Quality Assurance Project Plan
Former Fort Ord, California, Volume I
Appendix C, Final Revision 8
Soil Gas Monitoring at Sites 2 and 12

Prepared for:
U.S. Army Corps of Engineers
Sacramento District
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On behalf of:
U.S. Department of the Army
Fort Ord BRAC
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USACE Contract No. W91238-19-C-0027
Task No. 6.5

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Report Date: **August 2023**
Report Version: **Final**

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Acronyms and Abbreviations

%	percent
µg/m^3	micrograms per cubic meter
ACL	aquifer cleanup level
ADR	Automated Data Review
AEI	Ahtna Environmental, Inc.
AES	Ahtna Engineering Services
Ahtna	Ahtna Global, LLC
Army	U.S. Department of the Army
AS	air sparge
BFB	4-bromofluorobenzene
bgs	below ground surface
BRAC	Base Realignment and Closure
CCA	Comprehensive Certificate of Analysis
CCV	Continuing Calibration Verification
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	chemical of concern
COD	coefficient of determination
CPR	cardiopulmonary resuscitation
CQCR	Contractor Quality Control Report
CQM	Construction Quality Management
CCRWQCB	California Regional Water Quality Control Board, Central Coast Region
DL	detection limit
DoD	Department of Defense
DQI	data quality indicator
DQO	data quality objective
DTSC	California Department of Toxic Substances Control
EDD	electronic data deliverable
EDF	electronic data format
ELAP	Environmental Laboratory Accreditation Program
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Differences
FADL	field activity daily logbook
FODIS	Fort Ord Data Integration System
FS	Feasibility Study
GAC	granular activated carbon
GC/MS	gas chromatography/mass spectrometry
HAZWOPER	Hazardous Waste Operations and Emergency Response
HHRA	human health risk assessment
HI	hazard index
ICAL	initial calibration
ICV	initial calibration verification

Acronyms and Abbreviations (continued)

lbs/day	pounds per day
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LIMS	Laboratory Information Management System
LOD	limit of detection
LOQ	limit of quantitation
MB	method blank
MPC	measurement performance criteria
N/A	not applicable
O&M	operations and maintenance
OSHA	Occupational Safety & Health Administration
PCE	tetrachloroethene
PDF	portable document format
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QSM	Quality Systems Manual
RAWP	Remedial Action Work Plan
RI	Remedial Investigation
ROD	Record of Decision
ROI	radius of influence
RPD	relative percent difference
RSD	relative standard deviation
RT	retention time
SGCL	soil gas cleanup level
SG-SL	soil gas screening level
Sites 2/12	Sites 2 and 12
SOP	standard operating procedure
SSHO	Site Safety and Health Officer
SVE	soil vapor extraction
SVETS	soil vapor extraction and treatment system
SVTU	soil vapor treatment unit
TAT	turnaround time
TCE	trichloroethene
USACE	U.S. Army Corps of Engineers
VOC	volatile organic compound

1.0 Introduction

On behalf of the U.S. Army Corps of Engineers (USACE), Sacramento District, Ahtna Global, LLC (Ahtna) has prepared this *Quality Assurance Project Plan, Former Fort Ord, California, Volume 1, Appendix C, Revision 8, Soil Gas Monitoring at Sites 2 and 12* (QAPP)[1] under Ahtna Contract Number W91238-19-C-0027. This work is being conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or "Superfund") to address historical releases of chemicals of concern (COCs) at the former Fort Ord. The QAPP was updated and revised to:

- Update standard operating procedures (SOPs) in Attachment A;
- Update the field documentation forms in Attachment B;
- Update the three-phase quality control process and documentation in Attachment C;
- Update the laboratory analyses certifications in Attachment D;
- Update project personnel;
- Update detection limits (DLs), limits of detection (LODs), and limits of quantification (LOQs) for U.S. Environmental Protection Agency (EPA) Method TO-15;
- Update the sample schedules for soil gas probes and soil vapor extraction (SVE) wells based on recent progress in soil gas remedial actions (Table 1);
- Reference Department of Defense (DoD) Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.4;
- Removed Figure 3 (Analytic Approach) for consistency with other site QAPPs;
- Removed Figure 4 (Typical Soil Gas Probe Design & Purge Volume Calculation). It was no longer needed after conversion to optimized worksheets; and
- Update to the optimized UFP-QAPP Worksheets.

This QAPP is the governing document for soil gas and soil vapor extraction and treatment system (SVETS) monitoring conducted by Ahtna and associated with Sites 2 and 12 (2/12). This QAPP details the quality assurance (QA) and quality control (QC) procedures to be used during sampling and analytical activities performed so the data generated are accurate, precise, complete, and representative of field conditions of sufficient quality to support project decisions.

[1] This document is Appendix C to the *Quality Assurance Project Plan, Superfund Response Actions, Former Fort Ord, California, Volume I*. Volume I is also the governing document for sampling and analysis of groundwater (Appendix A), soil (Appendix B), and landfill gas (Appendix D). Volume II of the QAPP pertains to the former Fort Ord military munitions response program.

2.0 Project Management

2.1 Worksheet #1 & 2: Title and Approval Page

Site Name/Project Name: Sites 2 and 12 (2/12)

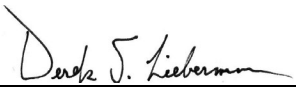
Site Location: Former Fort Ord, California

Document Title: Quality Assurance Project Plan, Former Fort Ord, California, Volume I, Appendix C, Final Revision 8, Soil Gas Monitoring at Sites 2 and 12

Lead Organization: U.S. Army Corps of Engineers

Preparer's Name, Organization, and Contact Info: Eric Schmidt, Ahtna
9699 Blue Larkspur Lane, Suite 203, Monterey, CA 93940. (831) 582-1348. eschmidt@ahtna.net

Preparation Date: 08/01/2023

Project Role	Name Organization	Signature	Date
Investigative Organization's Project Manager	Derek S. Lieberman Ahtna		8/1/23
Investigative Organization's Project Chemist	Eric Schmidt Ahtna		8/1/23
Lead Organization's Technical Lead	Erin Corr USACE	CORR.ERIN.NICOLE.1609085602 Digitally signed by CORR.ERIN.NICOLE.1609085602 Date: 2023.08.02 07:58:25 -07'00'	
Lead Organization's Project Chemist	Kyle Bayliff USACE	BAYLIFF.KYLE.WESLEY.1553766881 Digitally signed by BAYLIFF.KYLE.WESLEY.1553766881 Date: 2023.08.02 15:52:47 -05'00'	

Plans and reports from previous investigations relevant to this project:

Title: Quality Assurance Project Plan, Former Fort Ord, California, Volume I, Appendix C, Soil Gas Monitoring at Sites 2 and 12

Revision Number: 8

Revision Date: August 2023

Site name/project name: Soil Gas Monitoring at Sites 2 and 12, Former Fort Ord, California

Site location: Monterey County, California

Site number/code: 2/12

Operable Unit: Sites 2 and 12

Contractor name: Ahtna Global, LLC

Contract number: W91238-19-C-0027

Contract title: Former Fort Ord Basewide Soil Gas and Soil Vapor Treatment and Monitoring

Work Assignment Number: N/A

Guidance used to prepare QAPP: Uniform Federal Policy for Quality Assurance Project Plans, Optimized UFP-QAPP Worksheets, March 2012, Revision 1. DoD QSM, Version 5.4, 2021

Regulatory program: Comprehensive Environmental Response Compensation and Liability Act (CERCLA) as amended by Superfund Amendment and Reauthorization Act

Approval entities: U.S. Environmental Protection Agency (EPA), California Department of Toxic Substance Control (DTSC), and Regional Water Quality Control Board, Central Coast Region (CCRWQCB)

Data users: U.S. Department of the Army (Army), USACE, EPA (and its consultant TechLaw, Inc.), DTSC, CCRWQCB, Army/USACE contractors, citizen groups, and members of the public

Organizational partners (stakeholders) and connection with lead organization: USACE, Army (lead agency/owner), EPA (lead oversight agency), DTSC (support agency), and CCRWQCB (support agency)

