
HPLC	Initial Calibration	After major instrument maintenance; upon failure of initial or continuing calibration verification	The %RSD between the calibration factors (CFs) must be $\leq 20\%$; or the average %RSD of all of the CFs must be $\leq 20\%$; or the correlation coefficient of curve must be ≥ 0.99	Recalibrate	Lab Section Manager	2.3.2.4, 2.3.2.5
HPLC	Initial Calibration Verification	After initial calibration	Must be within $\pm 20\%$ of the expected value	Recalibrate	Lab Section Manager	2.3.2.4, 2.3.2.5
HPLC	Continuing Calibration Verification	At a minimum at the beginning of the analytical sequence, periodically within the sequence and at the end of the sequence	The %D between the CFs in the initial and continuing calibrations must be $\leq 20\%$; or the average %D of all of the CFs must be $\leq 20\%$	Recalibrate	Lab Section Manager	2.3.2.4, 2.3.2.5

QAPP Worksheet #24
(UFP-QAPP Manual Section 3.2.2)
Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference¹
TOC Analyzer (NDIRD)	Initial Calibration	Each analytical sequence	Correlation coefficient of curve must be >0.995	Recalibrate	Lab Section Manager	3.6.2.2, 3.6.2.1
TOC Analyzer (NDIRD)	Initial Calibration Verification	Each analytical sequence	Analyte must agree within 10% of analyte true values	Recalibrate	Lab Section Manager	3.6.2.2, 3.6.2.1
TOC Analyzer (NDIRD)	Continuing Calibration Verification	Every 10 samples and at end of sequence	Analyte must agree within 10% of analyte true values	Recalibrate	Lab Section Manager	3.6.2.2, 3.6.2.1
GC-MS	Initial Calibration	After major instrument maintenance, upon failure of initial or continuing calibration verification	Must meet minimum RF criteria for SPCCs and maximum %RSD criteria for CCCs and non-CCCs in SOP; or the average %RSD of all of the RFs must be <=15%; or the correlation coefficient of curve must be >=0.99	Recalibrate	Lab Section Manager	1.3.2.2
GC-MS	Initial Calibration Verification	After initial calibration	Must be within 20% of its expected value of each target analyte and surrogate or within 40% of the poor purgers and the gases. Sporadic failure of up to three target compounds is allowed, but they must not exceed 40% of their expected value	Recalibrate	Lab Section Manager	1.3.2.2

**QAPP Worksheet #24
 (UFP-QAPP Manual Section 3.2.2)
 Analytical Instrument Calibration Table**

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference¹
GC-MS	Continuing Calibration Verification	At the beginning of every 12-hour analytical sequence	Must meet minimum RF criteria for SPCCs and maximum %D criteria for CCCs and non-CCCs in SOP	Recalibrate	Lab Section Manager	1.3.2.2
GC-MS	Initial Calibration	After major instrument maintenance; upon failure of initial or continuing calibration verification	Must meet minimum RF criteria for SPCCs and maximum %RSD criteria for CCCs and non-CCCs in SOP; or the average %RSD of all of the RFs must be $\leq 15\%$; or the correlation coefficient of curve must be ≥ 0.99	Recalibrate	Lab Section Manager	2.5.2.7
GC-MS	Initial Calibration Verification	After initial calibration	Must be within $\pm 30\%$ of the expected value; 10% of the analytes can be within 40% of the expected value	Recalibrate	Lab Section Manager	2.5.2.7
GC-MS	Continuing Calibration Verification	At the beginning of every 12-hour analytical sequence	Must meet minimum RF criteria for SPCCs and maximum %D criteria for CCCs and non-CCCs in SOP	Recalibrate	Lab Section Manager	2.5.2.7

QAPP Worksheet #24
(UFP-QAPP Manual Section 3.2.2)
Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference¹
GC	Initial Calibration	After major instrument maintenance; upon failure of initial or continuing calibration verification	The %RSD between the CFs must be $\leq 20\%$; or the average %RSD of all of the CFs must be $\leq 20\%$; or the correlation coefficient of curve must be ≥ 0.99	Recalibrate	Lab Section Manager	2.2.7.4
GC	Initial Calibration Verification	After initial calibration	Must be within $\pm 20\%$ of the expected value	Recalibrate	Lab Section Manager	2.2.7.4
GC	Continuing Calibration Verification	At the beginning and end of every 12-hour analytical sequence and every 10 samples	The %D between the CFs in the initial and continuing calibration must be $\leq 15\%$; or the average %D of all of the CFs must be $\leq 15\%$	Recalibrate	Lab Section Manager	2.2.7.4
ICP-AES	Initial Calibration Verification	Each analytical sequence	Analytes must agree within 10% of analyte true values	Recalibrate	Lab Section Manager	3.2.1.6
ICP-AES	Continuing Calibration Verification	Every 10 samples and at the end of the analytical sequence	Analytes must agree within 10% of analyte true values	Recalibrate	Lab Section Manager	3.2.1.6
CVAA	Initial Calibration	Each analytical sequence	Correlation coefficient of curve must be ≥ 0.995	Recalibrate	Lab Section Manager	3.3.4
CVAA	Initial Calibration Verification	Each analytical sequence	Analytes must agree within 10% of analyte true values	Recalibrate	Lab Section Manager	3.3.4

QAPP Worksheet #24
(UFP-QAPP Manual Section 3.2.2)
Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference¹
CVAA	Continuing Calibration Verification	Every 10 samples and at the end of the analytical sequence	Analytes must agree within 20% of analyte true values	Recalibrate	Lab Section Manager	3.3.4
pH meter	Calibration	Daily, before use	The value for each of the certified buffer solutions must be within ± 0.05 pH units	Recalibrate	Lab Section Manager	3.5.14.3
Flash Point	Calibration	Daily, before use	The flash point obtained for chlorobenzene must be within the limits of 82 ± 2 F	Recalibrate	Lab Section Manager	3.5.9.1

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

QAPP Worksheet #25
(UFP-QAPP Manual Section 3.2.3)
Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

Identify all analytical instruments that require maintenance, testing, or inspection and provide the SOP reference number for each. In addition, document the frequency, acceptance criteria, and corrective action requirements on the worksheet.

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference¹
HRMS	Inspect guard column and/or column	WDM evaluation	Visible changes	As needed	30% CCAL	Change guard column and/or column	Xiangqiu Liang/CAS-Houston	HRMS-8280A
HPLC/1050/110 Series	Backflush guard column, backflush column	N/A	N/A	As needed	N/A	N/A	Mike Erickson/CAS Kelso	SOC-NITG
HPLC/1050/110 Series	Change guard column, change column	N/A	N/A	As needed	N/A	N/A	Mike Erickson/CAS Kelso	SOC-NITG
HPLC/1050/110 Series	Change in-line filters, change pump seals, clean flow cell	N/A	N/A	As needed	N/A	N/A	Mike Erickson/CAS Kelso	SOC-NITG
HPLC/1050/110 Series	N/A	N/A	Leak Check	After column maintenance	N/A	N/A	Mike Erickson/CAS Kelso	SOC-NITG
HPLC/1050/110 Series	Change pump diaphragm	N/A	N/A	Annually	N/A	N/A	Mike Erickson/CAS Kelso	SOC-NITG
HPLC/1050/110 Series	N/A	N/A	Fluorescence detector check	Daily	N/A	N/A	Mike Erickson/CAS Kelso	SOC-NITG
HPLC/1050/110 Series	N/A	N/A	Diode array absorbance check	Daily	N/A	N/A	Mike Erickson/CAS	SOC-NITG
HPLC/1050/110 Series	N/A	Perform Initial Calibration Verification	N/A	As needed	+ -20%	See Maintenance activities	Mike Erickson/CAS	SOC-NITG

QAPP Worksheet #25
(UFP-QAPP Manual Section 3.2.3)
Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference ¹
HPLC/1050/110 Series	N/A	Perform Continuing Calibration Verification	N/A	Open, close, and 1/20 samples	+/-15%	See Maintenance activities and recalibrate	Mike Erickson/CAS	SOC-NITG
HPLC/ESI/MS Agilent 1100 HPLC-02	Change gas supply	Check pressure gauge	N/A	Check daily	>200psi	Change supply	Tom Traver/CAS Rochester	HPLC-DoD Perchlorate
HPLC/ESI/MS Agilent 1100 HPLC-02	Change analytical column	Check chromatography	N/A	Check each use	Adequate peak shape and resolution	Change analytical column	Tom Traver/CAS Rochester	HPLC-DoD Perchlorate
HPLC/ESI/MS Agilent 1100 HPLC-02	Change mobile phase	check baseline stability	Check volume	Check each use	Enough volume for run; no interference >1/2 MRL	Change mobile phase	Tom Traver/CAS Rochester	HPLC-DoD Perchlorate
HPLC/ESI/MS Agilent 1100 HPLC-02	Change Inlet Filters	Check for contamination	N/A	Check each use	no interferences >1/2 MRL	Change inlet filters	Tom Traver/CAS Rochester	HPLC-DoD Perchlorate
GC-MS	Replace/clean ion source; clean injector, replace injector liner, replace/clip capillary column Flush/replace tubing on purge and trap; replace trap	QC standards	Ion source, Injector liner, column, column flow, purge lines, purge flow, trap	As needed	See SOP	See SOP	Lab Section Manager	1.2.3.2, 1.2.3.3, 1.2.3.2, 1.2.3.3, 2.4.3.4, 1.3.2.2, 2.5.2.7
GC	ECD maintenance; replace/clip capillary column	QC standards	ECD, injector, injector liner, column, column flow	As needed	See SOP	See SOP	Lab Section Manager	2.1.1.6, 2.2.7.4

QAPP Worksheet #25
(UFP-QAPP Manual Section 3.2.3)
Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference¹
ICP-AES	Clean plasma torch; clean filters; clean spray and nebulizer chambers; replace pump tubing	QC standards	Torch, filters, nebulizer, chamber, pump, pump tubing	As needed	See SOP	See SOP	Lab Section Manager	3.1.1.4, 3.2.1.6
CVAA	Replace reductant tubing and sample mixing coil tubing; replace sample probe; replace pump tubing; clean optical cell	QC standards	Tubing, sample probe, optical cell	As needed	See SOP	See SOP	Lab Section Manager	3.3.4
Spectrophotometer	Flush/replace tubing	QC Standards	Tubing	As needed	See SOP	See SOP	Lab Section Manager	3.4.5
HPLC	Change frits in solvent bottles; change pump seals filled; flush column with solvent	QC Standards	Solvent bottles, tubing, column	As needed	See SOP	See SOP	Lab Section Manager	2.3.2.4, 2.3.2.5
TOC Analyzer (NDIRD)	Replace sample tubing, clean sample boat, replace syringe	QC standards	Tubing, sample boat, syringe	As needed	See SOP	See SOP	Lab Section Manager	3.6.2.2, 3.6.2.1
pH meter	Clean probe	QC standards	probe	As needed	See SOP	See SOP	Lab Section Manager	3.5.14.3

QAPP Worksheet #25
(UFP-QAPP Manual Section 3.2.3)
Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference¹
Flash Point	Lid tightness, shutter action; flame position	QC standards	Lid, shutter, flame	As needed	See SOP	See SOP	Lab Section Manager	3.5.9.1

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

**QAPP Worksheet #26
 (UFP-QAPP Manual Appendix A)
 Sample Handling System**

Use this worksheet to identify components of the project-specific sample handling system. Record personnel, and their organizational affiliations, who are primarily responsible for ensuring proper handling, custody, and storage of field samples from the time of collection, to laboratory delivery, to final sample disposal. Indicate the number of days field samples and their extracts/digestates will be archived prior to disposal.

Sample Collection, Packaging, and Shipment
Sample Collection (Personnel/Organization): Christopher Houck/CH2M HILL
Sample Packaging (Personnel/Organization): Christopher Houck/CH2M HILL
Coordination of Shipment (Personnel/Organization): Christopher Houck/CH2M HILL
Type of Shipment/Carrier: Overnight Carrier/FedEx
Sample Receipt and Analysis
Sample Receipt (Personnel/Organization): Cathy Dover/CompuChem
Sample Custody and Storage (Personnel/Organization): Cathy Dover/CompuChem
Sample Preparation (Personnel/Organization): Teresa Grant/CompuChem (Organics) and Paul Cvetich/CompuChem (Inorganics)
Sample Determinative Analysis (Personnel/Organization): Ron Fertile/CompuChem (VOC and SVOC), Teresa Jennings/CompuChem (GC), and Paul Cvetich/CompuChem (Inorganics)
Sample Archiving
Field Sample Storage (No. of days from sample collection): 90 days from receipt
Sample Extract/Digestate Storage (No. of days from extraction/digestion): 1 year
Biological Sample Storage (No. of days from sample collection): N/A
Sample Disposal
Personnel/Organization: Cathy Dover/CompuChem
Number of Days from Analysis: 90 days from receipt

QAPP Worksheet #27 (UFP-QAPP Manual Section 3.3.3) Sample Custody Requirements

Describe the procedures that will be used to maintain sample custody and integrity. Include examples of chain-of-custody forms, traffic reports, sample identification, custody seals, laboratory sample receipt forms, and laboratory sample transfer forms. Attach or reference applicable SOPs.

Worksheet Not Applicable (State Reason)

Field Sample Custody Procedures (sample collection, packaging, shipment, and delivery to laboratory):

Samples will be collected by field team members under the supervision of the FTL. As samples are collected, they will be placed in containers and labeled, as outlined below. Labels will be taped to the jar to ensure they do not separate. Samples will be cushioned with packaging material and placed into coolers containing enough ice to keep the samples below 4°C until they are received by the laboratory. The chain of custody (COC) will also be placed into the cooler. Coolers will be shipped to the laboratory via FedEx, with the airbill number indicated on the COC (to relinquish custody). Upon delivery, the laboratory will log in each cooler and report the status of the samples.

Laboratory Sample Custody Procedures (receipt of samples, archiving, disposal):

See the laboratory SOPs 4.1 "Receiving Samples," 4.6 "Storing Samples," and 4.8 "Purging, Storing, and Preparing Completed Extracts for Disposal" for details of sample handling.

Sample Identification Procedures:

Upon receipt of a cooler, the receiving clerk signs the COC and records the temperature of the temperature blank (if absent, a sample container is used). The sample containers in the cooler are unpacked and checked against the client's COC. Any discrepancies or breakage is noted on the COC. If any water samples require preservation, the clerk will check the pH values (except VOCs, gasoline range organic & RSK175) to see if they fall within the acceptable range. The clerk will deliver the COC (and any other paperwork, for example, temperature or pH QA notice – see SOP 4.1) to the project manager for LIMS entry and client contact (if needed).

Sample labels will include, at a minimum, client name, site, sample ID, date/time collected, analysis group or method, and sampler's initials. The field logbook will identify the sample ID with the location, depth, date/time collected, and the parameters requested. The

QAPP Worksheet #27 (UFP-QAPP Manual Section 3.3.3) Sample Custody Requirements

laboratory will assign each field sample a laboratory sample ID based on information in the COC. The laboratory will send sample log-in forms to EIS to check that sample IDs and parameters are correct.

Chain-of-custody Procedures:

Chains of custody will include, at a minimum, laboratory contact information, client contact information, sample information, and relinquished by/received by information. Sample information will include sample ID, date/time collected, number and type of containers, preservative information, analysis method, and comments. The COC will also have the sampler's name and signature. The COC will link location of the sample from the field logbook to the laboratory receipt of the sample. The laboratory will use the sample information to populate the LIMS database for each sample.

QAPP Worksheet #28
(UFP-QAPP Manual Section 3.4)
QC Samples Table

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

Worksheet Not Applicable (State Reason)

QAPP Worksheet #28-1
QC Samples Table

Matrix	Soil/Sediment
Analytical Group	TCL Volatiles
Concentration Level	Low Soil (OLM04.3)
Sampling SOP¹	SA-1.3, SA-1.2
Analytical Method/SOP Reference	EPA CLP OLM04.3/ 1.1.4.1, 1.2.3.2, 1.2.3.2
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	35

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action ²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Equipment Rinsate Blank	one per equipment per day	Must meet all internal standard and system monitoring compound criteria in SOW; all target compounds < CRQL except methylene chloride and cyclohexanone < 2.5 times CRQL; acetone and 2-butanone < 5 times CRQL	Qualify data as necessary	Data Validation Subcontractor	contamination	Must meet all internal standard and system monitoring compound criteria in SOW; all target compounds < CRQL except methylene chloride and cyclohexanone < 2.5 times CRQL; acetone and 2-butanone < 5 times CRQL
Field Ambient Blank	one per week	Must meet all internal standard and system monitoring compound criteria in SOW; all target compounds < CRQL except methylene chloride and cyclohexanone < 2.5 times CRQL; acetone and 2-butanone < 5 times CRQL	Qualify data as necessary	Data Validation Subcontractor	contamination	Must meet all internal standard and system monitoring compound criteria in SOW; all target compounds < CRQL except methylene chloride and cyclohexanone < 2.5 times CRQL; acetone and 2-butanone < 5 times CRQL
Trip Blank	one per cooler containing volatiles	Must meet all internal standard and system monitoring compound criteria in SOW; all target compounds < CRQL except methylene chloride and cyclohexanone < 2.5 times CRQL; acetone and 2-butanone < 5 times CRQL	Qualify data as necessary	Data Validation Subcontractor	contamination	Must meet all internal standard and system monitoring compound criteria in SOW; all target compounds < CRQL except methylene chloride and cyclohexanone < 2.5 times CRQL; acetone and 2-butanone < 5 times CRQL
Field Duplicate	one per 10 field samples	should meet RPD criteria of 35% for soil/sediment	Qualify data as necessary	Data Validation Subcontractor	contamination	should meet RPD criteria of 35% for soil/sediment

**QAPP Worksheet #28-1
QC Samples Table**

Matrix	Soil/Sediment					
Analytical Group	TCL Volatiles					
Concentration Level	Low Soil (OLM04.3)					
Sampling SOP¹	SA-1.3, SA-1.2					
Analytical Method/SOP Reference	EPA CLP OLM04.3/ 1.1.4.1, 1.2.3.2, 1.2.3.2					
Field Team Leader	Chris Houck					
Field Sampling Organization	CH2M HILL					
Analytical Organization	CompuChem					
No. of Sample Locations	35					
QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	1 per 12-hour period in which samples are analyzed	Must meet all internal standard and system monitoring compound criteria in SOW; all target compounds < CRQL except methylene chloride and cyclohexanone < 2.5 times CRQL; acetone and 2-butanone < 5 times CRQL	If contaminated, find and eliminate source of contamination. Reanalyze.	LQAO	contamination/bias	Must meet all internal standard and system monitoring compound criteria in SOW; all target compounds < CRQL except methylene chloride and cyclohexanone < 2.5 times CRQL; acetone and 2-butanone < 5 times CRQL
Instrument Blank	analyze after high concentration sample	Must meet all internal standard and system monitoring compound criteria in SOW; all target compounds < CRQL except methylene chloride and cyclohexanone < 2.5 times CRQL; acetone and 2-butanone < 5 times CRQL	reanalyze	LQAO	contamination/bias	Must meet all internal standard and system monitoring compound criteria in SOW; all target compounds < CRQL except methylene chloride and cyclohexanone < 2.5 times CRQL; acetone and 2-butanone < 5 times CRQL
Matrix spike/Matrix spike duplicate	if requested, per SDG or per 20 field samples in an SDG; per concentration level	must meet relative RT criteria; should meet advisory % recovery and RPD criteria in SOW	no further action necessary; investigate repeated failures	LQAO	precision/accuracy	must meet relative RT criteria; should meet advisory % recovery and RPD criteria in SOW
Storage Blank	1 per SDG, after all sample in the SDG have been analyzed	same as method blank	reanalyze	LQAO	contamination/bias	same as method blank

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

**QAPP Worksheet #28-2
QC Samples Table**

Matrix	Soil/Sediment
Analytical Group	TCL Semivolatiles
Concentration Level	Low Soil (OLM04.3)
Sampling SOP¹	SA-1.3, SA-1.2
Analytical Method/SOP Reference	EPA CLP OLM04.3/ 2.4.3.2, 2.4.3.4
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	35

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Equipment Rinsate Blank	one per day per equipment	must meet all internal standard and surrogate criteria in SOW; all target compounds < CRQL except phthalate esters < 5 times CRQL	Qualify data as necessary	Data Validation Subcontractor	contamination	must meet all internal standard and surrogate criteria in SOW; all target compounds < CRQL except phthalate esters < 5 times CRQL
Field Ambient Blank	one per week	must meet all internal standard and surrogate criteria in SOW; all target compounds < CRQL except phthalate esters < 5 times CRQL	Qualify data as necessary	Data Validation Subcontractor	contamination	must meet all internal standard and surrogate criteria in SOW; all target compounds < CRQL except phthalate esters < 5 times CRQL
Field Duplicate	one per 10 field samples	should meet RPD criteria of 35% for soil/sediment	Qualify data as necessary	Data Validation Subcontractor	contamination	should meet RPD criteria of 35% for soil/sediment
Method Blank	1 per extraction batch not to exceed 20 field samples	must meet all internal standard and surrogate criteria in SOW; all target compounds < CRQL except phthalate esters < 5 times CRQL	If contaminated, find and eliminate the source. If internal or DMC fail acceptance criteria; reanalyze. If surrogates continue to fail, re-extract and reanalyze along with all associated samples	LQAO	contamination/bias	must meet all internal standard and surrogate criteria in SOW; all target compounds < CRQL except phthalate esters < 5 times CRQL

**QAPP Worksheet #28-2
 QC Samples Table**

Matrix	Soil/Sediment
Analytical Group	TCL Semivolatiles
Concentration Level	Low Soil (OLM04.3)
Sampling SOP¹	SA-1.3, SA-1.2
Analytical Method/SOP Reference	EPA CLP OLM04.3/ 2.4.3.2, 2.4.3.4
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	35

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Matrix spike/Matrix spike duplicate	If requested, per SDG or per 20 field samples within an SDG; per concentration level	must meet relative RT criteria; should meet advisory spike recovery and RPD criteria in the SOW	no further action necessary; investigate repeated failures	LQAO	precision/accuracy	must meet relative RT criteria; should meet advisory spike recovery and RPD criteria in the SOW

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

**QAPP Worksheet #28-3
 QC Samples Table**

Matrix	Soil/Sediment
Analytical Group	TCL Pesticides/ Aroclors
Concentration Level	Soil (OLM04.3)
Sampling SOP¹	SA-1.3, SA-1.2
Analytical Method/SOP Reference	EPA CLP OLM04.3/ 2.1.1.1, 2.1.1.6
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	35

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Equipment Rinsate Blank	one per day per equipment	all target compounds < CRQL; surrogates must be within RT windows; surrogate recoveries must be within 30-150%	Qualify data as necessary	Data Validation Subcontractor	contamination	all target compounds < CRQL; surrogates must be within RT windows; surrogate recoveries must be within 30-150%
Field Ambient Blank	one per week	all target compounds < CRQL; surrogates must be within RT windows; surrogate recoveries must be within 30-150%	Qualify data as necessary	Data Validation Subcontractor	contamination	all target compounds < CRQL; surrogates must be within RT windows; surrogate recoveries must be within 30-150%
Field Duplicate	one per 10 field samples	should meet RPD criteria of 35% for soil/sediment	Qualify data as necessary	Data Validation Subcontractor	contamination	should meet RPD criteria of 35% for soil/sediment
Method Blank	1 per extraction batch not to exceed 20 field samples	all target compounds < CRQL; surrogates must be within RT windows; surrogate recoveries must be within 30-150%	If contaminated, find and eliminate the source. If acceptance criteria not met, reanalyze. If acceptance criteria still not met re-extract and reanalyze along with all associated samples.	LQAO	contamination/bias	all target compound < CRQL; surrogates must be within RT windows; surrogate recoveries must be within 30-150%

**QAPP Worksheet #28-3
QC Samples Table**

Matrix	Soil/Sediment
Analytical Group	TCL Pesticides/ Aroclors
Concentration Level	Soil (OLM04.3)
Sampling SOP¹	SA-1.3, SA-1.2
Analytical Method/SOP Reference	EPA CLP OLM04.3/ 2.1.1.1, 2.1.1.6
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	35

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Sulfur Blank	1 per batch of samples on which sulfur cleanup is performed	all target compounds < CRQL; surrogates must be within RT windows; surrogate recoveries must be within 30-150%	If contaminated, find and eliminate the source. If acceptance criteria not met, reanalyze. If acceptance criteria still not met re-extract and reanalyze along with all associated samples.	LQAO	contamination/bias	all target compound < CRQL; surrogates must be within RT windows; surrogate recoveries must be within 30-150%
Instrument Blank	1 to initiate each 12-hour analytical sequence	surrogates must be within RT windows; all target compounds < half CRQL	reanalyze	LQAO	contamination/bias	surrogates must be within RT windows; all target compounds < half CRQL
Matrix spike/Matrix spike duplicate	If requested, per SDG or per 20 field samples within an SDG	surrogates must be with in RT windows; should meet advisory spike % recovery and RPD acceptance criteria in the SOW	no further action necessary; investigate repeated failures	LQAO	precision/accuracy	surrogates must be with in RT windows; should meet advisory spike % recovery and RPD acceptance criteria in the SOW

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

**QAPP Worksheet #28-4
 QC Samples Table**

Matrix	Soil/Sediment
Analytical Group	TAL Metals/ Cyanide
Concentration Level	Soil (ILM04.1)
Sampling SOP¹	SA-1.3, SA-1.2
Analytical Method/SOP Reference	EPA CLP ILM04.1/ 3.1.1.3, 3.1.1.4, 3.4.3, 3.3.3, 3.3.4, 3.4.5
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	35

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Equipment Rinsate Blank	one per day per equipment	absolute values of all analyte concentrations must be ≤ the CRDL	Qualify data as necessary	Data Validation Subcontractor	contamination	absolute values of all analyte concentrations must be ≤ the CRDL
Field Ambient Blank	one per week	absolute values of all analyte concentrations must be ≤ the CRDL	Qualify data as necessary	Data Validation Subcontractor	contamination	absolute values of all analyte concentrations must be ≤ the CRDL
Field Duplicate	one per 10 field samples	should meet RPD criteria of 35% for soil/sediment	Qualify data as necessary	Data Validation Subcontractor	contamination	should meet RPD criteria of 35% for soil/sediment
CRDL Standard (CRI for ICP) (CRA for other instruments)	1 at the beginning and end of each sample analysis sequence not to exceed 20 analytical samples, including the CRI/CRA	no requirement		LQAO	accuracy	

**QAPP Worksheet #28-4
 QC Samples Table**

Matrix	Soil/Sediment
Analytical Group	TAL Metals/ Cyanide
Concentration Level	Soil (ILM04.1)
Sampling SOP¹	SA-1.3, SA-1.2
Analytical Method/SOP Reference	EPA CLP ILM04.1/ 3.1.1.3, 3.1.1.4, 3.4.3, 3.3.3, 3.3.4, 3.4.5
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	35

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Calibration Blank	Following each initial and continuing calibration; every 2 hours or every 10 analytical samples, whichever is more frequent	absolute values of all analyte concentrations must be < the CRDL	Stop analysis; correct problem; recalibrate	LQAO	contamination/bias	absolute values of all analyte concentrations must be < the CRDL
Preparation blank	1 per digestion batch	absolute values of all analyte concentrations must be ≤ the CRDL	re-prepare and reanalyze; except if concentration of analyte(s) in all associated samples is > 10x the concentration in the blank	LQAO	contamination/bias	absolute values of all analyte concentrations must be ≤ the CRDL

**QAPP Worksheet #28-4
 QC Samples Table**

Matrix	Soil/Sediment
Analytical Group	TAL Metals/ Cyanide
Concentration Level	Soil (ILM04.1)
Sampling SOP¹	SA-1.3, SA-1.2
Analytical Method/SOP Reference	EPA CLP ILM04.1/ 3.1.1.3, 3.1.1.4, 3.4.3, 3.3.3, 3.3.4, 3.4.5
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	35

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Interference Check Sample (ICS)	Follow the CRI at the beginning and end of the analytical sequence not to exceed 20 analytical samples, including the CRI/CRA, and the ICS; not required for Mercury or Cyanide analyses	must be within $\pm 2x$ the CRQL of the analyte's true value for ICSA solution; $\pm 20\%$ of the analyte's true value in the ICSAB solution	Check system. Correct problem. Recalibrate	LQAO	accuracy/bias	must be within $\pm 2x$ the CRQL of the analyte's true value for ICSA solution; $\pm 20\%$ of the analyte's true value in the ICSAB solution
Matrix Spike	1 per SDG	spike recovery limits are 75-125%	Flag data with an "N", unless recovery is $> 4x$ the spike added; analyze a post digestion spike (POS), if recoveries fail and analyte concentration is $< 4x$ the spike added (POS not required for Hg)	LQAO	accuracy/bias	spike recovery limits are 75-125%
LCS	1 per SDG or per preparation batch, whichever is more frequent	spike recovery limits are 80-125%; except for Ag and Sb	re-prepare and reanalyze digestion batch	LQAO	accuracy	spike recovery limits are 80-125%; except for Ag and Sb

**QAPP Worksheet #28-4
 QC Samples Table**

Matrix	Soil/Sediment
Analytical Group	TAL Metals/ Cyanide
Concentration Level	Soil (ILM04.1)
Sampling SOP¹	SA-1.3, SA-1.2
Analytical Method/SOP Reference	EPA CLP ILM04.1/ 3.1.1.3, 3.1.1.4, 3.4.3, 3.3.3, 3.3.4, 3.4.5
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	35

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Duplicate Sample	1 per SDG	RPD of 20%, if concentration is > 5x CRDL; or ± the CRDL if the concentration is < 5x CRDL	flag data for associated samples with a ""	LQAO	precision/accuracy	RPD of 20%, if concentration is > 5x CRDL; or ± the CRDL if the concentration is < 5x CRDL
Serial Dilution	1 per SDG; not required for Mercury and Cyanide analysis	should agree within 10% of the original sample	flag data for associated samples with an "E"	LQAO	precision/accuracy	should agree within 10% of the original sample

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

**QAPP Worksheet #28-5
 QC Samples Table**

Matrix	Soil/Sediment
Analytical Group	Explosives
Concentration Level	Medium (SW-846 8330)
Sampling SOP¹	L-3
Analytical Method/SOP Reference	SW-846 8330/ 2.3.2.2, 2.3.2.4
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	35

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Equipment Rinsate Blank	one per day per equipment	no target compounds > the reporting limit; surrogate recovery must be within the limits of 38-155%	Qualify data as necessary	Data Validation Subcontractor	contamination	no target compounds > the reporting limit; surrogate recovery must be within the limits of 38-155%
Field Ambient Blank	one per week	no target compounds > the reporting limit; surrogate recovery must be within the limits of 38-155%	Qualify data as necessary	Data Validation Subcontractor	contamination	no target compounds > the reporting limit; surrogate recovery must be within the limits of 38-155%
Field Duplicate	one per 10 field samples	should meet RPD criteria of 35% for soil/sediment	Qualify data as necessary	Data Validation Subcontractor	contamination	should meet RPD criteria of 35% for soil/sediment
Method Blank	1 per extraction batch not to exceed 20 field samples	no target compounds > the reporting limit; surrogate recovery must be within the limits of 38-155%	If contaminated, find and eliminate the source. If acceptance criteria not met, reanalyze. If acceptance criteria still not met re-extract and reanalyze along with all associated samples.	LQAO	contamination/bias	no target compounds > the reporting limit; surrogate recovery must be within the limits of 38-155%

**QAPP Worksheet #28-5
 QC Samples Table**

Matrix	Soil/Sediment
Analytical Group	Explosives
Concentration Level	Medium (SW-846 8330)
Sampling SOP¹	L-3
Analytical Method/SOP Reference	SW-846 8330/ 2.3.2.2, 2.3.2.4
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	35

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS	1 per extraction batch not to exceed 20 field samples	surrogate recovery must be within the limits of 38-155%; spike recovery limits must be within the range of 50-150%	If acceptance criteria not met, reanalyze. If acceptance criteria still not met re-extract and reanalyze along with all associated samples.	LQAO	accuracy/bias	surrogate recovery must be within the limits of 38-155%; spike recovery limits must be within the range of 50-150%
MS/MSD	per client request, 1 per 20 field samples in an SDG	spike recovery limits are 50-150%; RPD limits are ± 30%	Evaluate LCS; may report with qualifier	LQAO	precision/accuracy	spike recovery limits are 50-150%; RPD limits are ± 30%

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

**QAPP Worksheet #28-6
 QC Samples Table**

Matrix	Soil/Sediment					
Analytical Group	Explosives					
Concentration Level	Medium (SW-846 8332)					
Sampling SOP¹	L-3					
Analytical Method/SOP Reference	SW-846 8332/ 2.3.2.2, 2.3.2.4					
Field Team Leader	Chris Houck					
Field Sampling Organization	CH2M HILL					
Analytical Organization	CompuChem					
No. of Sample Locations	35					
QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Equipment Rinseate Blank	one per day per equipment	no target compounds > the reporting limit; surrogate recovery must be within the limits of 50-150%	Qualify data as necessary	Data Validation Subcontractor	contamination	no target compounds > the reporting limit; surrogate recovery must be within the limits of 50-150%
Field Ambient Blank	one per week	no target compounds > the reporting limit; surrogate recovery must be within the limits of 50-150%	Qualify data as necessary	Data Validation Subcontractor	contamination	no target compounds > the reporting limit; surrogate recovery must be within the limits of 50-150%
Field Duplicate	one per 10 field samples	should meet RPD criteria of 35% for soil/sediment	Qualify data as necessary	Data Validation Subcontractor	contamination	should meet RPD criteria of 35% for soil/sediment
Method Blank	1 per extraction batch not to exceed 20 field samples	no target compounds > the reporting limit; surrogate recovery must be within the limits of 50-150%	If contaminated, find and eliminate the source. If acceptance criteria not met, reanalyze. If acceptance criteria still not met re-extract and reanalyze along with all associated samples.	LQAO	contamination/bias	no target compounds > the reporting limit; surrogate recovery must be within the limits of 50-150%

**QAPP Worksheet #28-6
 QC Samples Table**

Matrix	Soil/Sediment
Analytical Group	Explosives
Concentration Level	Medium (SW-846 8332)
Sampling SOP¹	L-3
Analytical Method/SOP Reference	SW-846 8332/ 2.3.2.2, 2.3.2.4
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	35

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS	1 per extraction batch not to exceed 20 field samples	surrogate recovery must be within the limits of 50-150%; spike recovery limits must be within the range of 50-150%	reextract and reanalyzed associated samples	LQAO	accuracy/bias	surrogate recovery must be within the limits of 50-150%; spike recovery limits must be within the range of 50-150%
MS/MSD	per client request, 1 per 20 field samples in an SDG	spike recovery limits are 50-150%; RPD limits are 30%	Evaluate LCS; may report with qualifier	LQAO	precision/accuracy	spike recovery limits are 50-150%; RPD limits are 30%

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

**QAPP Worksheet #28-7
QC Samples Table**

Matrix	Soil/Sediment
Analytical Group	Explosives
Concentration Level	Medium (USACOE 89-35)
Sampling SOP¹	L-3
Analytical Method/SOP Reference	USACOE 89-35/ SOC-NITG
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CAS Kelso
No. of Sample Locations	35

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Equipment Rinseate Blank	one per day per decontaminated equipment	no target compounds > the reporting limit; surrogate recovery must be within the limits of 39-132%	Qualify data as necessary	Data Validation Subcontractor	contamination	no target compounds > the reporting limit; surrogate recovery must be within the limits of 39-132%
Field Ambient Blank	one per week	no target compounds > the reporting limit; surrogate recovery must be within the limits of 39-132%	Qualify data as necessary	Data Validation Subcontractor	contamination	no target compounds > the reporting limit; surrogate recovery must be within the limits of 39-132%
Field Duplicate	one per 10 field samples	should meet RPD criteria of 35% for soil/sediment	Qualify data as necessary	Data Validation Subcontractor	contamination	should meet RPD criteria of 35% for soil/sediment
Method Blank	1 per extraction batch not to exceed 20 field samples	no target compounds > the reporting limit; surrogate recovery must be within the limits of 39-132%	If contaminated, find and eliminate the source. If acceptance criteria not met, reanalyze. If acceptance criteria still not met re-extract and reanalyze along with all associated samples.	LQAO	contamination/bias	no target compounds > the reporting limit; surrogate recovery must be within the limits of 39-132%

**QAPP Worksheet #28-7
 QC Samples Table**

Matrix	Soil/Sediment
Analytical Group	Explosives
Concentration Level	Medium (USACOE 89-35)
Sampling SOP¹	L-3
Analytical Method/SOP Reference	USACOE 89-35/ SOC-NITG
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CAS Kelso
No. of Sample Locations	35

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS	1 per extraction batch not to exceed 20 field samples	surrogate recovery must be within the limits of 39-132%; spike recovery limits must be within the range of 50-150%	reextract and reanalyzed associated samples	LQAO	accuracy/bias	surrogate recovery must be within the limits of 39-132%; spike recovery limits must be within the range of 50-150%
MS/MSD	1 per 20 field samples in an SDG	spike recovery limits are 50-150%; RPD limits are 30%	Evaluate LCS; may report with qualifier	LQAO	precision/accuracy	spike recovery limits are 50-150%; RPD limits are 30%

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

**QAPP Worksheet #28-8
QC Samples Table**

Matrix	Soil/Sediment
Analytical Group	Explosives
Concentration Level	Medium (SW-846 6850)
Sampling SOP¹	L-3
Analytical Method/SOP Reference	SW-846 6850/ HPLC-DoD Perchlorate
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CAS Rochester
No. of Sample Locations	35

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Equipment Rinseate Blank	one per day per decontaminated equipment	no target compounds > 1/2 the reporting limit	Qualify data as necessary	Data Validation Subcontractor	contamination	no target compounds > 1/2 the reporting limit
Field Ambient Blank	one per week	no target compounds > 1/2 the reporting limit	Qualify data as necessary	Data Validation Subcontractor	contamination	no target compounds > 1/2 the reporting limit
Field Duplicate	one per 10 field samples	should meet RPD criteria of 35% for soil/sediment	Qualify data as necessary	Data Validation Subcontractor	contamination	should meet RPD criteria of 35% for soil/sediment
Method Blank	1 per batch not to exceed 20 field samples	no target compounds > 1/2 the reporting limit	If contaminated, find and eliminate the source and reprep and reanalyze the associated samples	Tom Traver/CAS-Rochester	contamination/bias	no target compounds > 1/2 the reporting limit
Reagent Blank	Prior to calibration and after each batch analyzed	no target compounds > 1/2 the reporting limit	If contaminated, reanalyze reagent blanks until no carryover is observed (<1/2 the reporting limit). Reanalyze all samples processed since the last clean reagent blank.	Tom Traver/CAS-Rochester	contamination	no target compounds > 1/2 the reporting limit
LCS	1 per batch not to exceed 20 field samples	spike recovery limits must be within the range of 85-115%	reextract and reanalyzed associated samples	Tom Traver/CAS-Rochester	accuracy/bias	spike recovery limits must be within the range of 85-115%
ICS	1/batch	spike recovery limits must be within the range of 85-115%	reextract and reanalyzed associated samples	Tom Traver/CAS-Rochester	interference	spike recovery limits must be within the range of 85-115%

**QAPP Worksheet #28-8
 QC Samples Table**

Matrix	Soil/Sediment
Analytical Group	Explosives
Concentration Level	Medium (SW-846 6850)
Sampling SOP¹	L-3
Analytical Method/SOP Reference	SW-846 6850/ HPLC-DoD Perchlorate
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CAS Rochester
No. of Sample Locations	35