QAPP type: Generic _____ Project-Specific **X**

Dates and titles of QAPP documents written for previous site work:

September 2013, Final Quality Assurance Project Plan/Field Sampling Plan, Remedial Investigation/Feasibility Study Addendum at Sites 2 and 12, Former Fort Ord, California (Appendix A to the RI/FS Addendum Work Plan, AR# BW-2665A)

March 2015, Quality Assurance Project Plan, Former Fort Ord, California, Volume I, Appendix C, Final Revision 0, Soil Gas Monitoring at Sites 2 and 12 (AR# BW-2727B)

March 2016, Quality Assurance Project Plan, Former Fort Ord, California, Volume I, Appendix C, Final Revision 1, Soil Gas Monitoring at Sites 2 and 12 (AR# BW-2792A)

May 2017, Quality Assurance Project Plan, Former Fort Ord, California, Volume I, Appendix C, Final Revision 2, Soil Gas Monitoring at Sites 2 and 12 (AR# BW-2792C)

January 2018, Quality Assurance Project Plan, Former Fort Ord, California, Volume I, Appendix C, Final Revision 3, Soil Gas Monitoring at Sites 2 and 12 (AR# BW-2792E)

February 2019, Quality Assurance Project Plan, Former Fort Ord, California, Volume I, Appendix C, Final Revision 4, Soil Gas Monitoring at Sites 2 and 12 (AR# BW-2792G)

November 2019, Quality Assurance Project Plan, Former Fort Ord, California, Volume I, Appendix C, Draft Addendum No. 1, Soil Gas Monitoring at Sites 2 and 12 (AR# BW-2792H)

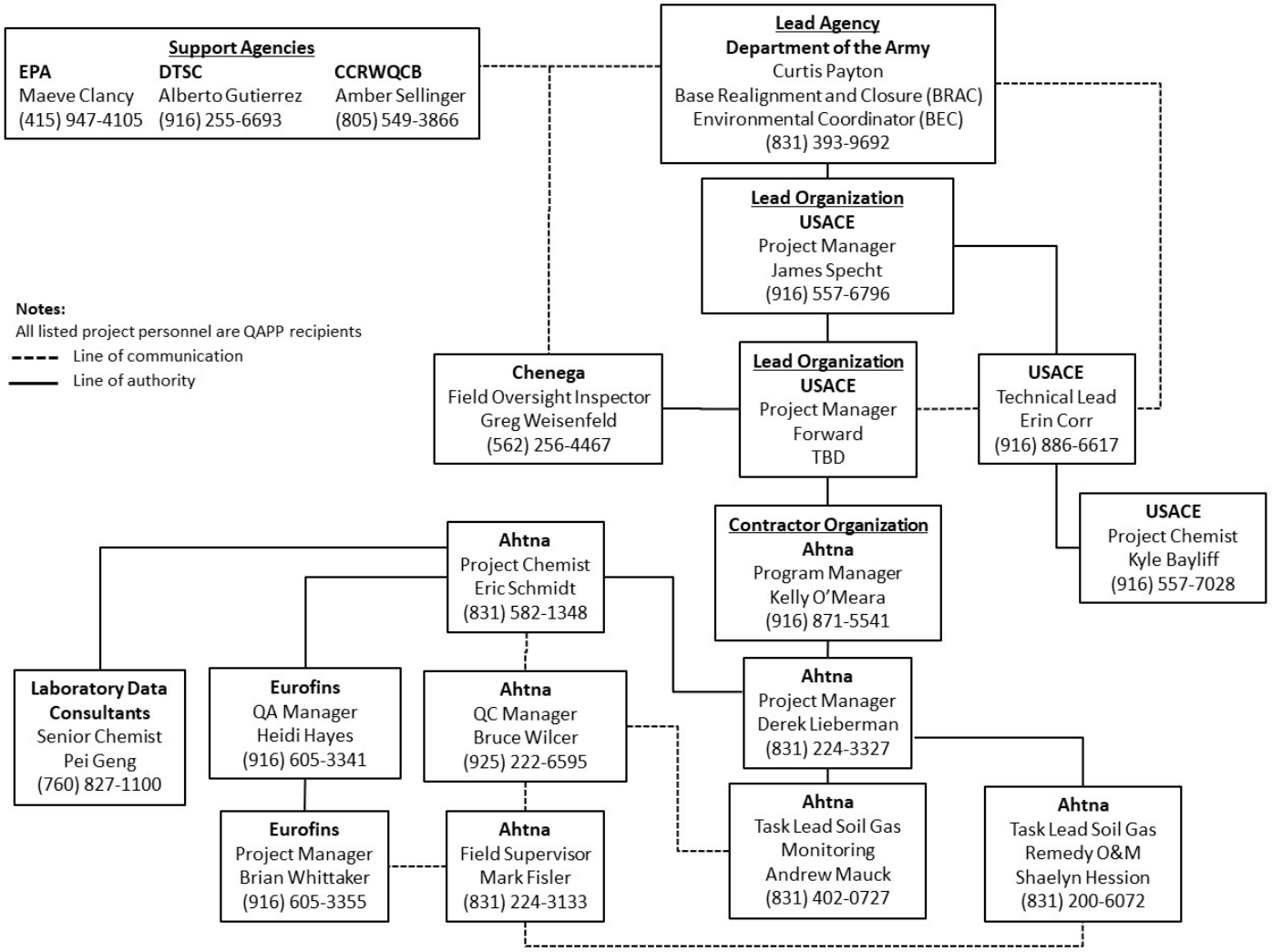
August 2020, Quality Assurance Project Plan, Former Fort Ord, California, Volume I, Appendix C, Final Revision 5, Soil Gas Monitoring at Sites 2 and 12 (AR# BW-2792M)

September 2021, Quality Assurance Project Plan, Former Fort Ord, California, Volume I, Appendix C, Final Revision 6, Soil Gas Monitoring at Sites 2 and 12 (AR# BW-2792P)

June 2022, Quality Assurance Project Plan, Former Fort Ord, California, Volume I, Appendix C, Final Revision 7, Soil Gas Monitoring at Sites 2 and 12 (AR# BW-2792S)

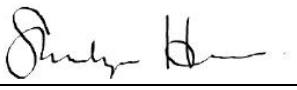
2.2 Worksheet #3 & 5: Project Organization and QAPP Distribution

Reporting relationships between organizations involved in the project, including the lead organization, contractors, and subcontractor organizations are identified below.



2.3 Worksheet #4, 7 & 8: Personnel Qualifications and Sign-Off Sheet

Organization: Ahtna

Project Personnel	Title	Telephone	Signature
Kelly O'Meara	Program Manager	(916) 871-5541	
Derek Lieberman	Project Manager	(831) 224-3327	
Shaelyn Hession	Task Lead, Soil Gas Remedy O&M	(831) 200-6072	
Andrew Mauck	Task Lead, Soil Gas Monitoring	(831) 402-0727	
Eric Schmidt	Project Chemist	(831) 582-1348	
Mark Fisler	Field Services Coordinator	(831) 224-3133	
Bruce Wilcer	QC Manager	(925) 222-6595	

Notes:
O&M = operations and maintenance

Worksheet #4, 7 & 8: Personnel Qualifications and Sign-Off Sheet (Continued)

Organization: Eurofins (Ahtna Subcontractor)

Project Personnel	Title	Telephone	Signature
Heidi Hayes	QA Manager	(916) 605-3341	
Brian Whittaker	Project Manager	(916) 605-3355	Brian Whittaker

Worksheet #4, 7 & 8: Personnel Qualifications and Sign-Off Sheet (Continued)

Organization: Laboratory Data Consultants (Ahtna Subcontractor)

Project Personnel	Title	Telephone	Signature
Pei Geng	Senior Chemist	(760) 827-1100	Pei Geng