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
LODV	At beginning and end of each batch	70-130% Recovery	Reanalyze samples <MRL with compliant LODV	Tom Traver/CAS-Rochester	accuracy/bias	70-130% Recovery
MS/MSD	if requested, 1 per 20 field samples in an SDG	spike recovery limits are 75-125%; RPD limits are 20%	Evaluate LCS; may report with qualifier and note outliers in the case narrative	Tom Traver/CAS-Rochester	precision/accuracy	spike recovery limits are 75-125%; RPD limits are 20%

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

QAPP Worksheet #28-9
QC Samples Table

Matrix	Soil/Sediment
Analytical Group	Wet Chemistry
Concentration Level	Medium (various)
Sampling SOP¹	SA-1.3, SA-1.2
Analytical Method/SOP Reference	Lloyd Kahn/ 3.6.2.2; SW-846 9045C/ 3.5.14.3
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	35

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Lloyd Kahn						
Field Duplicate	one per 10 field samples	should meet RPD criteria of 35% for soil/sediment	Qualify data as necessary	Data Validation Subcontractor	contamination	should meet RPD criteria of 35% for soil/sediment
Calibration Blank	following each initial and continuing calibration; every 10 samples	< CRQL	Stop analysis; correct problem; recalibrate	LQAO	contamination/bias	< CRQL
Method Blank	1 per batch of 20 samples	< CRQL	Stop analysis; correct problem; recalibrate	LQAO	contamination/bias	< CRQL
MS/MSD	Per client request, 1 per SDG	spike recovery \pm 25%; RPD of \leq 20	Evaluate LCS; may report with qualifier	LQAO	accuracy	spike recovery \pm 25%; RPD of \leq 20
LCS	1 per batch of 20 samples	spike recovery \pm 10%	reanalyze	LQAO	accuracy	spike recovery \pm 10%
Initial Calibration Verification (ICV)	immediately following initial calibration	must agree within \pm 10% of true value	Stop analysis; correct problem; recalibrate	LQAO	accuracy	must agree within \pm 10% of true value

**QAPP Worksheet #28-9
 QC Samples Table**

Matrix	Soil/Sediment					
Analytical Group	Wet Chemistry					
Concentration Level	Medium (various)					
Sampling SOP¹	SA-1.3, SA-1.2					
Analytical Method/SOP Reference	Lloyd Kahn/ 3.6.2.2; SW-846 9045C/ 3.5.14.3					
Field Team Leader	Chris Houck					
Field Sampling Organization	CH2M HILL					
Analytical Organization	CompuChem					
No. of Sample Locations	35					
QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
SW-846 9045C						
ICV (Initial Calibration Verification)	1 per batch of 20 samples	± 0.05 pH unit of the temperature adjusted pH value	recalibrate pH meter; reanalyze	LQAO	accuracy	± 0.05 pH unit of the temperature adjusted pH value
CCV(Continuing Calibration Verification)	1 per 10 samples	± 0.10 pH unit of the temperature adjusted pH value	recalibrate pH meter; reanalyze	LQAO	accuracy	± 0.10 pH unit of the temperature adjusted pH value
Duplicate sample	1 per 10 samples	must agree within ± 0.10 pH units	recalibrate pH meter; reanalyze	LQAO	precision/accuracy	must agree within ± 0.10 pH units

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

QAPP Worksheet #28-10
QC Samples Table

Matrix	Groundwater / Surface Water
Analytical Group	TCL Volatiles
Concentration Level	Water (OLM04.3)
Sampling SOP¹	SA-1.1, SA-1.2
Analytical Method/SOP Reference	EPA CLP OLM04.3/ 1.2.3.3
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	15

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Equipment Rinseate Blank	one per day per equipment	Must meet all internal standard and system monitoring compound criteria in SOW; all target compounds < CRQL except methylene chloride and cyclohexanone < 2.5 times CRQL; acetone and 2-butanone < 5 times CRQL	Qualify data as necessary	Data Validation Subcontractor	contamination	Must meet all internal standard and system monitoring compound criteria in SOW; all target compounds < CRQL except methylene chloride and cyclohexanone < 2.5 times CRQL; acetone and 2-butanone < 5 times CRQL
Field Ambient Blank	one per week	Must meet all internal standard and system monitoring compound criteria in SOW; all target compounds < CRQL except methylene chloride and cyclohexanone < 2.5 times CRQL; acetone and 2-butanone < 5 times CRQL	Qualify data as necessary	Data Validation Subcontractor	contamination	Must meet all internal standard and system monitoring compound criteria in SOW; all target compounds < CRQL except methylene chloride and cyclohexanone < 2.5 times CRQL; acetone and 2-butanone < 5 times CRQL

QAPP Worksheet #28-10
QC Samples Table

Matrix	Groundwater / Surface Water
Analytical Group	TCL Volatiles
Concentration Level	Water (OLM04.3)
Sampling SOP¹	SA-1.1, SA-1.2
Analytical Method/SOP Reference	EPA CLP OLM04.3/ 1.2.3.3
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	15

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Trip Blank	one per cooler containing volatiles	Must meet all internal standard and system monitoring compound criteria in SOW; all target compounds < CRQL except methylene chloride and cyclohexanone < 2.5 times CRQL; acetone and 2-butanone < 5 times CRQL	Qualify data as necessary	Data Validation Subcontractor	contamination	Must meet all internal standard and system monitoring compound criteria in SOW; all target compounds < CRQL except methylene chloride and cyclohexanone < 2.5 times CRQL; acetone and 2-butanone < 5 times CRQL
Field Duplicate	one per 10 field samples	should meet RPD criteria of 25% for groundwater/ surface water	Qualify data as necessary	Data Validation Subcontractor	contamination	should meet RPD criteria of 35% for soil/sediment
Method Blank	1 per 12-hour period in which samples are analyzed	Must meet all internal standard and system monitoring compound criteria in SOW; all target compounds < CRQL except methylene chloride and cyclohexanone < 2.5 times CRQL; acetone and 2-butanone < 5 times CRQL	If contaminated, find and eliminate source of contamination. Reanalyze along with any associated samples	LQAO	contamination/bias	Must meet all internal standard and system monitoring compound criteria in SOW; all target compounds < CRQL except methylene chloride and cyclohexanone < 2.5 times CRQL; acetone and 2-butanone < 5 times CRQL

**QAPP Worksheet #28-10
QC Samples Table**

Matrix	Groundwater / Surface Water
Analytical Group	TCL Volatiles
Concentration Level	Water (OLM04.3)
Sampling SOP¹	SA-1.1, SA-1.2
Analytical Method/SOP Reference	EPA CLP OLM04.3/ 1.2.3.3
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	15

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Instrument Blank	analyze after high concentration sample	Must meet all internal standard and system monitoring compound criteria in SOW; all target compounds < CRQL except methylene chloride and cyclohexanone < 2.5 times CRQL; acetone and 2-butanone < 5 times CRQL	reanalyze	LQAO	contamination/bias	Must meet all internal standard and system monitoring compound criteria in SOW; all target compounds < CRQL except methylene chloride and cyclohexanone < 2.5 times CRQL; acetone and 2-butanone < 5 times CRQL
Matrix spike/Matrix spike duplicate	if requested, per SDG or per 20 field samples within an SDG	must meet internal standard relative RT criteria; should meet advisory % recovery and RPD criteria in SOW	No further action required; investigate, if repeated failures occur	LQAO	precision/accuracy	must meet internal standard relative RT criteria; should meet advisory % recovery and RPD criteria in SOW
Storage Blank	1 per SDG	same as method blank	reanalyze	LQAO	contamination/bias	same as method blank

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

**QAPP Worksheet #28-11
QC Samples Table**

Matrix	Groundwater / Surface Water					
Analytical Group	TCL Semivolatiles					
Concentration Level	Water (OLM04.3)					
Sampling SOP¹	SA-1.1, SA-1.2					
Analytical Method/SOP Reference	EPA CLP OLM04.3/ 2.4.3.1, 2.4.3.4					
Field Team Leader	Chris Houck					
Field Sampling Organization	CH2M HILL					
Analytical Organization	CompuChem					
No. of Sample Locations	15					
QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Equipment Rinseate Blank	one per day per equipment	must meet all internal standard and surrogate criteria in SOW; all target compounds < CRQL except phthalate esters < 5 times CRQL	Qualify data as necessary	Data Validation Subcontractor	contamination	must meet all internal standard and surrogate criteria in SOW; all target compounds < CRQL except phthalate esters < 5 times CRQL
Field Ambient Blank	one per week	must meet all internal standard and surrogate criteria in SOW; all target compounds < CRQL except phthalate esters < 5 times CRQL	Qualify data as necessary	Data Validation Subcontractor	contamination	must meet all internal standard and surrogate criteria in SOW; all target compounds < CRQL except phthalate esters < 5 times CRQL
Field Duplicate	one per 10 field samples	should meet RPD criteria of 25% for groundwater/surface water	Qualify data as necessary	Data Validation Subcontractor	contamination	should meet RPD criteria of 35% for soil/sediment
Method Blank	1 per extraction batch not to exceed 20 field samples	must meet all internal standard and surrogate criteria in SOW; all target compounds < CRQL except phthalate esters < 5 times CRQL	If contaminated, find and eliminate the source. If internal or surrogate standard fail acceptance criteria; reanalyze. If surrogates continue to fail, re-extract and reanalyze along with all associated samples	LQAO	contamination/bias	must meet all internal standard and surrogate criteria in SOW; all target compounds < CRQL except phthalate esters < 5 times CRQL

**QAPP Worksheet #28-11
 QC Samples Table**

Matrix	Groundwater / Surface Water
Analytical Group	TCL Semivolatiles
Concentration Level	Water (OLM04.3)
Sampling SOP¹	SA-1.1, SA-1.2
Analytical Method/SOP Reference	EPA CLP OLM04.3/ 2.4.3.1, 2.4.3.4
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	15

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Matrix spike/Matrix duplicate	if requested, per 20 field samples; per concentration level	must meet internal standard relative RT criteria; should meet advisory % recovery and RPD criteria in the SOW	No further action required; investigate if repeated failures occur	LQAO	precision/accuracy	must meet internal standard relative RT criteria; should meet advisory % recovery and RPD criteria in the SOW

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

QAPP Worksheet #28-12
QC Samples Table

Matrix	Groundwater / Surface Water
Analytical Group	TCL Pesticides/ Aroclors
Concentration Level	Water (OLM04.3)
Sampling SOP¹	SA-1.1, SA-1.2
Analytical Method/SOP Reference	EPA CLP OLM04.3/ 2.1.1.6, 2.1.1.6, 2.1.1.5
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	15

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action ²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Equipment Rinsate Blank	one per day per equipment	all target compounds < CRQL; surrogates must be within RT windows; surrogate recoveries must be within 30-150%	Qualify data as necessary	Data Validation Subcontractor	contamination	all target compounds < CRQL; surrogates must be within RT windows; surrogate recoveries must be within 30-150%
Field Ambient Blank	one per week	all target compounds < CRQL; surrogates must be within RT windows; surrogate recoveries must be within 30-150%	Qualify data as necessary	Data Validation Subcontractor	contamination	all target compounds < CRQL; surrogates must be within RT windows; surrogate recoveries must be within 30-150%
Field Duplicate	one per 10 field samples	should meet RPD criteria of 25% for groundwater/surface water	Qualify data as necessary	Data Validation Subcontractor	contamination	should meet RPD criteria of 25% for groundwater/surface water
Method Blank	1 per extraction batch not to exceed 20 field samples	all target compounds < CRQL; surrogates must be within RT windows; surrogate recoveries must be within 30-150%	If contaminated, find and eliminate the source. If acceptance criteria not met, reanalyze. If acceptance criteria still not met re-extract and reanalyze along with all associated samples.	LQAO	contamination/bias	all target compounds < CRQL; surrogates must be within RT windows; surrogate recoveries must be within 30-150%

QAPP Worksheet #28-12
QC Samples Table

Matrix	Groundwater / Surface Water
Analytical Group	TCL Pesticides/ Aroclors
Concentration Level	Water (OLM04.3)
Sampling SOP¹	SA-1.1, SA-1.2
Analytical Method/SOP Reference	EPA CLP OLM04.3/ 2.1.1.6, 2.1.1.6, 2.1.1.5
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	15

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action ²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Sulfur Cleanup Blank	1 per batch of samples on which sulfur cleanup is performed	all target compounds < CRQL; surrogates must be within RT windows; surrogate recoveries must be within 30-150%	If contaminated, find and eliminate the source. If acceptance criteria not met, reanalyze. If acceptance criteria still not met re-extract and reanalyze along with all associated samples.	LQAO	contamination/bias	all target compounds < CRQL; surrogates must be within RT windows; surrogate recoveries must be within 30-150%
Instrument Blank	1 to initiate each 12-hour analytical sequence	target compounds must be < half CRQL; surrogates must be within the RT windows	reanalyze	LQAO	contamination/bias	target compounds must be < half CRQL; surrogates must be within the RT windows
Matrix spike/Matrix spike duplicate	If requested, per 20 field samples in an SDG	surrogates must be within RT windows; should meet advisory % recovery and RPD criteria in the SOW	No further action required; investigate if repeated failures occur	LQAO	precision/accuracy	surrogates must be within RT windows; should meet advisory % recovery and RPD criteria in the SOW

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

QAPP Worksheet #28-13
QC Samples Table

Matrix	Groundwater / Surface Water
Analytical Group	TAL Metals/ Cyanide TAL Filtered Metals
Concentration Level	Water (ILM04.1)
Sampling SOP¹	SA-1.1, SA-1.2
Analytical Method/SOP Reference	EPA CLP ILM04.1/ 3.1.1.2, 3.1.1.4, 3.4.1, 3.4.5, 3.3.1, 3.3.4
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	15

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Equipment Rinsate Blank	one per day per equipment	absolute values of all analyte concentrations must be ≤ the CRDL	Qualify data as necessary	Data Validation Subcontractor	contamination	absolute values of all analyte concentrations must be ≤ the CRDL
Field Ambient Blank	one per week	absolute values of all analyte concentrations must be ≤ the CRDL	Qualify data as necessary	Data Validation Subcontractor	contamination	absolute values of all analyte concentrations must be ≤ the CRDL
Field Duplicate	one per 10 field samples	should meet RPD criteria of 25% for groundwater/surface water	Qualify data as necessary	Data Validation Subcontractor	contamination	should meet RPD criteria of 35% for soil/sediment
CRDL Standard (CRI for ICP) (CRA for other instruments)	1 at the beginning and end of each sample analysis sequence not to exceed 20 analytical samples, including the CRI/CRA	no requirement		LQAO	accuracy	no requirement

QAPP Worksheet #28-13
QC Samples Table

Matrix	Groundwater / Surface Water					
Analytical Group	TAL Metals/ Cyanide TAL Filtered Metals					
Concentration Level	Water (ILM04.1)					
Sampling SOP¹	SA-1.1, SA-1.2					
Analytical Method/SOP Reference	EPA CLP ILM04.1/ 3.1.1.2, 3.1.1.4, 3.4.1, 3.4.5, 3.3.1, 3.3.4					
Field Team Leader	Chris Houck					
Field Sampling Organization	CH2M HILL					
Analytical Organization	CompuChem					
No. of Sample Locations	15					
QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Calibration Blank	Following each initial and continuing calibration; every 2 hours or every 10 analytical samples, whichever is more frequent	absolute values of all analyte concentrations must be < the CRDL	Stop analysis; correct problem; recalibrate	LQAO	contamination/bias	absolute values of all analyte concentrations must be < the CRDL
Preparation blank	1 per digestion batch	absolute values of all analyte concentrations must be ≤ the CRDL	re-prepare and reanalyze; except if concentration of analyte(s) in all associated samples is > 10x the concentration in the blank	LQAO	contamination/bias	absolute values of all analyte concentrations must be ≤ the CRDL
Interference Check Sample (ICS)	Follow the CRI at the beginning and end of the analytical sequence not to exceed 20 analytical samples, including the CRI/CRA, and the ICS; not required for Mercury or Cyanide analyses	must be within ± 2x the CRQL of the analyte's true value for ICSA solution; ± 20% of the analyte's true value in the ICSAB solution	Check system. Correct problem. Recalibrate	LQAO	accuracy/bias	must be within ± 2x the CRQL of the analyte's true value for ICSA solution; ± 20% of the analyte's true value in the ICSAB solution

QAPP Worksheet #28-13
QC Samples Table

Matrix	Groundwater / Surface Water					
Analytical Group	TAL Metals/ Cyanide TAL Filtered Metals					
Concentration Level	Water (ILM04.1)					
Sampling SOP¹	SA-1.1, SA-1.2					
Analytical Method/SOP Reference	EPA CLP ILM04.1/ 3.1.1.2, 3.1.1.4, 3.4.1, 3.4.5, 3.3.1, 3.3.4					
Field Team Leader	Chris Houck					
Field Sampling Organization	CH2M HILL					
Analytical Organization	CompuChem					
No. of Sample Locations	15					

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action ²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Matrix Spike	1 per SDG	spike recovery limits are 75-125%	Flag data with an "N", unless recovery is > 4x the spike added; analyze a post digestion spike (POS), if recoveries fail and analyte concentration is < 4x the spike added (POS not required for Hg)	LQAO	accuracy/bias	spike recovery limits are 75-125%
LCS	1 per SDG or per preparation batch, whichever is more frequent	spike recovery limits are 80-125%; except for Ag and Sb	re-prepare and reanalyze digestion batch	LQAO	accuracy	spike recovery limits are 80-125%; except for Ag and Sb
Duplicate Sample	1 per SDG	RPD of 20%, if concentration is > 5x CRDL; or ± the CRDL if the concentration is < 5x CRDL	flag data for associated samples with a ""	LQAO	precision/accuracy	RPD of 20%, if concentration is > 5x CRDL; or ± the CRDL if the concentration is < 5x CRDL
Serial Dilution	1 per SDG; not required for Mercury and Cyanide analysis	should agree within 10% of the original sample	flag data for associated samples with an "E"	LQAO	precision/accuracy	should agree within 10% of the original sample

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

QAPP Worksheet #28-14
QC Samples Table

Matrix	Groundwater / Surface Water					
Analytical Group	Explosives					
Concentration Level	Medium (SW-846 8330)					
Sampling SOP¹	SA-1.1, SA-1.2					
Analytical Method/SOP Reference	SW-846 8330/ 2.3.2.5, 2.3.2.6					
Field Team Leader	Chris Houck					
Field Sampling Organization	CH2M HILL					
Analytical Organization	CompuChem					
No. of Sample Locations	15					
QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Equipment Rinseate Blank	one per day per decontaminated equipment	no target compounds > the reporting limit; surrogate recovery must be within the limits of 39-132%	Qualify data as necessary	Data Validation Subcontractor	contamination	no target compounds > the reporting limit; surrogate recovery must be within the limits of 39-132%
Field Ambient Blank	one per week	no target compounds > the reporting limit; surrogate recovery must be within the limits of 39-132%	Qualify data as necessary	Data Validation Subcontractor	contamination	no target compounds > the reporting limit; surrogate recovery must be within the limits of 39-132%
Field Duplicate	one per 10 field samples	should meet RPD criteria of 25% for groundwater/surface water	Qualify data as necessary	Data Validation Subcontractor	contamination	should meet RPD criteria of 35% for soil/sediment

QAPP Worksheet #28-14
QC Samples Table

Matrix	Groundwater / Surface Water
Analytical Group	Explosives
Concentration Level	Medium (SW-846 8330)
Sampling SOP¹	SA-1.1, SA-1.2
Analytical Method/SOP Reference	SW-846 8330/ 2.3.2.5, 2.3.2.6
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	15