2.4 Worksheet #6: Communication Pathways

Communication Driver	Organization	Name and Position	Contact Information	Procedure (timing, pathways, documentation, etc.)
Regulatory agency interface	Army	Curtis Payton	(831) 393-9692 r.c.payton.civ@army.mil	Materials and information regarding the project will be forwarded by email to the regulatory agencies through the Army BEC for review at scheduled BRAC Cleanup Team meetings.
Army BRAC Office interface	USACE	Erin Corr, Technical Lead	(916) 886-6617 Erin.N.Corr@usace.army.mil	Materials and information regarding the project will be forwarded by email to the Army BRAC Office through USACE Technical Lead for review at scheduled Army Internal Progress Meetings.
Lead Organization Project Manager interface	Ahtna	Derek Lieberman, Project Manager	(831) 224-3327 dlieberman@ahtna.net	Materials and information regarding the project will be forwarded by email to USACE by the Ahtna Project Manager for review at weekly status meetings.
Field progress reports	Ahtna	Mark Fisler, Field Supervisor	(831) 224-3133 mfisler@ahtna.net	Ahtna Field Supervisor will report fieldwork progress by email to Ahtna Project Manager daily.
Stop work due to safety issues	Ahtna	Holly Dillon, Site Safety and Health Officer	(831) 324-3299 hdillon@ahtna.net	All onsite Personnel have authority and responsibility to stop work on the site if an imminent hazard is observed. The Site Safety and Health Officer will be consulted by phone immediately for further recommendations.
QAPP changes prior to fieldwork	Ahtna	Derek Lieberman, Project Manager	(831) 224-3327 dlieberman@ahtna.net	Significant changes to the QAPP must approved by the Ahtna Project Manager, USACE Technical Lead, and USACE Project Chemist, and submitted to the regulatory agencies for review and comment via email (where the subject of the email is “QAPP Change”) prior to implementation.

Communication Driver	Organization	Name and Position	Contact Information	Procedure (timing, pathways, documentation, etc.)
QAPP changes during project execution [1]	Ahtna	Derek Lieberman, Project Manager	(831) 224-3327 dlieberman@ahtna.net	Field changes to the QAPP must be approved by the Ahtna Project Manager, USACE Technical Lead, and USACE Project Chemist by phone or email (where the subject of the email is "Field Change Request") prior to implementation.
Field corrective actions[1]	Ahtna	Mark Fisler, Field Supervisor	(831) 224-3133 mfisler@ahtna.net	Ahtna Field Supervisor will determine the need for corrective action and will report field issues to Ahtna Project Manager daily. Ahtna Project Manager will notify the Ahtna QC Manager of issues within one business day and will respond to the request for corrective action within 24 hours.
Sample receipt variances	Eurofins	Heidi Hayes, QA Officer	(916) 605-3341 heidi.hayes@et.eurofinsus.com	Discrepancies or non-compliance are documented immediately on the Sample Receipt Confirmation Form, which is automatically emailed to the Eurofins Project Manager, who will immediately contact the Ahtna Project Chemist for resolution.
Laboratory QC variances	Ahtna	Eric Schmidt, Project Chemist	(831) 582-1348 eschmidt@ahtna.net	Ahtna Project Chemist will report laboratory QC issues to USACE Technical Lead and USACE Project Manager by email within two business days of the occurrence.
Analytical corrective actions[1]	Ahtna	Eric Schmidt, Project Chemist	(831) 582-1348 eschmidt@ahtna.net	Ahtna Project Chemist will determine the need for corrective action and will report nonconformance and QC issues to the Ahtna Project Manager and USACE Project Chemist by email within two business days of the occurrence.
Data verification issues	Ahtna	Eric Schmidt, Project Chemist	(831) 582-1348 eschmidt@ahtna.net	Ahtna Project Chemist will report incomplete records issues to USACE Technical Lead and USACE Project Manager by email within five business days of completing data verification (Worksheet #35).

Communication Driver	Organization	Name and Position	Contact Information	Procedure (timing, pathways, documentation, etc.)
Data validation issues	Ahtna	Eric Schmidt, Project Chemist	(831) 582-1348 eschmidt@ahtna.net	Ahtna Project Chemist will report non-compliance with procedures to USACE Technical Lead and USACE Project Manager by email within five business days of receiving data validation reports.
Data usability issues	Ahtna	Eric Schmidt, Project Chemist	(831) 582-1348 eschmidt@ahtna.net	Ahtna Project Chemist will report data quality issues that could impact data usability to USACE Technical Lead/USACE Project Chemist within five business days of completing the usability assessment (Worksheet #37).
Data review corrective actions	Ahtna	Eric Schmidt, Project Chemist	(831) 582-1348 eschmidt@ahtna.net	Ahtna Project Chemist will determine the need for corrective action and will provide recommendations to the Ahtna Project Manager and USACE Technical Lead by email within five business days of completing the data review.
Release of analytical data	Ahtna	Eric Schmidt, Project Chemist	(831) 582-1348 eschmidt@ahtna.net	Analytical data will not be released until review or validation is completed, as appropriate. The Ahtna Project Chemist will approve the release of data to the Ahtna Project Manager.
Data import and export	Ahtna	Teri Farrell-Bage, Database Manager	(925) 915-6255 tbage@ahtna.net	The Ahtna Database Manager coordinates with the Ahtna Field Supervisor and SGS Project Manager to obtain data for electronic upload/manual entry into the data management system, QC review of the entered data, and preparation of the required tables and plots of the data. Coordinates with the Ahtna Project Chemist for QC purposes and forwards deliverables to the Project Manager.

Notes:

[1] In the event significant QAPP changes occur during project execution or significant corrective action is required for field or laboratory activities, information concerning the QAPP change or corrective action will be provided to the regulatory agencies by the Army within 14 days of the event or the next scheduled meeting of the BRAC Cleanup Team, whichever is sooner.

2.5 Worksheet #9: Project Planning Session Summary

Project Name: Soil Gas Monitoring at Sites 2 and 12 **Start Date:** Ongoing **Project Manager:** Derek Lieberman, Ahtna	**Site Name:** Sites 2 and 12 **Site Location:** Former Fort Ord, California
Date of Planning Session: October 10, 2022 **Planning Session Purpose:** Define data quality objectives (DQOs) and analytic approach criteria for the SVETS.	

Name	Title/Role	Affiliation	Telephone	E-mail Address
Shaelyn Hession	Task Lead, Soil Gas Remedy O&M	Ahtna	(831) 200-6072	shession@ahtna.net
Andrew Mauck	Task Lead, Soil Gas Monitoring	Ahtna	(831) 402-0727	amauck@ahtna.net
Eric Schmidt	Project Chemist	Ahtna	(831) 582-1348	eschmidt@ahtna.net
Holly Dillon	SSHO	Ahtna	(831) 324-3299	hdillon@ahtna.net

Planning Session Summary:

Review contract to determine QAPP requirements and reviewed QAPP Revision 7 for potential updates needed.

Action Items:

Based on this review, Ahtna will:

- Initiate QAPP Revision 8 update.
- Update QAPP to the optimized UFP-QAPP Worksheets.
- After review of the previous four quarters of data (Fourth Quarter 2021 through Third Quarter 2022) and comparison to the analytic approach in the QAPP, update the list of sampled soil gas probes quarterly and annually.
- Update the sample schedules for soil gas probes and soil vapor extraction (SVE) wells based on recent progress in soil gas remedial actions (Table 1).
- Add updated Eurofins SOPs in Attachment A.
- Update the field documentation forms in Attachment B.
- Update the three-phase quality control process and documentation in Attachment C.
- Update the laboratory analyses certifications in Attachment D.
- Update Figure 2 (SVTU Process Flow Diagram and Sampling Locations) to show only one GAC treatment unit.
- Reference DoD QSM Version 5.4.
- Update project personnel.
- Update DLs, LODs, and LOQs for U.S. Environmental Protection Agency (EPA) Method TO-15.

3.0 Project Quality Objectives

3.1 Worksheet #10: Conceptual Site Model

3.1.1 Background and History

The former military installation covers about 28,000 acres, is bounded by Monterey Bay to the west and the Santa Lucia Range to the south, and is surrounded by the cities of Del Rey Oaks, Marina, Sand City, and Seaside. State Highway 1 and the Union Pacific Railroad right-of-way traverse through the western portion of the former Fort Ord, separating the Monterey Bay beachfront from the rest of the installation. The former Fort Ord served as a training and staging facility for infantry troops from 1917 until its closure in 1994. In 1990, the former Fort Ord was placed on the EPA's National Priorities List (NPL),[2] primarily due to volatile organic compounds (VOCs) found in groundwater beneath the Fort Ord Landfills. The former Fort Ord was closed in 1994 under the BRAC Act.[3] Environmental remediation at the former Fort Ord is being completed pursuant to the CERCLA §121 and the National Oil and Hazardous Substances Contingency Plan.

3.1.2 Sources of Known or Suspected Hazardous Waste

When the former Fort Ord was an active military facility, Site 2 consisted of the primary sewage treatment facility for Fort Ord and Site 12 included numerous industrial activities, including vehicle maintenance and repair, furniture repair, storage of motor oils, hazardous material storage, vehicle cleaning and degreasing, and disposal of waste and oil.

Historical activities at Sites 2/12, including disposal of solvents at Site 12, resulted in releases of VOCs, primarily trichloroethene (TCE) and tetrachloroethene (PCE), into soil and groundwater. Although groundwater remediation activities have been conducted since 1999 and have successfully reduced TCE concentrations in groundwater at Sites 2/12, PCE concentrations began increasing in 2011 (ITSI, 2012), creating the potential for vapor intrusion to the overlying retail area. A human health risk assessment (HHRA) was conducted using indoor air and sub-slab soil gas data collected as part of the Remedial Investigation/Feasibility Study (RI/FS) Addendum at Sites 2/12. The HHRA concluded the vapor intrusion pathway does not present an unacceptable risk to human health (AES, 2015). Groundwater in the upper portion of the Upper 180-Foot Aquifer, where soil vapors may form, was investigated in 2013 and found to contain a plume of PCE above its ACL. Vadose (unsaturated) zone soils were also investigated, but only PCE and TCE were detected in the soil samples at concentrations below their respective soil screening levels. Soil gas was also investigated and distinct PCE and TCE plumes were identified in the vadose zone (AES, 2015).

[2] The NPL is the list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories. The NPL is intended primarily to guide the EPA in determining which sites warrant further investigation.
[3] BRAC is the process the Department of Defense (DoD) has used to reorganize its installation infrastructure to more efficiently and effectively support its forces and increase operational readiness.

3.1.3 Known Contaminants

Known contaminants, or COCs, for soil gas were identified during the original Remedial Investigation (RI) at the site (Army, 1997) and subsequent RI (AES, 2015). A decision document included the Record of Decision (ROD) for groundwater COCs, as described in the Groundwater QAPP (Ahtna, 2022) and soil gas COCs described in the Explanation of Significant Differences (ESD No. 1; Army, 2016) as described in this QAPP. The soil gas COCs are PCE and TCE, as listed in Worksheet #15.

3.1.4 Fate and Transport Considerations

There are or have been four potential migration pathways specific to Sites 2/12:

- Leaching of chemicals into underlying unsaturated zone soil from surface disposal of solvents at Site 12
- Concentration-driven diffusion of vapor-phase chemicals in soil gas
- Partitioning of chemicals between soil gas and groundwater
- Migration of dissolved phase chemicals in groundwater

Potential transport pathways and mechanisms are described in detail in Section 3.0 of the *Basewide Remedial Investigation/Feasibility Study, Fort Ord, California, Volume II – Remedial Investigation: Introduction* (HLA, 1995). Based on environmental conditions, historical data at Sites 2/12, and chemical-specific properties, PCE and TCE are considered to have medium to high persistence and moderate mobility. Soil types present at the site have a low retardation factor, and there is insignificant adsorption of these chemicals. Additionally, PCE and TCE water solubilities and partition coefficients indicate moderate mobility. Persistence of PCE and TCE over time and the relative absence of breakdown products indicate little or no reductive dechlorination of these compounds. Concentration-driven diffusion is likely a continuing process at Site 12 given the variation of concentration gradients in the unsaturated zone over time. Additionally, groundwater and soil gas analytical data and modeling during the RI/FS Addendum at Sites 2/12 indicated the areas of highest concentrations of PCE and TCE in soil gas were associated with concentrations of PCE and TCE in groundwater that exceed aquifer cleanup levels (ACLs; AES, 2015).

Diffusion of the soil gas PCE plume resulted in expansion downward to the water table, where PCE moved from the vapor phase into the groundwater by dissolving into water infiltrating through the capillary fringe. PCE partitioned between soil gas and groundwater as it moved toward equilibrium in the two media.

3.1.5 Potential Receptors and Exposure Pathways

Groundwater at Sites 2/12 is considered a potential drinking water, industrial water, and agricultural water source under the *Water Quality Control Plan for the Central Coastal Basin* (CCRWQCB, 2019), although the groundwater is not currently being used for these purposes. Drinking water in the Fort Ord area is provided by the Marina Coast Water District (MCWD) and is pumped from wells that are located east of Sites 2/12. These supply wells are screened in the Lower 180-Foot Aquifer or deeper aquifers. Groundwater within the Sites 2/12 area is located in the Prohibition Zone of the Special Groundwater Protection Zone at the former Fort Ord, and Monterey County restricts installation of new supply wells

in this zone. According to Monterey County Code Title 15 Section 15.08.140, a prohibition zone is an area overlying or adjacent to a contaminant plume where water well construction is prohibited and applications for water wells will not be accepted; therefore, potential exposure pathways to groundwater at Sites 2/12 are currently incomplete and are expected to remain so in the future. Volumes III and IV of the Basewide Remedial Investigation/Feasibility Study (HLA, 1995) provide additional details on the potential receptors and exposure pathways.

The potential for vapor intrusion to the retail area overlying Site 12 was evaluated in the HHRA using indoor air and sub-slab soil gas data collected as part of the RI/FS Addendum at Sites 2/12. Indoor shoppers and retail workers were considered as potential receptors for the vapor intrusion exposure pathway. The HHRA concluded the vapor intrusion pathway does not present an unacceptable risk to human health (AES, 2015).

3.1.6 Land Use Considerations

The Site 12 area was redeveloped into a commercial retail area identified as The Dunes on Monterey Bay, which included construction of several big-box stores, a movie theater complex, food services, and a large parking area. As described in Section 3.1.5, for this land use there are currently no pathways to potential receptors for COCs in groundwater and the vapor intrusion pathway for COCs in soil gas does not present an unacceptable risk to human health.

The Site 2 area remains undeveloped and open to the general public as part of Fort Ord Dunes State Park. The Site 2 area was proposed for reuse as an aquaculture and oceanographic research facility, and later as a desalination plant (FORA, 1997); however, the site remains unused with the derelict sewage treatment plant facilities still onsite. As described in Section 3.1.5, for this land use there are currently no pathways to potential receptors for COCs in groundwater and there are no known COCs in soil gas in the Site 2 area.

3.1.7 Physiography and Topography

The predominant topography of the area reflects a morphology typical of the dune sand deposits that underlie the western and northern portions of the former Fort Ord. In these areas, the ground surface slopes gently to the west and northwest, draining toward Monterey Bay. Runoff is minimal because of the high rate of surface-water infiltration into the permeable dune sand. Consequently, well-developed natural drainages are absent throughout much of this area. Closed drainage depressions typical of dune topography are common. Elevations at the former Fort Ord range from approximately 50 feet above mean sea level (MSL) at Site 2 to 250 feet above MSL at the Fort Ord Landfills.

3.1.8 Geology and Hydrology

The predominant lithology is a loose, well-sorted (poorly graded) fine to medium sand. The sands represent active and recently active dunes and older Pleistocene-age dune sands. The active dune sands parallel the beach and extend several hundred feet inland. The older dune sands cover most of the northern and western portions of the former Fort Ord. Paleosols, representing former ground surfaces (silty sands), exist within these sands. These paleosols indicate that one or more cycles of dune deposition have occurred with intervening periods of soil development. The paleosols in the dunes bordering the beach indicate that older dune sand is locally present beneath the recent dune sand.