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	1 per extraction batch not to exceed 20 field samples	no target compounds > the reporting limit; surrogate recovery must be within the limits of 39-132%	If contaminated, find and eliminate the source. If acceptance criteria not met, reanalyze. If acceptance criteria still not met re-extract and reanalyze along with all associated samples.	LQAO	contamination/bias	no target compounds > the reporting limit; surrogate recovery must be within the limits of 39-132%
LCS	1 per extraction batch not to exceed 20 field samples	surrogate recovery must be within the limits of 39-132%; spike recovery limits must be within the range of 50-150%	If acceptance criteria not met, reanalyze. If acceptance criteria still not met re-extract and reanalyze along with all associated samples.	LQAO	accuracy/bias	surrogate recovery must be within the limits of 39-132%; spike recovery limits must be within the range of 50-150%
MS/MSD	1 per 20 field samples in an SDG	spike recovery limits are 50-150%; RPD limits are ± 30	Evaluate LCS; quality as needed	LQAO	precision/accuracy	spike recovery limits are 50-150%; RPD limits are ± 30

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

QAPP Worksheet #28-15
QC Samples Table

Matrix	Groundwater / Surface Water					
Analytical Group	Explosives					
Concentration Level	Medium (SW-846 8332)					
Sampling SOP¹	SA-1.1, SA-1.2					
Analytical Method/SOP Reference	SW-846 8332/ 2.3.2.5, 2.3.2.6					
Field Team Leader	Chris Houck					
Field Sampling Organization	CH2M HILL					
Analytical Organization	CompuChem					
No. of Sample Locations	15					
QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Equipment Rinseate Blank	one per day per decontaminated equipment	no target compounds > the reporting limit; surrogate recovery must be within the limits of 50-150%	Qualify data as necessary	Data Validation Subcontractor	contamination	no target compounds > the reporting limit; surrogate recovery must be within the limits of 50-150%
Field Ambient Blank	one per week	no target compounds > the reporting limit; surrogate recovery must be within the limits of 50-150%	Qualify data as necessary	Data Validation Subcontractor	contamination	no target compounds > the reporting limit; surrogate recovery must be within the limits of 50-150%
Field Duplicate	one per 10 field samples	should meet RPD criteria of 25% for groundwater/surface water	Qualify data as necessary	Data Validation Subcontractor	contamination	should meet RPD criteria of 35% for soil/sediment

QAPP Worksheet #28-15
QC Samples Table

Matrix	Groundwater / Surface Water
Analytical Group	Explosives
Concentration Level	Medium (SW-846 8332)
Sampling SOP¹	SA-1.1, SA-1.2
Analytical Method/SOP Reference	SW-846 8332/ 2.3.2.5, 2.3.2.6
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	15

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action ²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	1 per extraction batch not to exceed 20 field samples	no target compounds > the reporting limit; surrogate recovery must be within the limits of 50-150%	If contaminated, find and eliminate the source. If acceptance criteria not met, reanalyze. If acceptance criteria still not met re-extract and reanalyze along with all associated samples.	LQAO	contamination/bias	no target compounds > the reporting limit; surrogate recovery must be within the limits of 50-150%
LCS	1 per extraction batch not to exceed 20 field samples	surrogate recovery must be within the limits of 50-150%; spike recovery limits must be within the range of 50-150%	If acceptance criteria not met, reanalyze. If acceptance criteria still not met re-extract and reanalyze along with all associated samples.	LQAO	accuracy/bias	surrogate recovery must be within the limits of 50-150%; spike recovery limits must be within the range of 50-150%
MS/MSD	If requested, 1 per 20 field samples in an SDG	spike recovery limits are 50-150%; RPD limits are ± 30	Evaluate LCS; quality as needed	LQAO	precision/accuracy	spike recovery limits are 50-150%; RPD limits are ± 30

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

QAPP Worksheet #28-16
QC Samples Table

Matrix	Groundwater / Surface Water
Analytical Group	Explosives
Concentration Level	Medium (USACOE 89-35)
Sampling SOP¹	SA-1.1, SA-1.2
Analytical Method/SOP Reference	USACOE 89-35/ SOC-NITG
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CAS-Kelso
No. of Sample Locations	15

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Equipment Rinseate Blank	one per day per decontaminated equipment	no target compounds > the reporting limit; surrogate recovery must be within the limits of 39-132%	Qualify data as necessary	Data Validation Subcontractor	contamination	no target compounds > the reporting limit; surrogate recovery must be within the limits of 39-132%
Field Ambient Blank	one per week	no target compounds > the reporting limit; surrogate recovery must be within the limits of 39-132%	Qualify data as necessary	Data Validation Subcontractor	contamination	no target compounds > the reporting limit; surrogate recovery must be within the limits of 39-132%
Field Duplicate	one per 10 field samples	should meet RPD criteria of 30% for groundwater/surface water	Qualify data as necessary	Data Validation Subcontractor	contamination	should meet RPD criteria of 35% for soil/sediment

QAPP Worksheet #28-16
QC Samples Table

Matrix	Groundwater / Surface Water
Analytical Group	Explosives
Concentration Level	Medium (USACOE 89-35)
Sampling SOP¹	SA-1.1, SA-1.2
Analytical Method/SOP Reference	USACOE 89-35/ SOC-NITG
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CAS-Kelso
No. of Sample Locations	15

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action ²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	1 per extraction batch not to exceed 20 field samples	no target compounds > the reporting limit; surrogate recovery must be within the limits of 39-132%	If contaminated, find and eliminate the source. If acceptance criteria not met, reanalyze. If acceptance criteria still not met re-extract and reanalyze along with all associated samples.	LQAO	contamination/bias	no target compounds > the reporting limit; surrogate recovery must be within the limits of 39-132%
LCS	1 per extraction batch not to exceed 20 field samples	surrogate recovery must be within the limits of 39-132%; spike recovery limits must be within the range of 50-150%	reextract and reanalyzed associated samples	LQAO	accuracy/bias	surrogate recovery must be within the limits of 39-132%; spike recovery limits must be within the range of 50-150%
MS/MSD	1 per 20 field samples in an SDG	spike recovery limits are 50-150%; RPD limits are 30%	Evaluate LCS; may report with qualifier	LQAO	precision/accuracy	spike recovery limits are 50-150%; RPD limits are 30%

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

QAPP Worksheet #28-17
QC Samples Table

Matrix	Groundwater / Surface Water
Analytical Group	Explosives
Concentration Level	Medium (SW-846 6850)
Sampling SOP¹	SA-1.1, SA-1.2
Analytical Method/SOP Reference	SW-846 6850/ HPLC DoD Perchlorate
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CAS Rochester
No. of Sample Locations	15

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Equipment Rinseate Blank	one per day per decontaminated equipment	no target compounds > 1/2 the reporting limit	Qualify data as necessary	Data Validation Subcontractor	contamination	no target compounds > 1/2 the reporting limit
Field Ambient Blank	one per week	no target compounds > 1/2 the reporting limit	Qualify data as necessary	Data Validation Subcontractor	contamination	no target compounds > 1/2 the reporting limit
Field Duplicate	one per 10 field samples	should meet RPD criteria of 25% for groundwater/surface water	Qualify data as necessary	Data Validation Subcontractor	contamination	should meet RPD criteria of 35% for soil/sediment
Method Blank	1 per batch not to exceed 20 field samples	no target compounds > 1/2 the reporting limit	If contaminated, find and eliminate the source and reprep and reanalyze the associated samples	Tom Traver/CAS-Rochester	contamination/bias	no target compounds > 1/2 the reporting limit
Reagent Blank	Prior to calibration and after each batch analyzed	no target compounds > 1/2 the reporting limit	If contaminated, reanalyze reagent blanks until no carryover is observed (<1/2 the reporting limit). Reanalyze all samples processed since the last clean reagent blank.	Tom Traver/CAS-Rochester	contamination	no target compounds > 1/2 the reporting limit
LCS	1 per batch not to exceed 20 field samples	spike recovery limits must be within the range of 85-115%	reextract and reanalyzed associated samples	Tom Traver/CAS-Rochester	accuracy/bias	spike recovery limits must be within the range of 85-115%
ICS	1/batch	spike recovery limits must be within the range of 85-115%	reextract and reanalyzed associated samples	Tom Traver/CAS-Rochester	interference	spike recovery limits must be within the range of 85-115%

QAPP Worksheet #28-17
QC Samples Table

Matrix	Groundwater / Surface Water					
Analytical Group	Explosives					
Concentration Level	Medium (SW-846 6850)					
Sampling SOP¹	SA-1.1, SA-1.2					
Analytical Method/SOP Reference	SW-846 6850/ HPLC-DoD Perchlorate					
Field Team Leader	Chris Houck					
Field Sampling Organization	CH2M HILL					
Analytical Organization	CAS Rochester					
No. of Sample Locations	15					
QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
LODV	At beginning and end of each batch	70-130% Recovery	Reanalyze samples <MRL with compliant LODV	Tom Traver/CAS-Rochester	accuracy/bias	70-130% Recovery
MS/MSD	if requested, 1 per 20 field samples in an SDG	spike recovery limits are 75-125%; RPD limits are 20%	Evaluate LCS; may report with qualifier and note outliers in the case narrative	Tom Traver/CAS-Rochester	precision/accuracy	spike recovery limits are 75-125%; RPD limits are 20%

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

QAPP Worksheet #28-18
QC Samples Table

Matrix	Groundwater / Surface Water					
Analytical Group	Wet Chemistry					
Concentration Level	Medium (various)					
Sampling SOP¹	SA-1.1, SA-1.2					
Analytical Method/SOP Reference	EPA 130.2/ 3.5.7.1					
Field Team Leader	Chris Houck					
Field Sampling Organization	CH2M HILL					
Analytical Organization	CompuChem					
No. of Sample Locations	15					
QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field Duplicate	one per 10 field samples	should meet RPD criteria of 25% for groundwater/surface water	Qualify data as necessary	Data Validation Subcontractor	contamination	should meet RPD criteria of 35% for soil/sediment
Calibration Blank	following each initial and continuing calibration; every 10 samples	< CRQL	Stop analysis; correct problem; recalibrate	LQAO	contamination/bias	< CRQL
Method Blank	1 per batch of 20 field samples	< CRQL	Stop analysis; correct problem; recalibrate	LQAO	contamination/bias	< CRQL
ICV/LCS	1 per batch of 20 field samples	spike recovery limits \pm 25% for all methods	reanalyze	LQAO	accuracy	spike recovery limits \pm 25% for all methods
MS/MSD	If requested, 1 per batch of 20 field samples	spike recovery limits \pm 25%; RPD \pm 20	Evaluate LCS; quality as needed	LQAO	precision/accuracy	spike recovery limits \pm 25%; RPD \pm 20

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

QAPP Worksheet #28-19
QC Samples Table

Matrix	Groundwater / Surface Water
Analytical Group	Dioxins/Furans
Concentration Level	Medium (SW-846 8280A)
Sampling SOP¹	SA-1.1, SA-1.2
Analytical Method/SOP Reference	SW-846 8280A/ HRMS-8280A
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CAS-Houston
No. of Sample Locations	3

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Equipment Rinsate Blank	one per day per decontaminated equipment	must meet acceptance criteria for DMC and internal standards; all target compounds < CRQL, except OCDD and OCDF < 3x CRQL	Qualify data as necessary	Data Validation Subcontractor	contamination	must meet acceptance criteria for DMC and internal standards; all target compounds < CRQL, except OCDD and OCDF < 3x CRQL
Field Ambient Blank	one per week	must meet acceptance criteria for DMC and internal standards; all target compounds < CRQL, except OCDD and OCDF < 3x CRQL	Qualify data as necessary	Data Validation Subcontractor	contamination	must meet acceptance criteria for DMC and internal standards; all target compounds < CRQL, except OCDD and OCDF < 3x CRQL
Field Duplicate	one per 10 field samples	should meet RPD criteria of 25% for groundwater/surface water	Qualify data as necessary	Data Validation Subcontractor	contamination	should meet RPD criteria of 35% for soil/sediment

QAPP Worksheet #28-19
QC Samples Table

Matrix	Groundwater / Surface Water
Analytical Group	Dioxins/Furans
Concentration Level	Medium (SW-846 8280A)
Sampling SOP¹	SA-1.1, SA-1.2
Analytical Method/SOP Reference	SW-846 8280A/ HRMS-8280A
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CAS-Houston
No. of Sample Locations	3

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	1 per extraction batch not to exceed 20 field samples	must meet acceptance criteria for DMC and internal standards; all target compounds < CRQL, except OCDD and OCDF < 3x CRQL	If contaminated, find and eliminate the source. If internal or surrogate standard fail acceptance criteria; reinject. If surrogates continue to fail, re-extract and reanalyze along with all associated samples	LQAO	contamination/bias	must meet acceptance criteria for DMC and internal standards; all target compounds < CRQL, except OCDD and OCDF < 3x CRQL
Matrix spike/Matrix spike duplicate	if requested, per 20 field samples; per concentration level	must meet internal standard relative RT criteria; should meet advisory % recovery and RPD criteria in the DLM02.0 SOW	No further action required; investigate if repeated failures occur	LQAO	precision/accuracy	must meet internal standard relative RT criteria; should meet advisory % recovery and RPD criteria in the DLM02.0 SOW

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

DMC = Deuterated Monitoring Compounds

QAPP Worksheet #28-20
QC Samples Table

Matrix	Solid IDW
Analytical Group	TCLP Volatiles
Concentration Level	Medium (SW-846 8260B)
Sampling SOP¹	SA-1.3
Analytical Method/SOP Reference	SW-846 1311/ 2.7.3; SW-846 8260B/ 1.3.2.2
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	1

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
ZHE Blank	1 per batch of not more than 20 samples	must meet all internal standard and surrogate criteria in SOP; all target compounds < reporting limit	Reanalyze; If contaminated, find and eliminate source of contamination. Re-extract batch	LQAO	contamination/bias	must meet all internal standard and surrogate criteria in SOP; all target compounds < reporting limit
Method Blank	1 per 12-hour analytical not to exceed 20 samples	must meet all internal standard and surrogate criteria in SOP; all target compounds < reporting limit	reanalyze	LQAO	contamination/bias	must meet all internal standard and surrogate criteria in SOP; all target compounds < reporting limit
Laboratory Control Sample	1 per 12-hour analytical not to exceed 20 samples	must meet all internal standard and surrogate an % recovery criteria in SOP	reanalyze	LQAO	precision/accuracy	must meet all internal standard and surrogate an % recovery criteria in SOP
Matrix spike/Matrix spike duplicate	if requested, per SDG or per 20 field samples in an SDG	must meet relative RT criteria; should meet advisory % recovery and RPD criteria in SOP	Evaluate LCS; qualify as needed	LQAO	conatimation/bias	must meet relative RT criteria; should meet advisory % recovery and RPD criteria in SOP

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

QAPP Worksheet #28-21
QC Samples Table

Matrix	Solid IDW
Analytical Group	TCLP Semivolatiles
Concentration Level	Medium (SW-846 8270C)
Sampling SOP¹	SA-1.3
Analytical Method/SOP Reference	SW-846 1311/ 2.7.2; SW-846 8270C/ 2.5.2.7, 2.5.2.2
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	1

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
TCLP Blank	1 per extraction batch not to exceed 20 field samples	must meet all internal standard and surrogate criteria in SOP; all target compounds < reporting limit except phthalate esters which must be < 5 times the reporting limit	If contaminated, find and eliminate the source and reextract. If internal or system monitoring compounds fail acceptance criteria; reanalyze; reextract and analyze for continued failure	LQAO	contamination/bias	must meet all internal standard and surrogate criteria in SOP; all target compounds < reporting limit except phthalate esters which must be < 5 times the reporting limit
Method Blank	1 per extraction batch not to exceed 20 field samples	must meet all internal standard and surrogate criteria in SOP; all target compounds < reporting limit except phthalate esters which must be < 5 times the reporting limit	If contaminated, find and eliminate the source and reextract. If internal or system monitoring compounds fail acceptance criteria; reanalyze; reextract and analyze for continued failure	LQAO	contamination/bias	must meet all internal standard and surrogate criteria in SOP; all target compounds < reporting limit except phthalate esters which must be < 5 times the reporting limit
Laboratory Control Sample	1 per extraction batch not to exceed 20 field samples	must meet all internal standard, surrogate and spike recovery criteria in SOP	If acceptance criteria not met, reanalyze. If acceptance criteria still not met re-extract and reanalyze along with all associated samples.	LQAO	accuracy	must meet all internal standard, surrogate and spike recovery criteria in SOP

QAPP Worksheet #28-21
QC Samples Table

Matrix	Solid IDW
Analytical Group	TCLP Semivolatiles
Concentration Level	Medium (SW-846 8270C)
Sampling SOP¹	SA-1.3
Analytical Method/SOP Reference	SW-846 1311/ 2.7.2; SW-846 8270C/ 2.5.2.7, 2.5.2.2
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	1

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Matrix spike/Matrix spike duplicate	If requested, per SDG or per 20 field samples within an SDG	must meet relative RT criteria; should meet advisory spike recovery and RPD criteria in the SOP	Evaluate the LCS; qualify as needed	LQAO	precision/accuracy	must meet relative RT criteria; should meet advisory spike recovery and RPD criteria in the SOP

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

QAPP Worksheet #28-22
QC Samples Table

Matrix	Solid IDW
Analytical Group	TCLP Pesticides
Concentration Level	Medium (SW-846 8081A)
Sampling SOP¹	SA-1.3
Analytical Method/SOP Reference	SW-846 1311/ 2.7.2; SW-846 8081A/ 2.2.4.3, 2.2.4.10
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	1

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
TCLP Blank	1 per extraction batch not to exceed 20 field samples	same as Method Blank	If contaminated, find and eliminate the source;re-extract. If internal or surrogate standard fail acceptance criteria; reanalyze. If surrogates continue to fail, re-extract and reanalyze along with all associated samples	LQAO	contamination/bias	same as Method Blank
Method Blank	1 per extraction batch not to exceed 20 field samples	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries meet criteria in SOP	If contaminated, find and eliminate the source;re-extract. If internal or surrogate standard fail acceptance criteria; reanalyze. If surrogates continue to fail, re-extract and reanalyze along with all associated samples	LQAO	contamination/bias	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries meet criteria in SOP
Sulfur Blank	1 per batch of samples on which sulfur cleanup is performed	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries meet criteria in SOP	If contaminated, find and eliminate the source;re-extract. If internal or surrogate standard fail acceptance criteria; reanalyze. If surrogates continue to fail, re-extract and reanalyze along with all associated samples	LQAO	contamination/bias	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries meet criteria in SOP

QAPP Worksheet #28-22
QC Samples Table

Matrix	Solid IDW
Analytical Group	TCLP Pesticides
Concentration Level	Medium (SW-846 8081A)
Sampling SOP¹	SA-1.3
Analytical Method/SOP Reference	SW-846 1311/ 2.7.2; SW-846 8081A/ 2.2.4.3, 2.2.4.10
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	1

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory Control Sample	1 per SDG or 20 field samples	surrogates must be within RT windows; surrogate and spike recoveries must meet criteria in SOP	Reanalyze; Extract along with associated samples and analyze for repeated failure	LQAO	accuracy	surrogates must be within RT windows; surrogate and spike recoveries must meet criteria in SOP
Matrix spike/Matrix spike duplicate	If requested, per 20 field samples	surrogates must be within RT windows; should meet advisory spike recovery and RPD criteria in SOP	Evaluate the LCS; qualify as needed	LQAO	precision/accuracy	surrogates must be within RT windows; should meet advisory spike recovery and RPD criteria in SOP

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

QAPP Worksheet #28-23
QC Samples Table

Matrix	Solid IDW
Analytical Group	TCLP Herbicides
Concentration Level	Medium (SW-846 8151A)
Sampling SOP¹	SA-1.3
Analytical Method/SOP Reference	SW-846 8311/ 2.7.2; SW-846 8151A/ 2.2.7.3, 2.2.7.4
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	1