One groundwater aquifer is in the remediation phase of cleanup activities at Sites 2/12: the unconfined Upper 180-Foot Aquifer. The aquifer consist predominantly of fine to coarse-grained sands which are separated by silty clay or clayey fine-grained sand aquitards. Groundwater in the unconfined Upper 180-Foot Aquifer flows west and discharges to the Monterey Bay.

3.2 Worksheet #11: Project/Data Quality Objectives

Data quality objectives (DQOs) are qualitative and quantitative statements that outline the decision-making process and specify the data required to support corrective actions. DQOs specify the level of uncertainty that will be accepted in results derived from data. The DQO process used for developing data quality criteria and performance specifications for decision-making is consistent with the *Guidance on Systematic Planning Using the Data Quality Objectives Process*, EPA QA/G-4 (EPA, 2006). The DQO process consists of the following seven steps:

Step 1: State the problem

Step 2: Identify the goals of the study

Step 3: Identify information inputs

Step 4: Define the boundaries of the study

Step 5: Develop the analytic approach

Step 6: Specify performance or acceptance criteria

Step 7: Develop the plan for obtaining data

The seven steps of the DQO process as applied to each project are described in the following sections.

3.2.1 Step 1: State the Problem

Follow up investigations and operation of an SVE and air sparge (AS) pilot study treatment system in 2014 (Figure 1) identified a groundwater plume and soil gas plume of TCE in the southern Site 12 area. The pilot study demonstrated that SVE and AS are effective technologies for remediation of soil gas and groundwater at Site 12 (AES, 2015); however, it was determined SVE and additional groundwater extraction and treatment (instead of AS) would likely be more effective for achieving remedial action objectives as described in the Explanation of Significant Differences No. 1 (ESD No. 1; Army, 2016). Accordingly, the SVETS and one additional groundwater extraction well were constructed per the *Final Remedial Action Work Plan Addendum, Sites 2 and 12 Groundwater Remediation, Former Fort Ord, California* (RAWP Addendum; AEI, 2015).

Further data collection is needed in the Sites 2/12 area to:

- Monitor the nature and extent of COC contamination in groundwater and soil gas;
- Support the continued remediation of the COCs in groundwater and soil gas (COCs in soil gas are a source of contamination in groundwater at Site 12);
- Ensure compliance with air quality standards identified in Regulation II (New Sources), Rule 207 (Air District, 2011) and Regulation X (Toxic Air Contaminants), Rule 1000 (Air District, 2017);
- Evaluate and optimize SVETS operations; and
- Support site closure.

The modified groundwater cleanup levels, soil gas cleanup levels (SGCLs), and modified groundwater remedy are described in ESD No. 1 (Army, 2016). Project action limits for soil gas are also summarized in Worksheet #15.

3.2.2 Step 2: Identify the Goals of the Study

The study goals with the Sites 2/12 remediation project are to:

- Adequately assess site conditions within the site physical and temporal boundaries;
- Assure continued compliance with the *Record of Decision, Basewide Remedial Investigation Sites, Fort Ord, California* (RI Sites ROD; Army, 1997) and ESD No. 1 (Army, 2016);
- Determine if COCs in soil gas will partition into groundwater at concentrations exceeding ACLs;
- Operate the SVETS to reduce COC concentrations in soil gas that may partition into groundwater at concentrations exceeding ACLs; and
- Ensure the soil vapor treatment unit (SVTU) effluent meets Air District discharge requirements.

To meet these goals, soil gas monitoring at Sites 2/12 will be conducted to determine whether:

- The SVETS is effectively and efficiently reducing COC concentrations in the vadose zone that could partition into groundwater at concentrations exceeding ACLs;
- Soil gas COC concentrations exceed the SGCLs at points near the groundwater interface and may partition into groundwater at concentrations exceeding ACLs; and
- Site closure is warranted.[4]

In addition, SVETS monitoring at Sites 2/12 will be conducted to determine whether:

- SVTU granular activated carbon (GAC) requires change-out;
- COC mass is being removed from the vadose zone and at what rate;
- SVE well extraction performance is optimal;
- Air quality standards are being met; and
- Current SVE well sampling frequency is adequate to meet project objectives.

Alternative outcomes for the proposed study questions are identified in Step 5.

3.2.3 Step 3: Identify Information Inputs

Inputs to decisions are as follows:

- COC concentrations in soil gas;
- COC concentrations in groundwater; determined in accordance with QAPP Appendix A (Ahtna, 2022);
- Soil gas screening levels (SG-SLs, Worksheet #15);[5]

[4] Site closure is dependent on decision criteria for completion of the groundwater restoration remedial action as described in QAPP Appendix A. Soil gas monitoring is only relevant for determining whether soil gas may be a continuing source of COCs to groundwater.

[5] SG-SLs are conservative risk-based CHHSLs (Cal/EPA, 2005) or site-specific values calculated per the Vapor Intrusion Guidance (DTSC, 2011) that assume chemical concentrations in soil gas less than 5 feet below a building foundation or the ground surface (i.e., there is less risk associated with chemicals in soil gas deeper than 5 feet).

- SGCLs (Worksheet #15);[6]
- Groundwater ACLs (identified in QAPP Appendix A [Ahtna, 2022] and ESD No. 1 [Army, 2016]);
- COC concentrations in the SVTU effluent to confirm whether discharge requirements are being met;
- COC concentrations in the SVTU effluent to determine whether GAC requires change-out;
- COC concentrations in the SVTU influent to determine the amount and rate of COC mass removal from the vadose zone;
- SVETS flow rate, vacuum and temperature data collected to evaluate and optimize system operation;
- SVE well flow rates as a function of applied vacuum;
- Applied vacuum in the SVE wells; and
- Induced vacuum in soil gas probes.

3.2.4 Step 4: Define the Boundaries of the Study

The Sites 2/12 study area is defined by the retail development tracts east of State Route 1, south of Imjin Parkway, west of 2nd Avenue, and north of the former 10th Street (Figure 1). Soil gas samples will be collected from soil gas probes at 10-foot intervals from approximately 10 feet below ground surface (bgs) to 70 feet bgs, and from SVE wells screened from approximately 45 feet bgs to 65 feet bgs. Twenty-four (24) soil gas probe locations and ten (10) SVE well locations at Site 12 are shown on Figure 1. Samples will be collected either quarterly or annually (Table 1) and sampling will continue until it can be demonstrated that remedial action objectives have been achieved, as described in ESD No. 1 (Army, 2016). Soil gas probes and SVE wells are located in public parking areas and undeveloped lots; therefore, there are no practical constraints that could interfere with sampling. If the SVETS is in operation, soil gas samples will also be collected from the SVTU located in a fenced compound adjacent to the Sites 2/12 groundwater treatment plant. A process flow diagram for the SVTU with potential sampling locations is shown in Figure 2.

3.2.5 Step 5: Develop the Analytic Approach

3.2.5.1 Soil Gas Monitoring

The following analytic approach will be applied to soil gas probe sampling frequency:

- If two consecutive quarters of monitoring data from a soil gas probe show concentrations of COCs less than or equal to their respective SGCLs, but greater than or equal to their SG-SLs, then the soil gas probe shall be evaluated for annual sampling.
    - If it is determined that quarterly data from the soil gas probe is necessary for defining the soil gas plume and/or evaluating remedy status, then the soil gas probe shall continue to be sampled quarterly.

SG-SLs are used to determine soil gas probe sampling frequency (Section 3.2.5.1), but are not criteria for assessing status of the remedial actions for Sites 2/12.

[6] SGCLs are the calculated concentrations of COCs in soil gas that will not partition into groundwater at concentrations exceeding ACLs and are therefore used to determine soil gas monitoring frequency, soil gas plume limits (Section 3.2.5.2), and operational status of individual SVE wells (Section 3.2.5.6).