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
TCLP Blank	1 per extraction batch not to exceed 20 field samples	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries must meet criteria in SOP	If contaminated, find and eliminate the source;re-extract. If acceptance criteria not met, reanalyze. If acceptance criteria still not met re-extract and reanalyze along with all associated samples.	LQAO	contamination/bias	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries must meet criteria in SOP
Method Blank	1 per extraction batch not to exceed 20 field samples	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries must meet criteria in SOP	If contaminated, find and eliminate the source;re-extract. If acceptance criteria not met, reanalyze. If acceptance criteria still not met re-extract and reanalyze along with all associated samples.	LQAO	contamination/bias	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries must meet criteria in SOP
Sulfur Blank	1 per batch of samples on which sulfur cleanup is performed	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries must meet	If contaminated, find and eliminate the source;re-extract. If acceptance criteria not met, reanalyze. If acceptance criteria still not met re-extract and reanalyze along with all associated samples.	LQAO	contamination/bias	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries must meet

QAPP Worksheet #28-23
QC Samples Table

Matrix	Solid IDW					
Analytical Group	TCLP Herbicides					
Concentration Level	Medium (SW-846 8151A)					
Sampling SOP¹	SA-1.3					
Analytical Method/SOP Reference	SW-846 8311/ 2.7.2; SW-846 8151A/ 2.2.7.3, 2.2.7.4					
Field Team Leader	Chris Houck					
Field Sampling Organization	CH2M HILL					
Analytical Organization	CompuChem					
No. of Sample Locations	1					
QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory Control Sample	1 per extraction batch not to exceed 20 field samples	surrogates must be within RT windows; surrogate recoveries must meet criteria in SOP	If acceptance criteria not met, reanalyze. If acceptance criteria still not met re-extract and reanalyze along with all associated samples.	LQAO	accuracy	surrogates must be within RT windows; surrogate recoveries must meet criteria in SOP
Matrix spike/Matrix spike duplicate	If requested; per 20 field samples	surrogates must be with in RT windows; should meet advisory spike % recovery and RPD acceptance criteria in the SOP	Evaluate LCS, qualify as needed	LQAO	precision/accuracy	surrogates must be with in RT windows; should meet advisory spike % recovery and RPD acceptance criteria in the SOP

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

QAPP Worksheet #28-24
QC Samples Table

Matrix	Solid IDW
Analytical Group	TCLP Metals
Concentration Level	Medium (SW-846 6010B)
Sampling SOP¹	SA-1.3
Analytical Method/SOP Reference	SW-846 1311/ 2.7.2; SW-846 6010B/ 3.2.1.7, 3.2.1.6
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	1

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Low Range Standard (LRS)	at the beginning and end analytical sequence not to exceed 20 analytical samples	analyte concentration 50-150% of true value	reanalyze	LQAO	accuracy	analyte concentration 50-150% of true value
Calibration Blank	at the beginning and end of the analytical sequence and every 10 samples	All analytes must be ≤ the reporting limit	recalibrate	LQAO	accuracy	All analytes must be ≤ the reporting limit
Preparation blank	1 per preparation batch of not more than 20 samples	All analytes must be ≤ the reporting limit	reprepare along with all associated samples	LQAO	contamination/bias	All analytes must be ≤ the reporting limit
Interference Check Sample (ICS)	at the beginning and end of the analytical sequence and every 10 samples	must meet the recovery limits of 20% of the true value	recalibrate	LQAO	bias	must meet the recovery limits of 20% of the true value

QAPP Worksheet #28-24
QC Samples Table

Matrix	Solid IDW
Analytical Group	TCLP Metals
Concentration Level	Medium (SW-846 6010B)
Sampling SOP¹	SA-1.3
Analytical Method/SOP Reference	SW-846 1311/ 2.7.2; SW-846 6010B/ 3.2.1.7, 3.2.1.6
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	1

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Matrix Spike/Matrix spike duplicate	If requested, 1 per preparation batch of not more than 20 samples	should meet the recovery limits of 25% of the true value	analyze a post digestion spike	LQAO	accuracy/bias	should meet the recovery limits of 25% of the true value
LCS	If requested, 1 per preparation batch of not more than 20 samples	must meet recovery limits of 20%	reprepare and re-analyze along with associated samples	LQAO	accuracy/bias	must meet recovery limits of 20%
Serial Dilution	per SDG	recovery should agree with in 10% of original sample	Flag data with an "E"	LQAO	precision/accuracy	recovery should agree with in 10% of original sample

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

QAPP Worksheet #28-25
QC Samples Table

Matrix	Solid IDW
Analytical Group	Reactivity
Concentration Level	Medium (SW-846 9014) (SW-846 9034)
Sampling SOP¹	SA-1.3
Analytical Method/SOP Reference	SW-846 9014/ 3.4.4; SW-846 9034/ 3.5.18.1
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	1

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action ²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Preparation blank	1 per digestion batch not to exceed 20 field samples	absolute values of all analyte concentrations must be ≤ the CRQL	re-prepare and reanalyze along with all associated samples	LQAO	contamination/bias	absolute values of all analyte concentrations must be ≤ the CRQL
LCS	1 per digestion batch not to exceed 20 field samples	recovery must be within 14 - 77% for cyanide; recovery must be 50- 150% for sulfide	re-prepare and reanalyze digestion batch	LQAO	accuracy	recovery must be within 14 - 77% for cyanide; recovery must be 50- 150% for sulfide
Duplicate Sample	1 per SDG	RPD of ± 20	reanalyze	LQAO	precision/accuracy	RPD of ± 20

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

**QAPP Worksheet #28-26
 QC Samples Table**

Matrix	Solid IDW
Analytical Group	Corrosivity
Concentration Level	Medium (SW-846 9045C)
Sampling SOP¹	SA-1.3
Analytical Method/SOP Reference	SW-846 9045C/ 3.5.14.3
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	1

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
calibration	1 per batch of 20 samples	± 0.10 pH unit of the temperature adjusted pH value	recalibrate pH meter; reanalyze	LQAO	accuracy	± 0.10 pH unit of the temperature adjusted pH value
Duplicate sample	1 per 10 samples	must agree within ± 0.10 pH units	recalibrate pH meter; reanalyze	LQAO	precision/accuracy	must agree within ± 0.10 pH units

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

QAPP Worksheet #28-27
QC Samples Table

Matrix	Solid IDW
Analytical Group	Ignitability
Concentration Level	Medium (Pensky Martens)
Sampling SOP¹	SA-1.3
Analytical Method/SOP Reference	Pensky Martens/ 3.5.9.1
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	1

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Sample Duplicate	1 per batch of 20 samples	must agree within $\pm 2^\circ$ F.	reprepare and re-analyze	LQAO	accuracy	must agree within $\pm 2^\circ$ F.
Laboratory Control Sample	2 per batch of 20 samples	flash point must be $81^\circ \pm 2^\circ$ F.	reprepare and re-analyze	LQAO	precision/accuracy	flash point must be $81^\circ \pm 2^\circ$ F.

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

QAPP Worksheet #28-28
QC Samples Table

Matrix	Liquid IDW
Analytical Group	TCLP Volatiles
Concentration Level	Medium (SW-846 8260B)
Sampling SOP¹	SA-1.2
Analytical Method/SOP Reference	SW-846 1311/ 2.7.3; SW-846 8260B/ 1.3.2.2
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	1

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
ZHE Blank	1 per batch of not more than 20 samples	must meet all internal standard and surrogate criteria; all target compounds < reporting limit	Reanalyze; If contaminated, find and eliminate source of contamination. Re-extract batch	LQAO	contamination/bias	must meet all internal standard and surrogate criteria; all target compounds < reporting limit
Method Blank	1 per 12-hour analytical not to exceed 20 samples	must meet all internal standard and surrogate criteria; all target compounds < reporting limit	reanalyze	LQAO	contamination/bias	must meet all internal standard and surrogate criteria; all target compounds < reporting limit
Laboratory Control Sample	1 per 12-hour analytical not to exceed 20 samples	must meet all internal standard and surrogate an % recovery criteria in SOP	reanalyze	LQAO	precision/accuracy	must meet all internal standard and surrogate an % recovery criteria in SOP
Matrix spike/Matrix spike duplicate	if requested, per SDG or per 20 field samples in an SDG	must meet relative RT criteria; should meet advisory % recovery and RPD criteria in SOP	Evaluate LCS; qualify as needed	LQAO	conatimation/bias	must meet relative RT criteria; should meet advisory % recovery and RPD criteria in SOP

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

QAPP Worksheet #28-29
QC Samples Table

Matrix	Liquid IDW
Analytical Group	TCLP Semivolatiles
Concentration Level	Medium (SW-846 8270C)
Sampling SOP¹	SA-1.2
Analytical Method/SOP Reference	SW-846 1311/ 2.7.2; SW-846 8270C/ 2.5.2.7, 2.5.2.2
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	1

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
TCLP Blank	1 per extraction batch not to exceed 20 field samples	must meet all internal standard and surrogate criteria in SOP; all target compounds < reporting limit except phthalate esters which must be < 5 times the reporting limit	If contaminated, find and eliminate the source and reextract. If internal or system monitoring compounds fail acceptance criteria; reanalyze; reextract and analyze for continued failure	LQAO	contamination/bias	must meet all internal standard and surrogate criteria in SOP; all target compounds < reporting limit except phthalate esters which must be < 5 times the reporting limit
Method Blank	1 per extraction batch not to exceed 20 field samples	must meet all internal standard and surrogate criteria in SOP; all target compounds < reporting limit except phthalate esters which must be < 5 times the reporting limit	If contaminated, find and eliminate the source and reextract. If internal or system monitoring compounds fail acceptance criteria; reanalyze; reextract and analyze for continued failure	LQAO	contamination/bias	must meet all internal standard and surrogate criteria in SOP; all target compounds < reporting limit except phthalate esters which must be < 5 times the reporting limit
Laboratory Control Sample	1 per extraction batch not to exceed 20 field samples	must meet all internal standard, surrogate and spike recovery criteria in SOP	If acceptance criteria not met, reanalyze. If acceptance criteria still not met re-extract and reanalyze along with all associated samples.	LQAO	accuracy	must meet all internal standard, surrogate and spike recovery criteria in SOP

**QAPP Worksheet #28-29
 QC Samples Table**

Matrix	Liquid IDW
Analytical Group	TCLP Semivolatiles
Concentration Level	Medium (SW-846 8270C)
Sampling SOP¹	SA-1.2
Analytical Method/SOP Reference	SW-846 1311/ 2.7.2; SW-846 8270C/ 2.5.2.7, 2.5.2.2
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	1

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Matrix spike/Matrix spike duplicate	If requested, per SDG or per 20 field samples within an SDG	must meet relative RT criteria; should meet advisory spike recovery and RPD criteria in the SOP	Evaluate the LCS; qualify as needed	LQAO	precision/accuracy	must meet relative RT criteria; should meet advisory spike recovery and RPD criteria in the SOP

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

**QAPP Worksheet #28-30
QC Samples Table**

Matrix	Liquid IDW
Analytical Group	TCLP Pesticides
Concentration Level	Medium (SW-846 8081A)
Sampling SOP¹	SA-1.2
Analytical Method/SOP Reference	SW-846 1311/ 2.7.2; SW-846 8081A/ 2.2.4.3, 2.2.4.10
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	1

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
TCLP Blank	1 per extraction batch not to exceed 20 field samples	same as Method Blank	If contaminated, find and eliminate the source;re-extract. If internal or surrogate standard fail acceptance criteria; reanalyze. If surrogates continue to fail, re-extract and reanalyze along with all associated samples	LQAO	contamination/bias	same as Method Blank
Method Blank	1 per extraction batch not to exceed 20 field samples	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries meet criteria in SOP	If contaminated, find and eliminate the source;re-extract. If internal or surrogate standard fail acceptance criteria; reanalyze. If surrogates continue to fail, re-extract and reanalyze along with all associated samples	LQAO	contamination/bias	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries meet criteria in SOP
Sulfur Blank	1 per batch of samples on which sulfur cleanup is performed	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries meet criteria in SOP	If contaminated, find and eliminate the source;re-extract. If internal or surrogate standard fail acceptance criteria; reanalyze. If surrogates continue to fail, re-extract and reanalyze along with all associated samples	LQAO	contamination/bias	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries meet criteria in SOP

**QAPP Worksheet #28-30
 QC Samples Table**

Matrix	Liquid IDW
Analytical Group	TCLP Pesticides
Concentration Level	Medium (SW-846 8081A)
Sampling SOP¹	SA-1.2
Analytical Method/SOP Reference	SW-846 1311/ 2.7.2; SW-846 8081A/ 2.2.4.3, 2.2.4.10
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	1

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory Control Sample	1 per SDG or 20 field samples	surrogates must be within RT windows; surrogate and spike recoveries must meet criteria in SOP	Reanalyze; Extract along with associated samples and analyze for repeated failure	LQAO	accuracy	surrogates must be within RT windows; surrogate and spike recoveries must meet criteria in SOP
Matrix spike/Matrix spike duplicate	If requested, per 20 field samples	surrogates must be within RT windows; should meet advisory spike recovery and RPD criteria in SOP	Evaluate the LCS; qualify as needed	LQAO	precision/accuracy	surrogates must be within RT windows; should meet advisory spike recovery and RPD criteria in SOP

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

QAPP Worksheet #28-31
QC Samples Table

Matrix	Liquid IDW
Analytical Group	TCLP Herbicides
Concentration Level	Medium (SW-846 8151A)
Sampling SOP¹	SA-1.2
Analytical Method/SOP Reference	SW-846 8311/ 2.7.2; SW-846 8151A/ 2.2.7.3, 2.2.7.4
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	1

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
TCLP Blank	1 per extraction batch not to exceed 20 field samples	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries must meet criteria in SOP	If contaminated, find and eliminate the source;re-extract. If acceptance criteria not met, reanalyze. If acceptance criteria still not met re-extract and reanalyze along with all associated samples.	LQAO	contamination/bias	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries must meet criteria in SOP
Method Blank	1 per extraction batch not to exceed 20 field samples	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries must meet criteria in SOP	If contaminated, find and eliminate the source;re-extract. If acceptance criteria not met, reanalyze. If acceptance criteria still not met re-extract and reanalyze along with all associated samples.	LQAO	contamination/bias	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries must meet criteria in SOP
Sulfur Blank	1 per batch of samples on which sulfur cleanup is performed	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries must meet	If contaminated, find and eliminate the source;re-extract. If acceptance criteria not met, reanalyze. If acceptance criteria still not met re-extract and reanalyze along with all associated samples.	LQAO	contamination/bias	all target compounds < reporting limit; surrogates must be within RT windows; surrogate recoveries must meet

QAPP Worksheet #28-31
QC Samples Table

Matrix	Liquid IDW
Analytical Group	TCLP Herbicides
Concentration Level	Medium (SW-846 8151A)
Sampling SOP¹	SA-1.2
Analytical Method/SOP Reference	SW-846 8311/ 2.2.2; SW-846 8151A/ 2.2.7.3, 2.2.7.4
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	1

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory Control Sample	1 per extraction batch not to exceed 20 field samples	surrogates must be within RT windows; surrogate recoveries must meet criteria in SOP	If acceptance criteria not met, reanalyze. If acceptance criteria still not met re-extract and reanalyze along with all associated samples.	LQAO	accuracy	surrogates must be within RT windows; surrogate recoveries must meet criteria in SOP
Matrix spike/Matrix spike duplicate	If requested; per 20 field samples	surrogates must be with in RT windows; should meet advisory spike % recovery and RPD acceptance criteria in the SOP	Evaluate LCS, qualify as needed	LQAO	precision/accuracy	surrogates must be with in RT windows; should meet advisory spike % recovery and RPD acceptance criteria in the SOP

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

QAPP Worksheet #28-32
QC Samples Table

Matrix	Liquid IDW
Analytical Group	TCLP Metals
Concentration Level	Medium (SW-846 6010B)
Sampling SOP¹	SA-1.2
Analytical Method/SOP Reference	SW-846 1311/ 2.7.2; SW-846 6010B/ 3.2.1.7, 3.2.1.6
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	1

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Low Range Standard (LRS)	at the beginning and end analytical sequence not to exceed 20 analytical samples	analyte concentration 50-150% of true value	reanalyze	LQAO	accuracy	analyte concentration 50-150% of true value
Calibration Blank	at the beginning and end of the analytical sequence and every 10 samples	All analytes must be ≤ the reporting limit	recalibrate	LQAO	accuracy	All analytes must be ≤ the reporting limit
Preparation blank	1 per preparation batch of not more than 20 samples	All analytes must be ≤ the reporting limit	reprepare along with all associated samples	LQAO	contamination/bias	All analytes must be ≤ the reporting limit
Interference Check Sample (ICS)	at the beginning and end of the analytical sequence and every 10 samples	must meet the recovery limits of 20% of the true value	recalibrate	LQAO	bias	must meet the recovery limits of 20% of the true value

QAPP Worksheet #28-32
QC Samples Table

Matrix	Liquid IDW
Analytical Group	TCLP Metals
Concentration Level	Medium (SW-846 6010B)
Sampling SOP¹	SA-1.2
Analytical Method/SOP Reference	SW-846 1311/ 2.7.2; SW-846 6010B/ 3.2.1.7, 3.2.1.6
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	1

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Matrix Spike/Matrix spike duplicate	If requested, 1 per preparation batch of not more than 20 samples	should meet the recovery limits of 25% of the true value	analyze a post digestion spike	LQAO	accuracy/bias	should meet the recovery limits of 25% of the true value
LCS	If requested, 1 per preparation batch of not more than 20 samples	must meet recovery limits of 20%	reprepare and re-analyze along with associated samples	LQAO	accuracy/bias	must meet recovery limits of 20%
Serial Dilution	per SDG	recovery should agree with in 10% of original sample	Flag data with an "E"	LQAO	precision/accuracy	recovery should agree with in 10% of original sample

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

QAPP Worksheet #28-33
QC Samples Table

Matrix	Liquid IDW
Analytical Group	Reactivity
Concentration Level	Medium (SW-846 9014) (SW-846 9034)
Sampling SOP¹	SA-1.2
Analytical Method/SOP Reference	SW-846 9014/ 3.4.4; SW-846 9034/ 3.5.18.1
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	1

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Preparation blank	1 per digestion batch not to exceed 20 field samples	absolute values of all analyte concentrations must be ≤ the CRQL	re-prepare and reanalyze along with all associated samples	LQAO	contamination/bias	absolute values of all analyte concentrations must be ≤ the CRQL
LCS	1 per digestion batch not to exceed 20 field samples	recovery must be within 14 - 77% for cyanide; recovery must be 50- 150% for sulfide	re-prepare and reanalyze digestion batch	LQAO	accuracy	recovery must be within 14 - 77% for cyanide; recovery must be 50- 150% for sulfide
Duplicate Sample	1 per SDG	RPD of ± 20	reanalyze	LQAO	precision/accuracy	RPD of ± 20

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

QAPP Worksheet #28-34
QC Samples Table

Matrix	Liquid IDW
Analytical Group	Reactivity
Concentration Level	Medium (SW-846 9045C)
Sampling SOP¹	SA-1.2
Analytical Method/SOP Reference	SW-846 9045C/ 3.5.14.3
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	1

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
calibration	1 per batch of 20 samples	± 0.10 pH unit of the temperature adjusted pH value	recalibrate pH meter; reanalyze	LQAO	accuracy	± 0.10 pH unit of the temperature adjusted pH value
Duplicate sample	1 per 10 samples	must agree within ± 0.10 pH units	recalibrate pH meter; reanalyze	LQAO	precision/accuracy	must agree within ± 0.10 pH units

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

QAPP Worksheet #28-35
QC Samples Table

Matrix	Liquid IDW
Analytical Group	Ignitability
Concentration Level	Medium (Pensky Martens)
Sampling SOP¹	SA-1.2
Analytical Method/SOP Reference	Pensky Martens/ 3.5.9.1
Field Team Leader	Chris Houck
Field Sampling Organization	CH2M HILL
Analytical Organization	CompuChem
No. of Sample Locations	1

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action²	Data Quality Indicator (DQI)	Measurement Performance Criteria
Sample Duplicate	1 per batch of 20 samples	must agree within $\pm 2^\circ$ F.	reprepare and re-analyze	LQAO	accuracy	must agree within $\pm 2^\circ$ F.
Laboratory Control Sample	2 per batch of 20 samples	flash point must be $81^\circ \pm 2^\circ$ F.	reprepare and re-analyze	LQAO	precision/accuracy	flash point must be $81^\circ \pm 2^\circ$ F.

¹Reference number from QAPP Worksheet #21.

²LQAO = Laboratory Quality Assurance Officer

QAPP Worksheet #29 (UFP-QAPP Manual Section 3.5.1) Project Documents and Records Table

Identify the documents and records that will be generated for all aspects of the project including, but not limited to, sample collection and field measurement, onsite and offsite analysis, and data assessment.

Worksheet Not Applicable (State Reason)

Sample Collection Documents and Records	Onsite Analysis Documents and Records	Offsite Analysis Documents and Records	Data Assessment Documents and Records	Other
Field Notebooks Field Forms (boring logs, calibration forms, etc.) COC Records Airbills Photographs Corrective Action Forms	No onsite analysis is projected other than PID/FID readings. These readings will be recorded in the field notebook and/or boring logs as they are collected.	Sample receipt, COC, and tracking records Standard Traceability Logs Equipment Calibration Logs Sample Prep Logs Run Logs Equipment Maintenance, Testing and Inspection Logs Corrective Action Forms Reported Field Sample Results Reported Results for Standard QC Check and QC Samples Instrument Printouts (raw data) for field samples, standards, QC checks and QC samples Data Package Completeness Checklists Sample Disposal Records Extraction/Clean-up Records Raw Data (stored on disk or CD-R)	Field Sampling Audit Checklists Field Analysis Audit Checklist Fixed Laboratory Audit Checklist Data Validation Reports Corrective Action Forms	

QAPP Worksheet #30
(UFP-QAPP Manual Section 3.5.2.3)
Analytical Services Table

Complete this worksheet for each matrix, analytical group, and concentration level. Identify all laboratories or organizations that will provide analytical services for the project, including onsite screening, onsite definitive, and offsite laboratory analytical work. If applicable, identify the subcontractor laboratories and backup laboratory or organization that will be used if the primary laboratory or organizations cannot be used.

Worksheet Not Applicable (State Reason)

Matrix	Analytical Group	Concentration Level	Sample Location/ ID Numbers	Analytical SOP	Data Package Turnaround Time	Laboratory/Organization (Name and Address, Contact Person and Telephone Number)	Backup Laboratory/Organization (Name and Address, Contact Person and Telephone Number)
SS/SB/SD	TCL Volatiles	Low Soil (OLM04.3)	35	1.1.4,1, 1.2.1.3, 1.2.3.2	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100
SS/SB/SD	TCL Semivolatiles	Low Soil (OLM04.3)	35	2.4.3.2, 2.4.3.4, 2.6.3	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100
SS/SB/SD	TCL Pesticides/Aroclors	Soil (OLM04.3)	35	2.1.1.2, 2.1.1.6, 2.1.1.5, 2.6.1, 2.6.5	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100
SS/SB/SD	TAL Metals/Cyanide	Soil (ILM04.1)	35	3.1.1.3, 3.1.1.4	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100
SS/SB/SD	Explosives	Medium (SW-846 8330)	35	2.3.2.2, 2.3.2.4	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100

QAPP Worksheet #30
(UFP-QAPP Manual Section 3.5.2.3)
Analytical Services Table

Matrix	Analytical Group	Concentration Level	Sample Location/ ID Numbers	Analytical SOP	Data Package Turnaround Time	Laboratory/Organization (Name and Address, Contact Person and Telephone Number)	Backup Laboratory/Organization (Name and Address, Contact Person and Telephone Number)
SS/SB/SD	Explosives	Medium (USACOE 89-35)	35	SOC-NITG	28 Days	CAS-Kelso; 1317 South 13 th avenue; Kelso, WA 98626; Ed Wallace: (360) 577-7222	CAS-Kelso Janice Jaeger: (585) 288-5380
SS/SB/SD	Explosives	Medium (SW-846 6850)	35	HPLC-DoD Perchlorate	28 Days	CAS-Rochester; 1 Mustard St; Suite 250; Rochester, NY 14609 Janice Jaeger: (585) 288-5380	CAS-Rochester Janice Jaeger: (585) 288-5380
SS/SB/SD	Wet Chemistry	Medium (Lloyd Kahn)	35	3.6.2.2	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100
SS/SB/SD	Wet Chemistry	Medium (SW-846 9045C)	35	3.5.14.3	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100
GW/SW	TCL Volatiles	Water (OLM04.3)	15	1.2.3.3	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100
GW/SW	TCL Semivolatiles	Water (OLM04.3)	15	2.4.3.1, 2.4.3.4	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100
GW/SW	TCL Pesticides/Aroclors	Water (OLM04.3)	15	2.1.1.1, 2.1.1.6, 2.6.1, 2.6.5	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100

QAPP Worksheet #30
(UFP-QAPP Manual Section 3.5.2.3)
Analytical Services Table

Matrix	Analytical Group	Concentration Level	Sample Location/ ID Numbers	Analytical SOP	Data Package Turnaround Time	Laboratory/Organization (Name and Address, Contact Person and Telephone Number)	Backup Laboratory/Organization (Name and Address, Contact Person and Telephone Number)
GW/SW	TAL Metals/Cyanide	Water (ILM04.1)	15	3.1.1.2, 3.1.1.4, 3.4.1, 3.4.5	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100
GW/SW	TAL Filtered Metals	Water (ILM04.1)	15	3.1.1.2, 3.1.1.4	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100
GW/SW	Explosives	Medium (SW-846 8330)	15	2.3.2.1, 2.3.2.4	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100
GW/SW	Explosives	Medium (SW-846 8332)	15	2.3.2.2, 2.3.2.4	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100
GW/SW	Explosives	Medium (USACOE 89-35)	15	SOC-NITG	28 Days	CAS-Kelso; 1317 South 13th avenue; Kelso, WA 98626; Ed Wallace: (360) 577-7222	CAS-Kelso Janice Jaeger: (585) 288-5380
GW/SW	Explosives	Medium (SW-846 6850)	15	HPLC-DoD Perchlorate	28 Days	CAS-Rochester; 1 Mustard St; Suite 250; Rochester, NY 14609 Janice Jaeger: (585) 288-5380	CAS-Rochester Janice Jaeger: (585) 288-5380
GW/SW	Wet Chemistry	Medium (EPA 130.2)	15	3.5.7.1	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100

QAPP Worksheet #30
(UFP-QAPP Manual Section 3.5.2.3)
Analytical Services Table

Matrix	Analytical Group	Concentration Level	Sample Location/ ID Numbers	Analytical SOP	Data Package Turnaround Time	Laboratory/Organization (Name and Address, Contact Person and Telephone Number)	Backup Laboratory/Organization (Name and Address, Contact Person and Telephone Number)
ASH	Dioxins/Furans	Medium (SW-846 8280A)	3	HRMS-8280 A	28 Days	CAS-Houston; 10655 Richmond Avenue; Suite 130A; Houston, TX 77042 Jane Freemyer: (713) 266-1519	CAS-Houston Janice Jaeger: (585) 288-5380
Solid IDW	TCLP Volatiles	Medium (SW-846 1311, SW-846 8260B)	1	2.7.3, 1.3.2.2	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100
Solid IDW	TCLP Semivolatiles	Medium (SW-846 1311, SW-846 8270C)	1	2.7.2, 2.5.2.2, 2.5.2.7	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100
Solid IDW	TCLP Pesticides	Medium (SW-846 1311, SW-846 8081A)	1	2.7.2, 2.2.4.3, 2.2.4.10	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100
Solid IDW	TCLP Herbicides	Medium (SW-846 1311, SW-846 8151A)	1	2.7.2, 2.2.7.3, 2.2.7.4	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100
Solid IDW	TCLP Metals	Medium (SW-846 1311, SW-846 6010B)	1	2.8.2, 3.2.1.4, 3.2.1.6	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100
Solid IDW	Reactivity	Medium (SW-846 9014, SW-846 9034)	1	3.4.4, 3.5.18.1	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100

**QAPP Worksheet #30
 (UFP-QAPP Manual Section 3.5.2.3)
 Analytical Services Table**

Matrix	Analytical Group	Concentration Level	Sample Location/ ID Numbers	Analytical SOP	Data Package Turnaround Time	Laboratory/Organization (Name and Address, Contact Person and Telephone Number)	Backup Laboratory/Organization (Name and Address, Contact Person and Telephone Number)
Solid IDW	Corrosivity	Medium (SW-846 9045C)	1	3.5.14.3	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100
Solid IDW	Ignitability	Medium (Pensky Martens)	1	3.5.9.1	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100
Liquid IDW	TCLP Volatiles	Medium (SW-846 1311, SW-846 8260B)	1	2.7.3, 1.3.2.2	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100
Liquid IDW	TCLP Semivolatiles	Medium (SW-846 1311, SW-846 8270C)	1	2.7.6, 2.5.2.2, 2.5.2.7	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100
Liquid IDW	TCLP Pesticides	Medium (SW-846 1311, SW-846 8081A)	1	2.7.6, 2.2.4.3, 2.2.4.10	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100
Liquid IDW	TCLP Herbicides	Medium (SW-846 1311, SW-846 8151A)	1	2.7.6, 2.2.7.1, 2.2.7.4	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100
Liquid IDW	TCLP Metals	Medium (SW-846 1311, SW-846 6010B)	1	2.7.6, 3.2.1.4, 3.2.1.6	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100

QAPP Worksheet #30
(UFP-QAPP Manual Section 3.5.2.3)
Analytical Services Table

Matrix	Analytical Group	Concentration Level	Sample Location/ ID Numbers	Analytical SOP	Data Package Turnaround Time	Laboratory/Organization (Name and Address, Contact Person and Telephone Number)	Backup Laboratory/Organization (Name and Address, Contact Person and Telephone Number)
Liquid IDW	Reactivity	Medium (SW-846 9014, SW-846 9034)	1	3.4.4, 3.5.18.1	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100
Liquid IDW	Corrosivity	Medium (SW-846 9045C)	1	3.5.14.3	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100
Liquid IDW	Ignitability	Medium (Pensky Martens)	1	3.5.9.1	28 Days	CompuChem; 501 Madison Avenue; Cary, NC 27513 Cathy Dover: (919) 379-4089	CompuChem Mark Ross: (919) 379-4100

**QAPP Worksheet #31
 (UFP-QAPP Manual Section 4.1.1)
 Planned Project Assessments Table**

Identify the type, frequency, and responsible parties of planned assessment activities that will be preformed for the project.

Worksheet Not Applicable (State Reason)

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment (Title and Organizational Affiliation)	Person(s) Responsible for Responding to Assessment Findings (Title and Organizational Affiliation)	Person(s) Responsible for Identifying and Implementing Corrective Actions (CA) (Title and Organizational Affiliation)	Person(s) Responsible for Monitoring Effectiveness of CA (Title and Organizational Affiliation)
Field Sampling Technical Systems Audit	1 / At sampling startup	Int.	CH2M HILL	Project QA officer - CH2M HILL	Christopher Houck - FTL (CH2M HILL)	Christopher Houck - FTL (CH2M HILL)	Project QA Officer - CH2M HILL
Offsite Laboratory Technical Systems Audit	1 / Prior to sampling startup	Ext.	NFESC (US Navy)	Pati Moreno/NFESC (IR QA Program Coordinator)	Ms. Valgena Respass (QA Manager, CompuChem)	Ms. Valgena Respass (QA Manager, CompuChem)	Project QA Officer - CH2M HILL

QAPP Worksheet #32
(UFP-QAPP Manual Section 4.1.2)
Assessment Findings and Corrective Action Responses

For each type of assessment, describe procedures for handling QAPP and project deviations encountered during the planned project assessments.

Worksheet Not Applicable (State Reason)

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (Name, Title, Organization)	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (Name, Title, Org.)	Timeframe for Response
Field Performance Audit Checklist	Written Audit Report	Project Manager, CH2M HILL	Within one week of audit	Memorandum	FTL, CH2M HILL	Within one week of receipt of Corrective Action Form
Laboratory Performance and Systems Audits	Written Audit Report	Ms. Valgena Respass (QA Manager, CompuChem)	Within two months of the audit	Memorandum	Pati Moreno/NFESC (IR QA Program Coordinator)	Within two months of receipt of response

WORKSHEET #32-1
Corrective Action Form

Person initiating corrective action _____ Date _____

Description of problem and when identified: _____

Cause of problem, if known or suspected: _____

Sequence of Corrective Action (CA): (including date implemented, action planned and personnel/ data affected) _____

CA implemented by: _____ Date: _____

CA initially approved by: _____ Date: _____

Follow-up date: _____

Final CA approved by: _____ Date: _____

Information copies to:

WORKSHEET #32-2 Field Performance Audit Checklist

Project Responsibilities

Project No.: _____ Date: _____

Project Location: _____ Signature: _____

Team Members:

Yes __ No __ 1) Is the approved Site 66 work plan being followed?
Comments _____

Yes __ No __ 2) Was a briefing held for project participants?
Comments _____

Yes __ No __ 3) Were additional instructions given to project participants?
Comments _____

Sample Collection

Yes __ No __ 1) Is there a written list of sampling locations and descriptions?
Comments _____

WORKSHEET #32-2
Field Performance Audit Checklist

- Yes __ No __ 2) Are samples collected as stated in the Master SOPs?
Comments _____

- Yes __ No __ 3) Are samples collected in the type of containers specified in the Site 66 work plan?
Comments _____

- Yes __ No __ 4) Are samples preserved as specified in the Site 66 work plan?
Comments _____

- Yes __ No __ 5) Are the number, frequency, and type of samples collected as specified in
the Site 66 work plan?
Comments _____

- Yes __ No __ 6) Are quality assurance checks performed as specified in the Site 66 work plan?
Comments _____

WORKSHEET #32-2
Field Performance Audit Checklist

Yes __ No __ 7) Are photographs taken and documented?
Comments _____

Document Control

Yes __ No __ 1) Have any accountable documents been lost?
Comments _____

Yes __ No __ 2) Have any accountable documents been voided?
Comments _____

Yes __ No __ 3) Have any accountable documents been disposed of?
Comments _____

Yes __ No __ 4) Are the samples identified with sample tags?
Comments _____

WORKSHEET #32-2
Field Performance Audit Checklist

Yes __ No __ 5) Are blank and duplicate samples properly identified?
Comments _____

Yes __ No __ 6) Are samples listed on a chain-of-custody record?
Comments _____

Yes __ No __ 7) Is chain-of-custody documented and maintained?
Comments _____

QAPP Worksheet #33
(UFP-QAPP Manual Section 4.2)
QA Management Reports Table

Identify the frequency and type of planned QA Management Reports, the projected delivery date, the personnel responsible for report preparation, and the report recipients.

Worksheet Not Applicable (State Reason)

Type of Report	Frequency (daily, weekly monthly, quarterly, annually, etc.)	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation (Title and Organizational Affiliation)	Report Recipient(s) (Title and Organizational Affiliation)
Field Audit Report	One during major events	Submitted with Final Reports	Field Team Assessor CH2M HILL	Included in SI Report. See Worksheet #3 for distribution list.
Data Usability Assessment Report	One after all data are generated and validated	Submitted with Final Reports	Mike Zamboni /Project Chemist, CH2M HILL	Included in SI Report. See Worksheet #3 for distribution list.

**QAPP Worksheet #34
 (UFP-QAPP Manual Section 5.2.1)
 Verification (Step I) Process Table**

Describe the processes that will be followed to verify project data. Verification inputs include items such as those listed in Table 9 of the UFP-QAPP Manual (Section 5.1). Describe how each item will be verified, when the activity will occur, and what documentation is necessary, and identify the persons responsible. *Internal* or *external* is in relation to the data generator.

Worksheet Not Applicable (State Reason)

Verification Input	Description	Internal/ External	Responsible for Verification (Name, Organization)
COC and Shipping Forms	COC forms and shipping documentation will be reviewed internally upon their completion and verified against the packed sample coolers they represent. The shipper's signature on the COC will be initialed by the reviewer, a copy of the COC retained in the site file, and the original and remaining copies taped inside the cooler for shipment. See COC SOP for further details.	Int.	Chris Houck/CH2M HILL Stacy Davenport/CH2M HILL
Audit Reports	Upon report completion, a copy of all audit reports will be placed in the site file. If corrective actions are required, a copy of the documented CA taken will be attached to the appropriate audit report in the QA site file. Periodically, and at the completion of site work, site file audit reports and CA forms will be reviewed internally to ensure that all appropriate CAs have been taken and that CA reports are attached. If CAs have not been taken, the site manager will be notified to ensure action is taken. Audit reports will be included in the QA Assessment section of the final RI report.	Int.	Michael Zamboni/CH2M HILL
Field Notebooks	Field notes will be reviewed internally and placed in the site file.	Int.	Christine Metcalf/CH2M HILL
Laboratory Data	All laboratory data packages will be verified internally by the laboratory performing the work for completeness and technical accuracy prior to submittal. All received data packages will be validated externally by the third-party validator. Also, the data will be examined by an EIS and a Chemist according to the procedures specified in Worksheet #6.	Int./Ext.	Laboratory QA Officer Data Validation Subcontractor/E-Data, Inc. Stacy Davenport/CH2M HILL Michael Zamboni/CH2M HILL

**QAPP Worksheet #35
 (UFP-QAPP Manual Section 5.2.2)
 Validation (Steps IIa and IIb) Process Table**

Describe the processes that will be followed to validate project data. Validation inputs include items such as those listed in Table 9 of the UFP-QAPP Manual (Section 5.1). Describe how each item will be validated, when the activity will occur, and what documentation is necessary, and identify the person responsible. Differentiate between steps IIa and IIb of validation.

Worksheet Not Applicable (State Reason)

Step IIa/IIb	Validation Input	Description	Responsible for Validation (Name, Organization)
IIb	Onsite Screening	Ensure that all field data meet Work Plan requirements for completeness and accuracy based on the field calibration records.	Chris Houck/CH2M HILL
IIa	SOPs	Ensure that all sampling and analytical SOPs were followed.	Chris Houck/CH2M HILL Laboratory QA Officer/CompuChem
IIa	Method QC Results	Ensure that all required QC samples were run and met required limits.	Data Validation Subcontractor/E-Data, Inc.
IIb	Work Plan QC Sample Results	Ensure that all required Work Plan QC samples were run and met required limits.	Michael Zamboni/CH2M HILL Data Validation Subcontractor/E-Data, Inc.
IIb	QLs	Ensure all sample results met the project quantification limit specified in the Work Plan.	Michael Zamboni/CH2M HILL
IIa	Raw Data	Ten percent review of raw data to confirm laboratory calculations	Data Validation Subcontractor/E-Data, Inc.

QAPP Worksheet #36
(UFP-QAPP Manual Section 5.2.2)
Validation (Steps IIa and IIb) Summary Table

Identify the matrices, analytical groups, and concentration levels that each entity performing validation will be responsible for, as well as criteria that will be used to validate those data.

Worksheet Not Applicable (State Reason)

Step IIa/IIb	Matrix	Analytical Group	Concentration Level	Validation Criteria	Data Validator (title and organizational affiliation)
IIa/IIb	SS/SB/SD	TCL Volatiles	Low Soil (OLM04.3)	EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review; EPA540/R-99/008, October 1999 Region III Modifications to National Functional Guidelines for Organic Data Review; Multi-Media, Multi-Concentration, September 1994	Data Validation Subcontractor/E-Data, Inc.
IIa/IIb	SS/SB/SD	TCL Semivolatiles	Low Soil (OLM04.3)	EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review; EPA540/R-99/008, October 1999 Region III Modifications to National Functional Guidelines for Organic Data Review; Multi-Media, Multi-Concentration, September 1994	Data Validation Subcontractor/E-Data, Inc.
IIa/IIb	SS/SB/SD	TCL Pesticides/Aroclors	Soil (OLM04.3)	EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review; EPA540/R-99/008, October 1999 Region III Modifications to National Functional Guidelines for Organic Data Review; Multi-Media, Multi-Concentration, September 1994	Data Validation Subcontractor/E-Data, Inc.
IIa/IIb	SS/SB/SD	TAL Metals/Cyanide	Soil (ILM04.1)	EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review; EPA 540-R-04-004, October 2004 Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analysis, April 1993	Data Validation Subcontractor/E-Data, Inc.