  - If it is determined that soil gas probes laterally or vertically adjacent to the soil gas probe have detections of COCs greater than their respective SGCLs, then the soil gas probe shall continue to be sampled quarterly.
  - If it is determined that annual data from the soil gas probe is sufficient for defining the soil gas plume and/or evaluating remedy status, then the soil gas probe shall be sampled annually.
- If two consecutive annual monitoring results from a soil gas probe show concentrations of COCs less than or equal to their respective SG-SLs, then the soil gas probe will be evaluated for removal from the sampling program.
- If an annual monitoring event shows COC concentrations above their respective SG-SLs at an annual soil gas probe, then the soil gas probe sampling frequency may be increased to quarterly.
- If soil gas probes laterally or vertically adjacent to a soil gas probe sampled annually have detections of COCs greater than their respective SGCLs, then the soil gas probe may be returned to a quarterly monitoring schedule.
- If monitoring indicates the soil gas monitoring network no longer provides vertical or lateral control of COCs, then additional soil gas probes may be proposed for sampling.
- If all individual soil gas probes in a soil gas probe cluster meet the criteria above for removal from the soil gas monitoring program, and it is determined that the soil gas probe cluster is no longer needed for the soil gas monitoring program based on an evaluation of remedy status, then it will be proposed for decommissioning subject to concurrence by the EPA, DTSC and CCRWQCB (collectively the "regulatory agencies").

Exceptions to the analytic approach that may be implemented based on decision inputs are:

- If a soil gas probe is located vertically and laterally adjacent to a storefront and is in an area with concentrations of soil gas COCs historically greater than SGCLs,[7] then it will be sampled quarterly or at an appropriate frequency based on historical data and anticipated data needs as determined by the Army and concurred with by the regulatory agencies.
- If a soil gas probe is located vertically adjacent to groundwater with concentrations of groundwater COCs greater than ACLs, then it will be sampled quarterly or at an appropriate frequency based on historical data and anticipated data needs as determined by the Army and concurred with by the regulatory agencies.

3.2.5.2 Soil Gas Plume Limits

For defining soil gas plume limits, the parameter of interest is the maximum COC concentrations detected in a soil gas probe as compared to the SGCLs, SG-SLs, or historical COC concentration trends at the soil gas probe.

- If the COC concentration detected in a soil gas probe is greater than or equal to the SGCL, then that monitoring point is within the soil gas plume limits.

[7] Probes SG-12-02-10, SG-12-04-10 and SG-12-06-10 currently meet these criteria (Table 1).

- If the COC concentration detected in a soil gas probe is less than the SGCL, then that monitoring point is outside the soil gas plume limits.

3.2.5.3 Perimeter Control

For perimeter control, the minimum value detected in the monitoring point (e.g., non-detect at the LOD) is the parameter of interest.

- If COCs are not detected in a soil gas probe and COCs are not detected in all adjacent monitoring points, then that soil gas probe is outside the study area boundary as defined in Section 3.2.4 and not needed for perimeter control.
- If COCs are not detected in a soil gas probe, but COCs are detected in adjacent monitoring points, then that soil gas probe defines the outer perimeter of the study area and that soil gas probe may continue to be monitored for perimeter control in accordance with the analytic approach for soil gas monitoring described above.

3.2.5.4 Discharge Limit Compliance

Discharge limit compliance is determined when the requirements of both Rule 207 (Air District, 2011) and Rule 1000 (Air District, 2017) are met. Non-compliance with either rule indicates a discharge exceedance.

Under Rule 207 (Air District, 2011), Best Available Control Technology is required for any new or modified stationary source with a potential to emit specific pollutants at rates greater than or equal to those listed in Table 4.1.1 of Rule 207 or Section 5.2 of Rule 207, whichever is more stringent. Of the 13 pollutant categories listed in Table 4.1.1 and Section 5.2 of Rule 207, only VOCs are expected to be emitted.[8] The more stringent requirement for VOCs is in Section 5.2 at 25 pounds per day (lbs/day).

For each quarterly period, the total VOC emission rate shall be calculated using the maximum detected total VOC concentration at the SVTU effluent for the quarter and the average SVTU influent flow rate for the quarter.[9] The following analytic approach shall then be applied to determine whether discharge limits are being met at the SVTU effluent with respect to Rule 207:

- If the calculated total VOC emission rate is less than 25 lbs/day, then the SVETS will continue to operate.
- If the calculated total VOC emission rate is greater than or equal to 25 lbs/day, then a confirmation sample will be collected from the SVTU effluent and analyzed with a 24-hour turnaround time (TAT).
- If the total VOC emission rate calculated using analytical results from the confirmation sample is greater than or equal to 25 lbs/day, then the SVETS will be shut down, operating conditions and GAC loading evaluated, SVE well flow rates adjusted as necessary, and a variance report issued for any out-of-limits operation. Following operational corrective actions, which may include a

[8] Based on the results of the RI/FS (HLA, 1995) and the RI/FS Addendum (AES, 2015), and the determinations of the RI Sites ROD (Army, 1997) and ESD No. 1 (Army, 2016).
[9] Total VOCs includes PCE and TCE, the Sites 2/12 soil gas COCs (Army, 2016).

GAC change-out, the SVETS will be restarted and a verification sample will be collected and analyzed to ensure compliance post-adjustment.

- If the total VOC emission rate calculated using analytical results from the verification sample and calculated SVETS flow rates is less than 25 lbs/day, then the SVETS will continue to operate.
- If the total VOC emission rate calculated using analytical results from the verification sample is greater than or equal to 25 lbs/day, then the SVETS will be shut down, and operating conditions and GAC loading re-evaluated. Following operational corrective actions, the SVETS will be restarted and resampled to verify compliance.

The SVETS is a new or modified source that has the potential to emit very low levels of carcinogenic toxic air contaminants or toxic air contaminants; therefore, emissions from the SVETS are subject to Rule 1000 (Air District, 2017). For each quarterly period, the hazard index (HI) and risk to a hypothetical receptor 50 meters away from the SVTU discharge point will be calculated using output from AERSCREEN modeling and the following analytic approach shall be used to determine whether discharge limits are being met at the SVTU effluent with respect to Rule 1000:[10]

- If the calculated HI is less than 1 and the excess cancer risk is less than 10 per million (1×10^{-5}), then the SVETS will continue to operate.
- If the calculated HI is greater than or equal to 1 or the risk is greater than 1×10^{-5}, then a confirmation sample will be collected from the SVTU effluent and analyzed with a 24-hour TAT.
- If the HI is greater than or equal to 1 or the risk is greater than 1×10^{-5} as calculated using analytical results from the confirmation sample, then the SVETS will be shut down, operating conditions and GAC loading evaluated, SVE well flow rates adjusted as necessary, and a variance report issued for any out-of-limits operation. Following operational corrective actions, which may include a GAC change-out, the SVETS will be restarted and resampled to verify compliance.
- If the HI is less than 1 and the risk is less than or equal to 1×10^{-5} as calculated using analytical results from the verification sample and calculated SVETS flow rates, then the SVETS will continue to operate.
- If the HI is greater than or equal to 1 or the risk is greater than 1×10^{-5} as calculated using analytical results from the verification sample, then the SVETS will be shut down, and operating conditions and GAC loading re-evaluated. Following operational corrective actions, the SVETS will be restarted and resampled to verify compliance.

3.2.5.5 GAC Change-out

The decision to do a GAC change-out will be made on a case-by-case basis taking into consideration the SVETS operating conditions, including, but not limited to:

- Online operational time into current GAC cycle;
- SVTU influent and effluent COC concentrations and concentration trends;
- SVETS operating flow rates;

[10] The AERSCREEN will produce estimates of "worst-case" 1-hour concentrations for a single source and includes conversion factors to estimate "worst-case" 3-hour, 8-hour, 24-hour, and annual concentrations. See https://www.epa.gov/scram/air-quality-dispersion-modeling-screening-models for more information.

- Operating SVE well COC concentrations and concentration trends; and
- Historical, current and planned future SVETS operations.

Generally, if the calculated quarterly total VOC emission rate is greater than or equal to 22.5 lbs/day (90% of the maximum emission rate of 25 lbs/day), then the need for a GAC change-out will be determined by the USACE Technical Lead and the Ahtna Project Manager based on SVETS operating conditions.