QAPP Worksheet #36
(UFP-QAPP Manual Section 5.2.2)
Validation (Steps IIa and IIb) Summary Table

Step IIa/IIb	Matrix	Analytical Group	Concentration Level	Validation Criteria	Data Validator (title and organizational affiliation)
IIa/IIb	SS/SB/SD	Explosives	Medium (various)	EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review; EPA540/R-99/008, October 1999 Region III Modifications to National Functional Guidelines for Organic Data Review; Multi-Media, Multi-Concentration, September 1994	Data Validation Subcontractor/ E-Data, Inc.
IIa/IIb	SS/SB/SD	Wet Chemistry	Medium (various)	EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review; EPA540/R-99/008, October 1999 Region III Modifications to National Functional Guidelines for Organic Data Review; Multi-Media, Multi-Concentration, September 1994 EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review; EPA 540-R-04-004, October 2004 Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analysis, April 1993	Data Validation Subcontractor/ E-Data, Inc.
IIa/IIb	GW/SW	TCL Volatiles	Water (OLM04.3)	EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review; EPA540/R-99/008, October 1999 Region III Modifications to National Functional Guidelines for Organic Data Review; Multi-Media, Multi-Concentration, September 1994	Data Validation Subcontractor/ E-Data, Inc.

**QAPP Worksheet #36
 (UFP-QAPP Manual Section 5.2.2)
 Validation (Steps IIa and IIb) Summary Table**

Step IIa/IIb	Matrix	Analytical Group	Concentration Level	Validation Criteria	Data Validator (title and organizational affiliation)
IIa/IIb	GW/SW	TCL Semivolatiles	Water (OLM04.3)	EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review; EPA540/R-99/008, October 1999 Region III Modifications to National Functional Guidelines for Organic Data Review; Multi-Media, Multi-Concentration, September 1994	Data Validation Subcontractor/ E-Data, Inc.
IIa/IIb	GW/SW	TCL Pesticides/Aroclors	Water (OLM04.3)	EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review; EPA540/R-99/008, October 1999 Region III Modifications to National Functional Guidelines for Organic Data Review; Multi-Media, Multi-Concentration, September 1994	Data Validation Subcontractor/ E-Data, Inc.
IIa/IIb	GW/SW	TAL Metals/Cyanide	Water (ILM04.1)	EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review; EPA 540-R-04-004, October 2004 Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analysis, April 1993	Data Validation Subcontractor/ E-Data, Inc.
IIa/IIb	GW/SW	Explosives	Medium (various)	EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review; EPA540/R-99/008, October 1999 Region III Modifications to National Functional Guidelines for Organic Data Review; Multi-Media, Multi-Concentration, September 1994	Data Validation Subcontractor/ E-Data, Inc.

QAPP Worksheet #36
(UFP-QAPP Manual Section 5.2.2)
Validation (Steps IIa and IIb) Summary Table

Step IIa/IIb	Matrix	Analytical Group	Concentration Level	Validation Criteria	Data Validator (title and organizational affiliation)
IIa/IIb	GW/SW	Wet Chemistry	Medium (various)	EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review; EPA 540-R-04-004, October 2004 Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analysis, April 1993	Data Validation Subcontractor/ E-Data, Inc.
IIa/IIb	ASH	Dioxins/Furans	Medium (SW-846 8280A)	EPA Analytical Services Branch National Functional Guidelines for Chlorinated Dibenzo-p-Dioxins and Chlorinated Dibenzofurans Data Review; EPA-540-R-05-001, September 2005 EPA Region III SOP for Dioxin/Furan Data Validation, March 1999	Data Validation Subcontractor/ E-Data, Inc.

**QAPP Worksheet #37
(UFP-QAPP Manual Section 5.2.3)
Usability Assessment**

Describe the procedures/methods/activities that will be used to determine whether data are of the right type, quality, and quantity to support environmental decision making for the project. Describe how data quality issues will be addressed and how limitations of the use of the data will be handled.

Worksheet Not Applicable (State Reason)

Summarize the usability assessment process and all procedures, including interim steps and any statistics, equations, and computer algorithms that will be used:

It is the joint responsibility of the contractor Project Chemist and the data validation subcontractor to ensure that the data meet the method detection limits, reporting limits, and laboratory QC limits listed in this Work Plan, the laboratory SOW, and the various methods. During this assessment, non-conformances are documented, the data are qualified for use in decision making, and for 10 percent of the results, the entire analytical process is reconstructed and recalculated from the raw data.

Describe the evaluative procedures used to assess overall measurement error associated with the project:

In-depth assessment occurs during the data validation process. The third-party validation contractor will follow the EPA National Functional Guidelines and the EPA Region III Modifications to the National Functional Guidelines to assess conformance with the QC limits. The findings of the data validation reports and the qualifiers applied to the data will be considered in context with field logs and corrective action reports to assess overall usability

Identify the personnel responsible for performing the usability assessment:

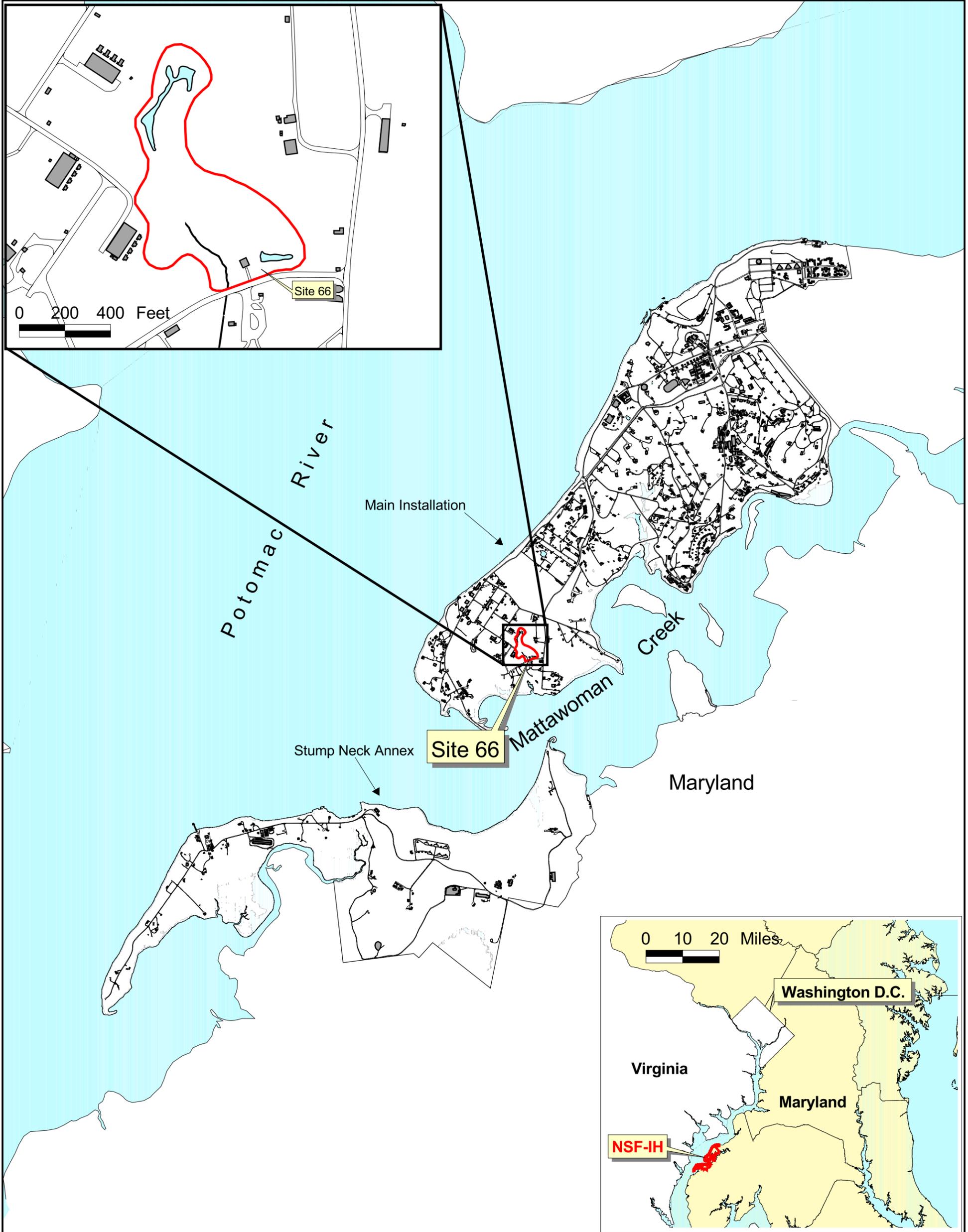
Data Validation Subcontractor/ E-Data, Inc.; Michael Zamboni/CH2M HILL

**QAPP Worksheet #37
(UFP-QAPP Manual Section 5.2.3)
Usability Assessment**

Describe the documentation that will be generated during usability assessment and how usability assessment results will be presented so that they identify trends, relationships (correlations), and anomalies:

The data validation reports will identify precision and accuracy exceedances with respect to the laboratory performance for each batch of samples, as well as comparability of field and lab duplicates. All the results will be assembled and statistically reported for an overall quality assessment provided in the final project event report. Discussion will cover completeness and representativeness. Attachments supporting this report will include data validation narratives, CA forms, and field audit reports.

Attachment 1
Figures



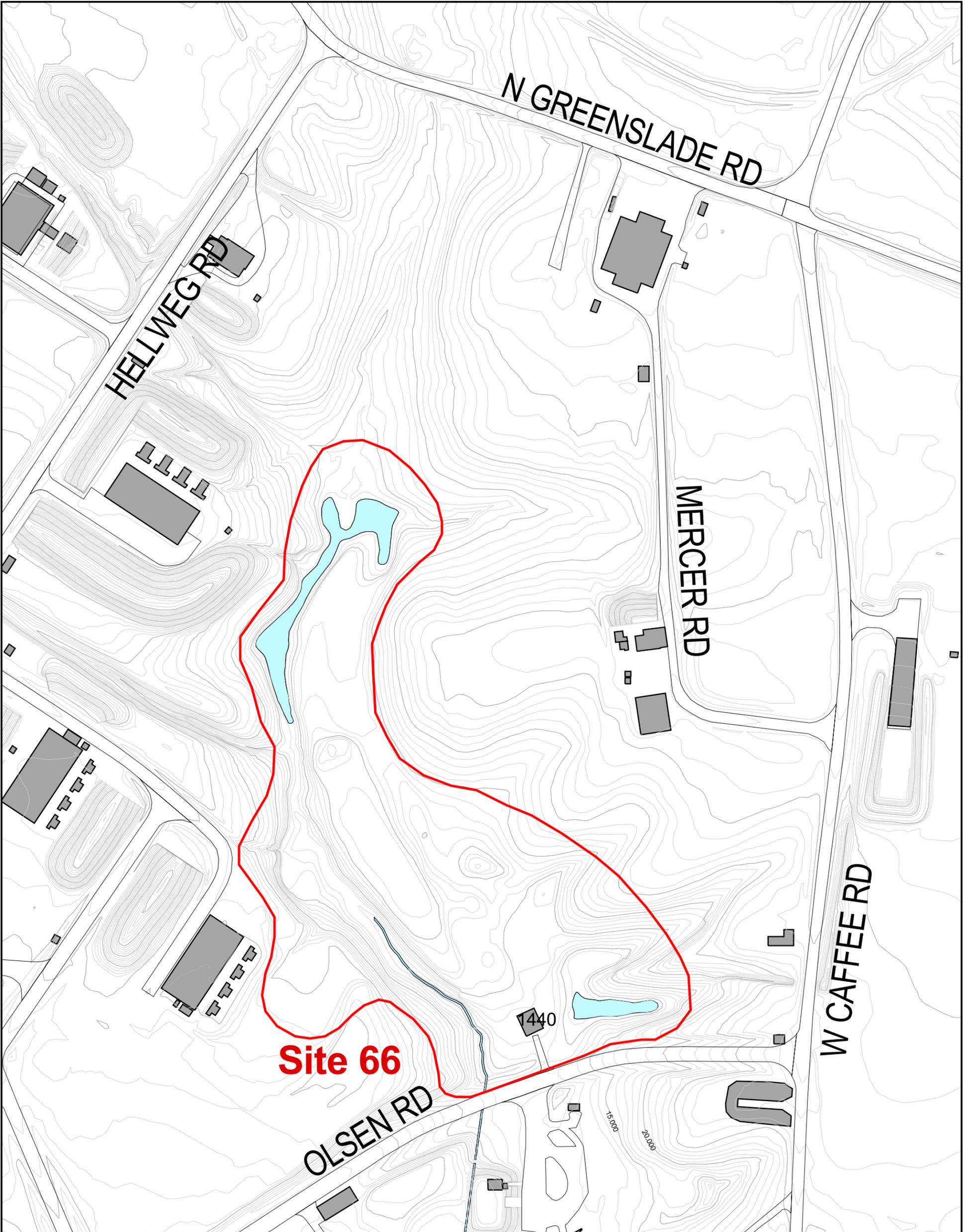
LEGEND

-  Approximate Site Boundary
-  Buildings
-  Road



0 3000 6000 Feet

Figure 1
Facility Location Map
Site Inspection Work Plan for Site 66
Turkey Run Disposal Area
NSF-IH, Indian Head, Maryland



LEGEND

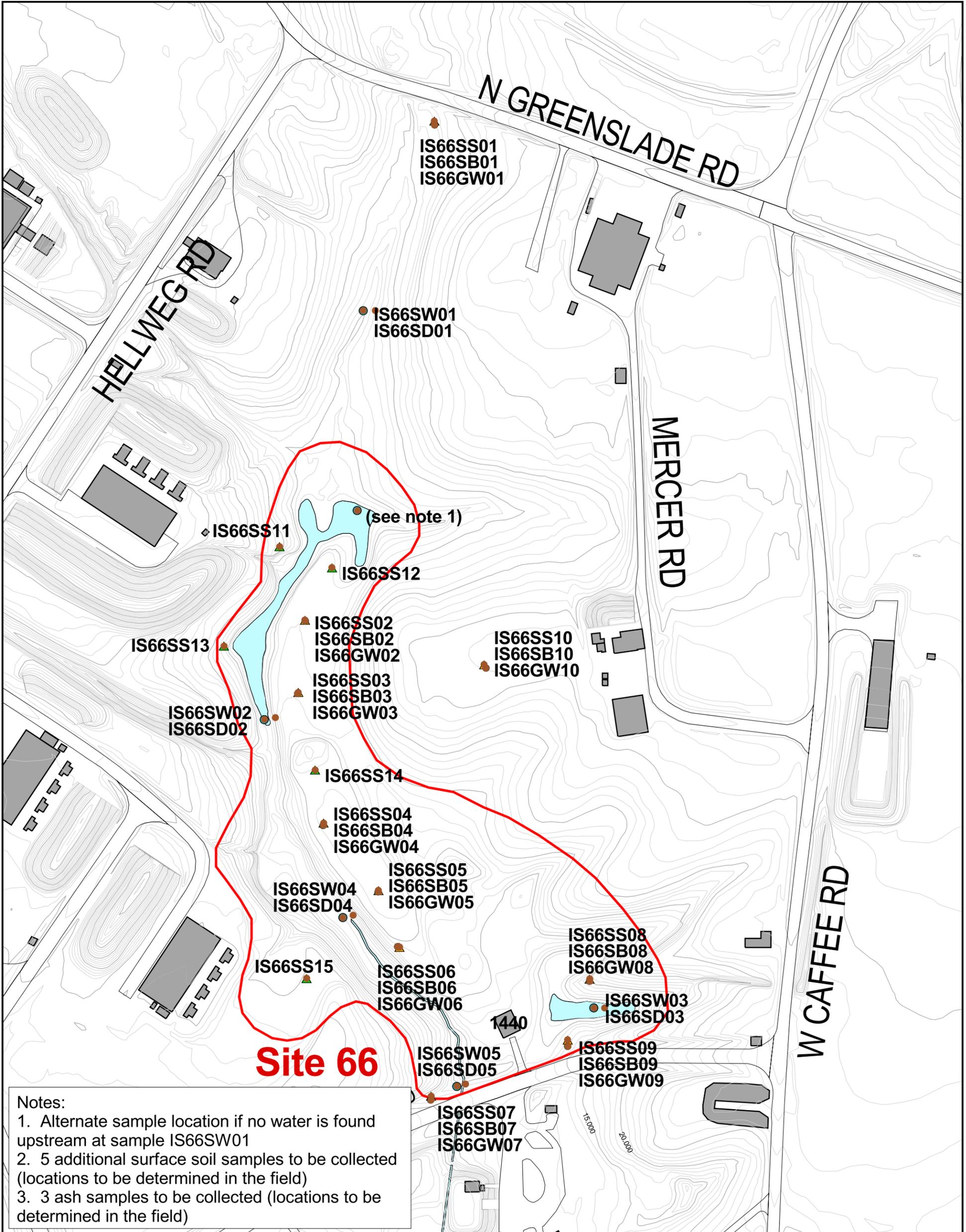
-  Approximate Site Boundary
-  Buildings
-  Road
-  5 Foot Elevation Contour
-  1 Foot Elevation Contour



0 150 300 Feet

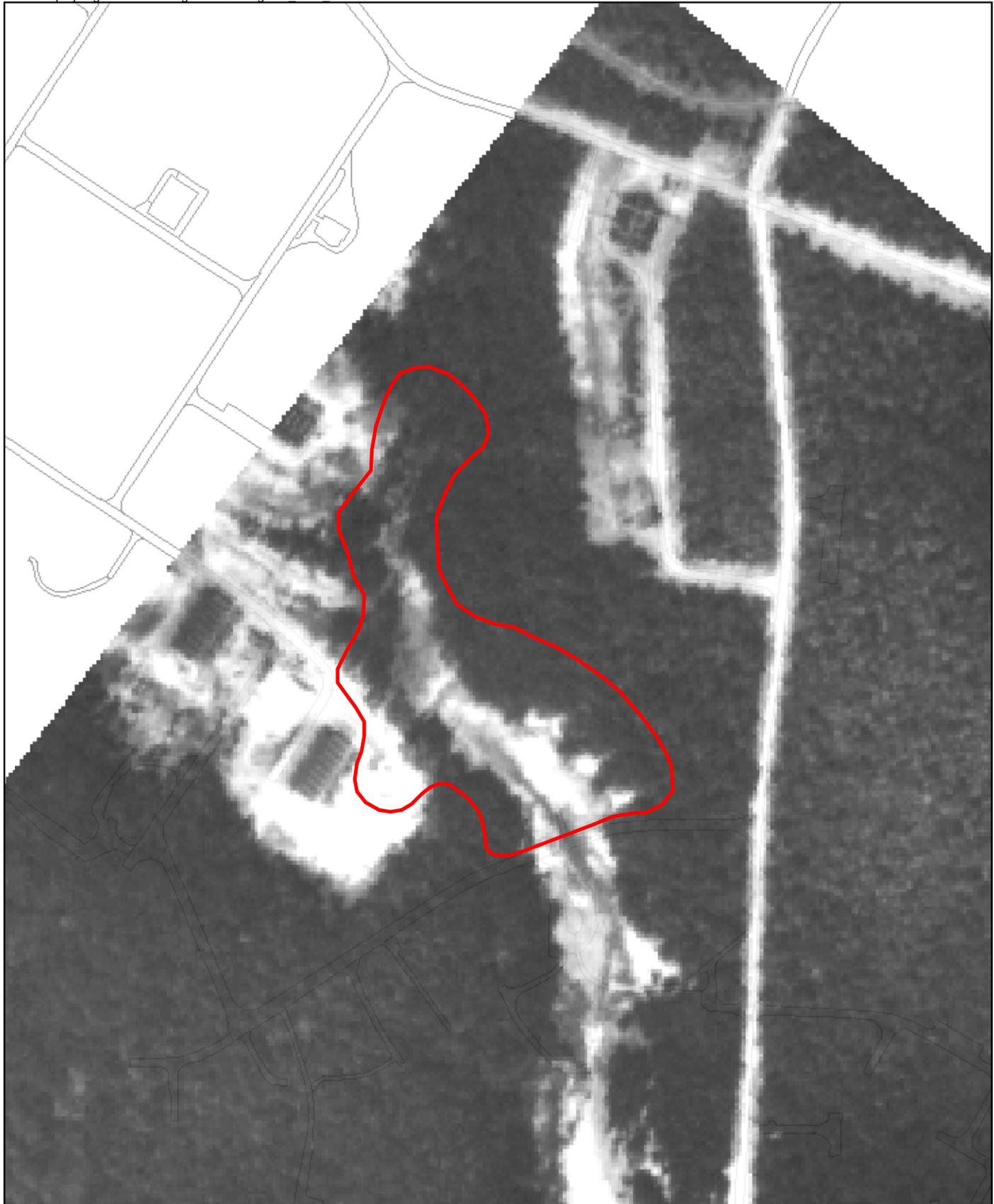


Figure 2
Site Map
Site Inspection Work Plan for Site 66
Turkey Run Disposal Area
NSF-IH, Indian Head, Maryland



LEGEND			
Approximate Site Boundary Buildings Road 5 Foot Elevation Contour 1 Foot Elevation Contour	Surface Soil Sample Surface Soil/Subsurface Soil/ Groundwater Samples Surface Water/Sediment Samples		

Figure 3
 Proposed Sample Locations
 Site Inspection Work Plan for Site 66
 Turkey Run Disposal Area
 NSF-IH, Indian Head, Maryland
CH2MHILL



Legend

-  Approximate Site Boundary
-  Roads

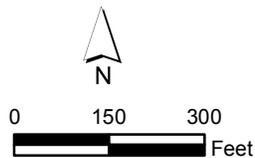
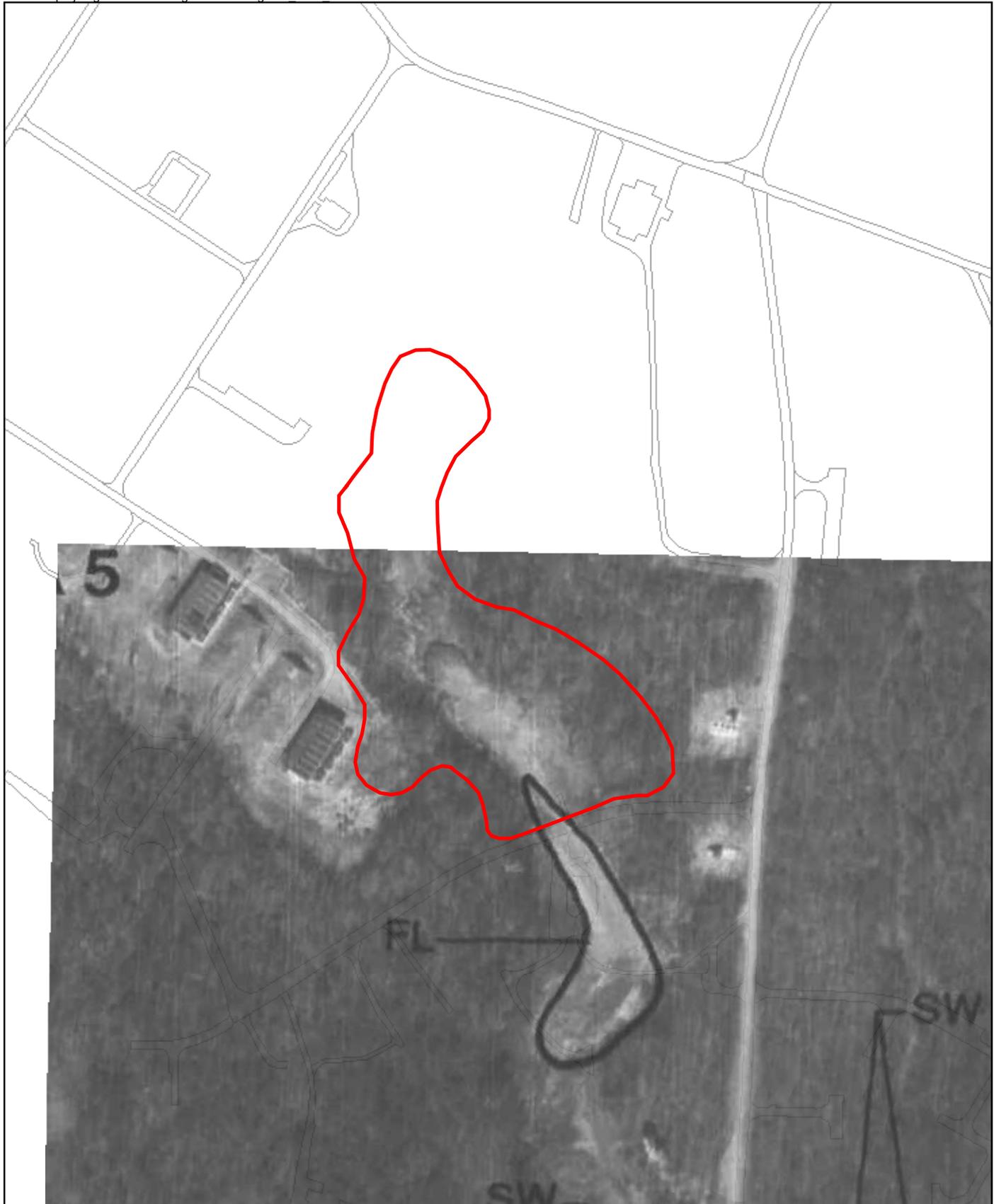


Figure 4
1956 Aerial Photograph
Site Inspection Work Plan for Site 66
Turkey Run Disposal Area
NSF-IH, Indian Head, Maryland



Legend

-  Approximate Site Boundary
-  Roads

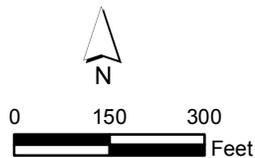


Figure 5
1963 Aerial Photograph
Site Inspection Work Plan for Site 66
Turkey Run Disposal Area
NSF-IH, Indian Head, Maryland



Legend

-  Approximate Site Boundary
-  Roads

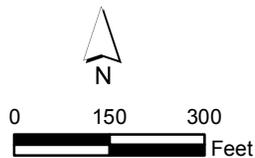
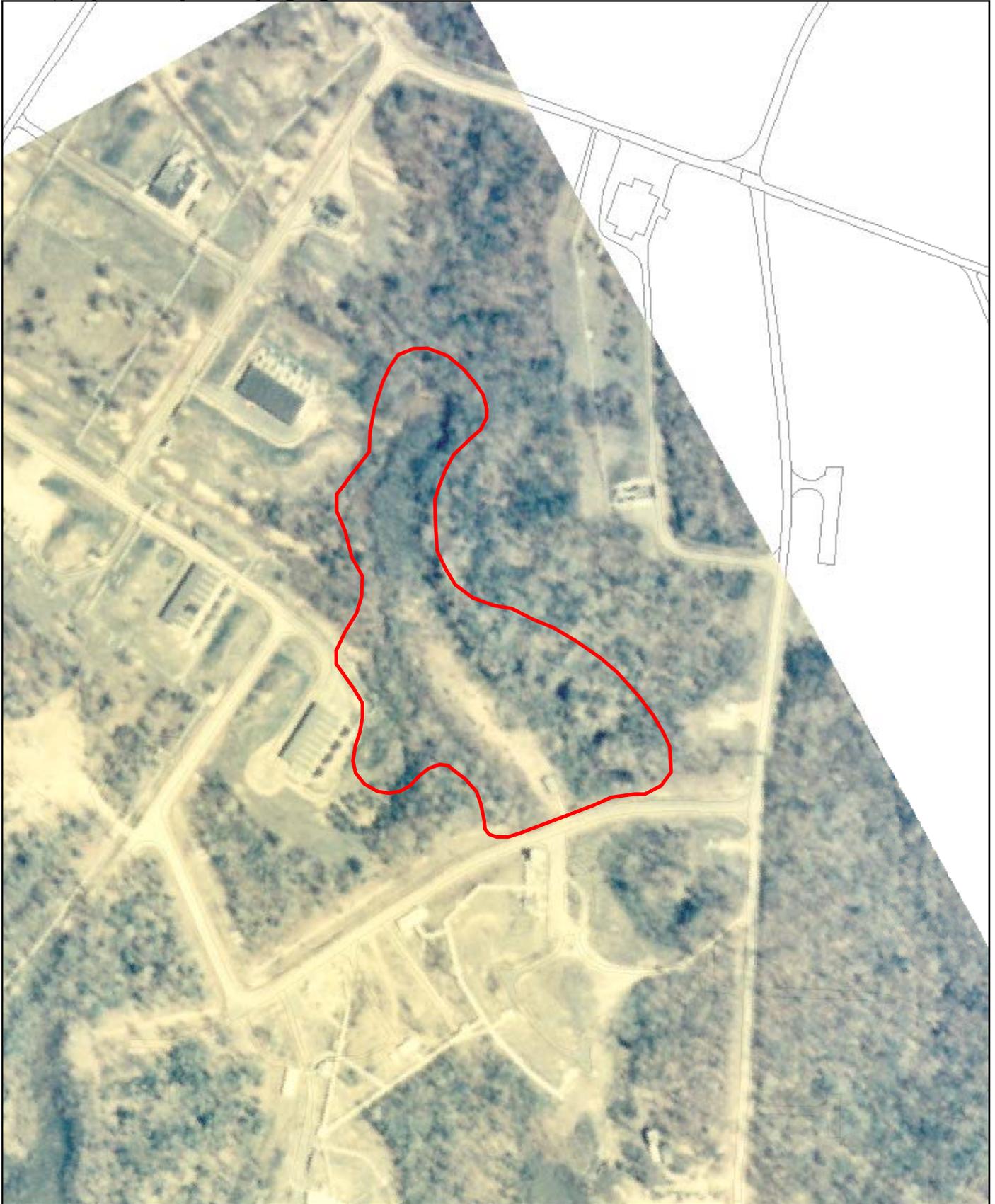


Figure 6
1967 Aerial Photograph
Site Inspection Work Plan for Site 66
Turkey Run Disposal Area
NSF-IH, Indian Head, Maryland



Legend

-  Approximate Site Boundary
-  Roads

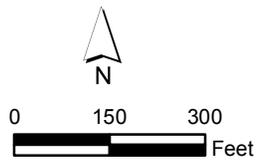
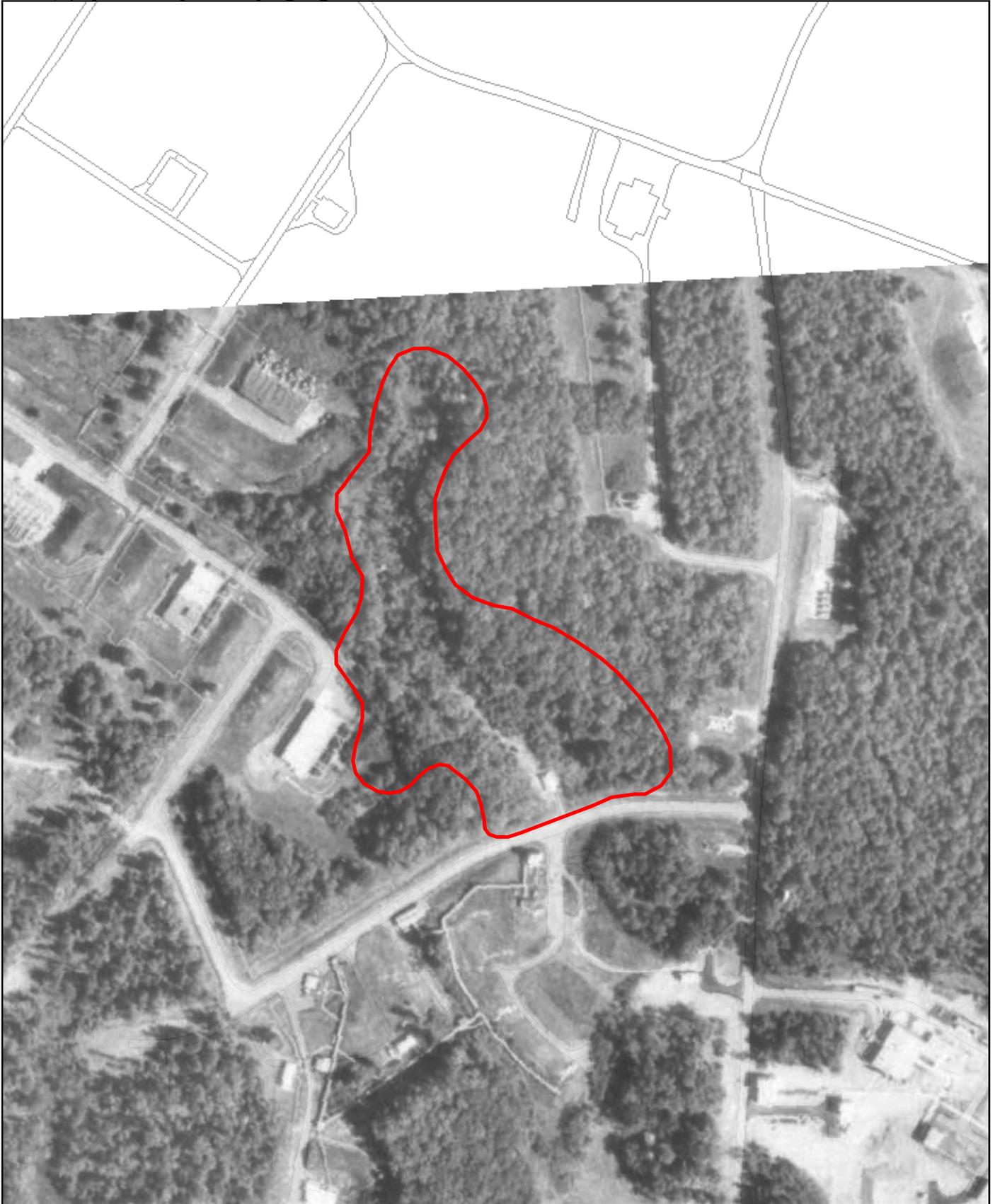


Figure 7
1972 Aerial Photograph
Site Inspection Work Plan for Site 66
Turkey Run Disposal Area
NSF-IH, Indian Head, Maryland



Legend

-  Approximate Site Boundary
-  Roads

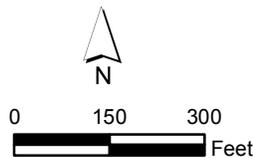
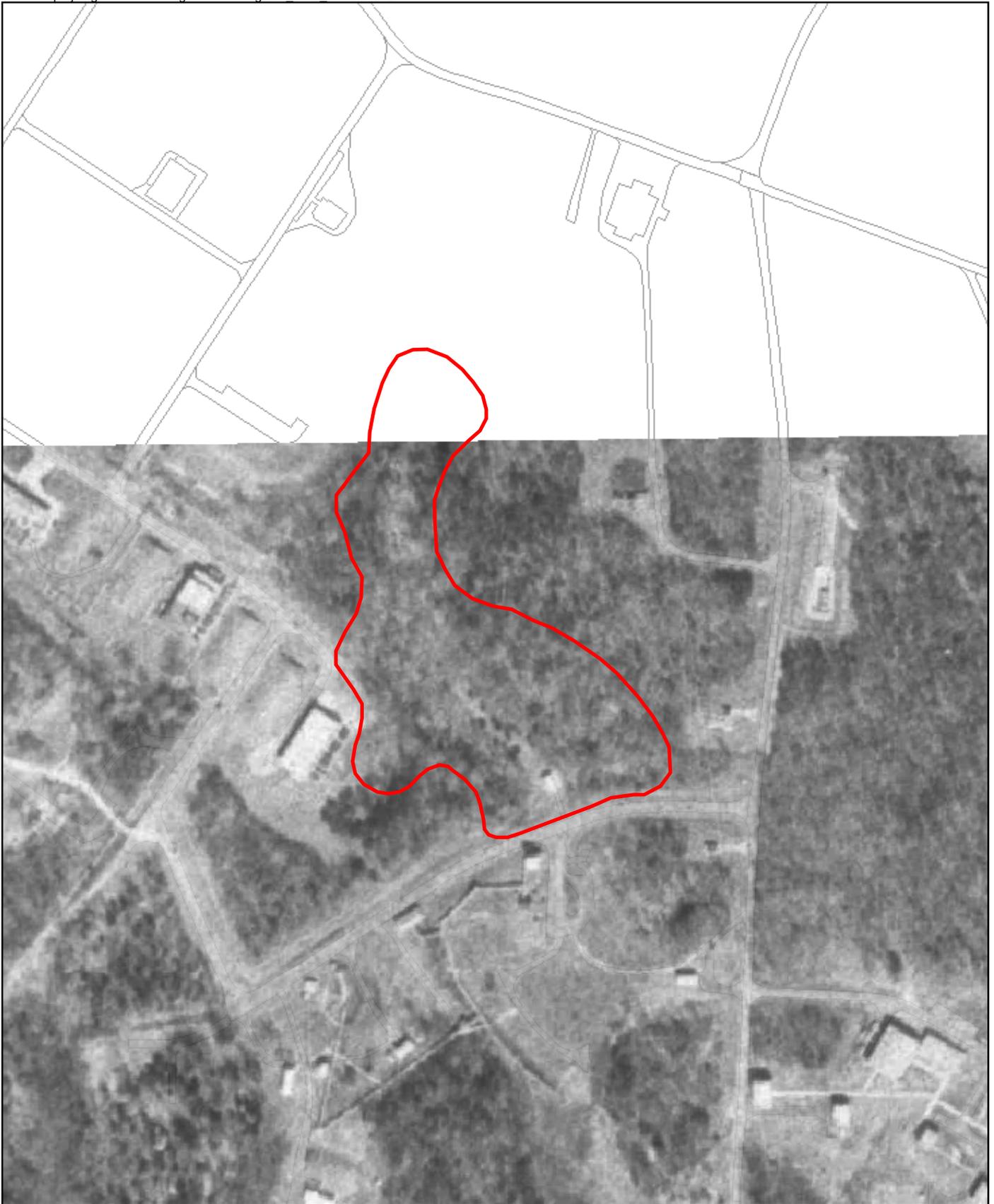


Figure 8
1980 Aerial Photograph
Site Inspection Work Plan for Site 66
Turkey Run Disposal Area
NSF-IH, Indian Head, Maryland



Legend

-  Approximate Site Boundary
-  Roads

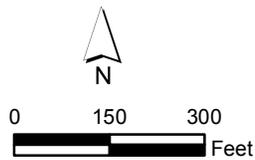


Figure 9
1982 Aerial Photograph
Site Inspection Work Plan for Site 66
Turkey Run Disposal Area
NSF-IH, Indian Head, Maryland



Legend

-  Approximate Site Boundary
-  Roads

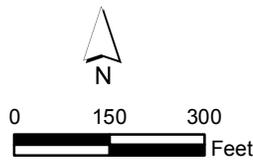


Figure 10
1987 Aerial Photograph
Site Inspection Work Plan for Site 66
Turkey Run Disposal Area
NSF-IH, Indian Head, Maryland

Attachment 2
Laboratory SOPs (Included as a CD)