3.2.5.6 Soil Gas Plume Remediation

Assessment of COC removal from the vadose zone resulting from operation of the SVETS is conducted through a soil gas monitoring program that evaluates plume migration and COC concentrations. SVE well and soil gas probe monitoring data will be used to evaluate the operational status of individual SVE wells and for evaluation of remediation progress. The analytic approach for determining the operational status of SVE wells with respect to soil gas plume remediation is:

- An SVE well will continue to be operated if any COC detected in the SVE well is greater than the corresponding SGCL (Worksheet #15).
- An SVE well will continue to be operated if any COC detected in a soil gas probe within the radius of influence (ROI) of the SVE well and within 20 feet of the groundwater interface has a concentration greater than the corresponding SGCL (Worksheet #15).
- An SVE well will continue to operate if its ROI and analytical data from nearby SVE wells and/or soil gas probes indicate operation of the SVE well is necessary for completion of the groundwater restoration remedial action.
- An SVE well will be shut off if COCs detected in the SVE well are less than or equal to the SGCL for two consecutive quarterly monitoring events, and if its ROI and analytical data from nearby SVE wells and/or soil gas probes indicate operation of the SVE well is no longer necessary for completion of the groundwater restoration remedial action.

Site closure is dependent on decision criteria for completion of the groundwater restoration remedial action as described in QAPP Appendix A (Ahtna, 2022). Additionally, the HHRA conducted as part of the RI/FS Addendum at Sites 2/12 concluded the vapor intrusion pathway does not present an unacceptable risk to human health (AES, 2015). Therefore, soil gas monitoring is only relevant for determining whether soil gas may be a continuing source of COCs to groundwater and this analytic approach may be subordinated by the analytic approach for groundwater plume remediation described below.

3.2.5.7 Groundwater Plume Remediation

Assessment of groundwater cleanup resulting from operation of the Sites 2/12 groundwater treatment system is conducted through a groundwater monitoring program that evaluates plume migration and COC concentrations, as described in QAPP Appendix A (Ahtna, 2022). Soil gas remediation was established to prevent COCs in soil gas from partitioning into groundwater at concentrations exceeding ACLs. As operation of the SVETS reduces COC mass in soil gas, the process may be reversed and COCs will partition from groundwater into soil gas where they may be removed by the SVETS; therefore, groundwater well data will also be used to evaluate the operational status of individual SVE wells. The

analytic approach for determining the operational status of SVE wells with respect to groundwater plume remediation are:

- An SVE well will be operated if it is located within an area where any groundwater COC detected in a monitoring well is greater than the corresponding ACL (Ahtna, 2022). However:
    - If analytical data from the operating SVE well and nearby groundwater monitoring wells indicate the SVE well is not facilitating groundwater remediation, then a recommendation will be presented for regulatory agency approval to discontinue operation of the SVE well.
    - If a groundwater monitoring well has COC concentration trends that are statistically decreasing but has adjacent soil gas probes with concentrations of COCs greater than SGCLs within 20 feet of the groundwater interface, then a recommendation will be presented for regulatory agency approval to discontinue operation of the SVE well.
    - If COC concentrations in one or more soil gas probes within 20 feet of the groundwater interface and within the ROI of an SVE well are on a statistically increasing trend towards an exceedance of the SGCL, but groundwater COC concentrations in an adjacent monitoring well are below the ACLs, the SVE well may continue to be operated to mitigate potential groundwater impact.
- An SVE well will be operated if the SVE ROI and analytical data from nearby groundwater wells indicate operation of the SVE well may supplement groundwater plume remediation.
- An SVE well will be shut off if the SVE ROI and analytical data from nearby groundwater wells indicate operation of the SVE well is no longer necessary for groundwater plume remediation.

3.2.5.8 SVE Well Sampling Frequency

SVE wells will be sampled quarterly when operating as part of the SVETS; however, due to the density of soil gas probes in the Site 12 area, it is not necessary to sample an SVE well after its operation has been terminated in accordance with the analytic approach for plume remediation. If an SVE well is no longer needed for plume remediation, then it may be proposed for decommissioning.

3.2.6 Step 6: Specify Performance or Acceptance Criteria

Because decisions pertaining to remediation will be based on sample collection and analysis, decision errors may result from the limitations of sampling or analytical techniques. To limit analytical errors, analytical method requirements have been established that include precision, accuracy and sensitivity goals that will produce data capable of supporting project decisions. To limit sampling errors, sample collection protocol specified in SOPs (Attachment A) will be strictly followed and sufficient samples will be collected to support project decisions. Sample volume and preservation requirements will be followed as described in Worksheet #19 & 30.

False positive and false negative decision errors are defined in the context of hypothesis testing, where the terms are defined with respect to the null hypothesis. A false positive decision error occurs when the null hypothesis is rejected when it is true. A false negative decision occurs when the null hypothesis is not rejected when it is false. The null hypothesis is COC concentrations in samples are greater than the SGCLs. Potential consequences of a false positive detection might include:

- Unnecessarily performing remediation activities where COC concentrations are lower than SGCLs.
- Increasing or maintaining sampling frequency when it is not necessary.

The potential consequence of a false negative result is COCs remaining in soil gas at levels that are potentially a source of groundwater COC concentrations above ACLs.

Decision errors are most likely to occur when the measured concentration is near the SGCL, or in the case of non-detects, when the LOQ is near the SGCL. To control decision errors when the LOQ is near the SGCL, the laboratory is required to report any detections below the LOQ (but above the LOD), thereby giving the data user additional information regarding trace level contamination. This may be the case when sample dilution raises the LOQ to a level near the cleanup level.

False negatives or positives could occur due to laboratory error, contamination, or dilution. False negatives or positives could occur if ambient air containing, respectively, lower or higher concentrations of COCs compared to the soil gas is inadvertently introduced during sample collection. All soil gas probes and sampling assemblies are leak tested with helium in the field prior to sampling to mitigate the possibility of accidental ambient air contamination.

Definitive data are required for supporting project decisions. It is assumed that, if the precision, accuracy, and sensitivity requirements specified in the QAPP are met, the data will be usable for decision-making purposes.

3.2.7 Step 7: Develop the Plan for Obtaining Data

The sampling approach is non-random and based on professional judgment. To limit uncertainty in obtained environmental data, criteria for the precision, accuracy, representativeness, completeness, comparability parameters and reporting limits for the parameters have been developed and are presented in this QAPP. Measurement errors will be controlled by using the appropriate sampling and analytical methods, adhering to the requirements of QSM Version 5.4 (DoD, 2021a), and data validation/review to verify laboratory processes and measurement quality objectives. The data that meet these criteria will be of definitive quality.

The optimum sampling design is derived for the Sites 2/12 soil gas remedy as a result of the DQO process. The overall sampling network design, including sample collection locations, rationales, and frequencies, was established to achieve discharge limit compliance and provide a cost-effective means to evaluate the treatment of the impacted soil gas, and can be found in Worksheet #17. The EPA Method TO-15 analytical procedure for this project was selected to accurately quantify the chemicals of interest at the levels of concern. Worksheets #19 & 30, #20, and #24-#28 specify analysis design requirements for EPA Method TO-15.

3.3 Worksheet #12: Measurement Performance Criteria

Analytical Group/Method: Volatile Organic Compounds (VOCs)/TO-15

Estimated Concentration Level: Low

Matrix: Soil Gas (µg/m^3)

Data Quality Indicator	QC Sample or Measurement Performance Activity	Measurement Performance Criteria	
Precision	Field Duplicates	RPD < 30%	
Precision	Laboratory Duplicate	RPD < 25%	
Accuracy	Surrogate	1,2-dichloroethane-d4	50–150 %
		Toluene-d8	50–150 %
		4-Bromofluorobenzene	50–150 %
Accuracy	Laboratory Control Sample (LCS)	Tetrachloroethene	66–124 %
		Trichloroethene	71–123 %
Bias/Sensitivity	Method Blanks	<LOQ (common laboratory contaminants) and < ½ LOQ (all other compounds) [1]	
Completeness	Data Assessment	≥ 90%	
Comparability	Data Review: compare results to previous sampling events	Same unit of measure and LOQs meet project action limits[1]	

Notes:
[1] See Worksheet #15 for LOQs and project action limits
QC = quality control
RPD = relative percent difference
LOQ = limit of quantitation

3.4 Worksheet #13: Secondary Data Uses and Limitations

Secondary data and information that will be used, including originating sources, are identified below. How the secondary data will be used and the limitations on their uses are specified. Data from these documents will be utilized as appropriate.

Data Type	Data Source (originating organization, report title and date)	Data uses relative to current project	Factors affecting the reliability of data and limitations on data use
USACE, soil gas results at temporary probes five feet bgs, collected 2012-2013	USACE – Final Soil Gas Investigation Interim Report, June 2013	Data will be used to evaluate magnitude and extent of soil gas COC concentrations and historical trends	Published data are available for past 19 years. No known limitations.
AES, soil gas results at permanent probes 10 to approximately 70 feet bgs, collected 2013-2014	AES – Final Remedial Investigation/Feasibility Study Addendum at Sites 2 and 12, February 2015	Data will be used to evaluate magnitude and extent of soil gas and groundwater COC concentrations and historical trends	Published data are available for past 18 years. No known limitations.
Ahtna, groundwater and soil gas wells sample results, quarterly data collection ongoing	Sites 2/12 Quarterly and Annual Groundwater and Soil Gas Monitoring and Treatment System Reports	Data will be used to evaluate magnitude and extent of soil gas and groundwater COC concentrations and historical trends	No known limitations.

3.5 Worksheet #14 & 16: Project Tasks & Schedule

3.5.1 Project Tasks

Applicable SOP(s) for the project tasks outlined in this Worksheet are listed in Worksheet #21 and provided in detail in Attachment A. The sampling tasks are described in Worksheets #17 and #18.

3.5.2 Waste and Equipment Decontamination

Wastewater will not be generated and no decontamination is required during soil gas monitoring. Personal protective equipment and miscellaneous waste will be placed in large garbage bags, sealed, and disposed of in facility trash receptacles.

3.5.3 Quality Control Tasks

Field SOPs will be implemented and field QC samples will be collected at the frequency indicated in Worksheet #20. Samples will be analyzed by the laboratory in accordance with this QAPP, DoD QSM, and the stated method. For items related to QC, see Worksheets #11, #12, #15, #22, #24, #25, #27, and #28.

3.5.4 Secondary Data

See Worksheet #13.

3.5.5 Data Management Tasks

The following are the team members and their responsibilities for the data management process:

Task Manager. Responsible for reviewing chain of custody forms and establishing the sample tracking system. Oversees proper use of Ahtna's sample management system and accuracy of the information entered. Reviews laboratory data for accuracy and quality and compares electronic outputs for accuracy to laboratory electronic copies. Conducts tracking of samples, forwards tracking information and received data to the Database Manager, and identifies the data inputs (for example, sample numbers) to use in generating tables and figures.

Database Manager. Responsible for setting up the data management system in consultation with the Project Chemist/Task Manager at the beginning of the data evaluation task. Oversees the data management process, including data conversion/manual entry into the data management system, QC of the entered data, and preparation of the required tables and plots of the data. Coordinates with the person responsible for reviewing the entered data for QC purposes. Forwards all deliverables to the Project Manager.

Geographic Information System (GIS) Manager. Responsible for coordinating with the Project Manager to set up the geodatabase prior to sampling. Maintains spatial layers and overall geodatabase integrity and accuracy. Provides all GIS-related outputs for reports.

3.5.6 Sample Tracking

The Task Manager is responsible for tracking samples in the sample tracking database to ensure that the analytical results for all samples sent for analysis are received. Copies of chains of custody from the field

team are used to enter in sample identifications (IDs), collect data, and for analyses. Upon receipt of a sample receipt notice from the laboratory, the date received by the laboratory, and a date the electronic copy is due will be entered. Likewise, upon receipt of the electronic copy and electronic data deliverable (EDD), the date they are received will also be entered. The EDDs will be uploaded when received from the laboratory and will be tracked in the sample tracking table. Validation qualifiers will be added to the database and results qualified accordingly.

3.5.7 Data Types

The data will be added to the project database as they become available. The data will include new data collected in the laboratory and validated by Laboratory Data Consultants. The data source will be noted in the database.

3.5.8 Data Tracking and Management

Every data set received from analytical laboratories will be tracked individually. Analytical laboratory reports of chemical analysis results will be tracked in a consistent fashion. Every data set will be assigned a unique identifier. The date of receipt, status of data validation, and status of database entry for each data set will all be tracked and recorded in the project database.

Hard/Electronic Copy. Measurements made during field data collection activities will be recorded in field logbooks and sample processing logs. Field data will be reduced and summarized, tabulated, and stored along with the field logbooks and sample processing logs. All raw analytical laboratory data are stored electronically.

Data Input Procedures. Sampling information, analytical results, applicable QA/QC data, data validation qualifiers, and other field-related information will be entered into the project database for storage and retrieval during data evaluation and report development. The analytical data will be loaded into the database using EDD files received from the analytical laboratory. Validation qualifiers will be entered manually. Other available field-related data collected will be manually entered onto standard EDD templates for loading into the database. Historical data, either in hard copy or electronic form, will be manually entered on or formatted to standard EDD templates for database loading.

3.5.9 Computer Database

The technical data, field observations, laboratory analytical results, and analytical data validation will be managed using Ahtna's database (EQuIS™) to store and analyze project data submissions. EQuIS™ is a front-end user interface for data management using a back-end SQL Server™ database. Servers that house the database are stored and managed by Earthsoft, Inc. Secure database access is performed through EQuIS™ or SQL Server Management Studio software. Data validation is performed by Laboratory Data Consultants, Inc. and validation information is ultimately stored in the EQuIS™ database.

Access and privileges are provided to database support staff on an as-needed basis by the Ahtna Data Manager. This protects the database from unauthorized access and any data modification. Privileges may range from read-only to loading, modifying, or querying the database.

Backups of the primary database are performed by Earthsoft, Inc. to ensure no data loss.

In addition to the internal computer database, EDDs will be uploaded to the BRAC Fort Ord Data Integration System (FODIS) database and the CCRWQCB GeoTracker database (as required).

3.5.10 Geographic Information System Description

A project geodatabase will be set up prior to sampling by the Task Manager and GIS Manager. Ahtna will adhere to all applicable federal, DoD, and Army geospatial data standards for tasks and deliverables in this QAPP and will meet the minimum requirements for spatial data in accordance with Spatial Data Standards for Facilities, Infrastructure, and Environment, current version whenever possible. Ahtna will submit the native GIS files that will include map data (.mxd) and geodatabase (.dbf) format. Ahtna will provide validated geospatial data to USACE for submission by BRAC to the FODIS database.

Each geospatial data set shall be accompanied by metadata conforming to the Federal Geographic Data Committee Content Standard for Digital Geospatial Metadata and the Army Installation Geospatial Information & Services Metadata Standard, v1. The horizontal accuracy of any geospatial data created shall be tested and reported in accordance with the National Standard for Spatial Data Accuracy and the results shall be recorded in the metadata. All data will have a datum of GCS_North American_1983 and a projection of North American Datum 1983 State Plane California Zone 4. The sea level datum used will be the National Geodetic Vertical Datum 1929 to conform with historical former Fort Ord data.

In addition to laboratory data, other physical data will be collected during field efforts. The information will be stored in the project database. Other types of data elements may be added as the field investigation needs and activities evolve.

3.5.11 Data Management Documentation

Documentation of data management activities is critical because it demonstrates that data is being managed in a consistent and organized fashion. EQuIS™ software developed by Earthsoft, Inc. is an industry standard for the management of environmental data. EQuIS software is the user interface that accesses data stored in a SQL Server database. This database is managed and housed by Earthsoft. All SQL Server updates, database backups, and customer support are provided to Ahtna by Earthsoft. Earthsoft also has an extensive community group and documentation regarding their application.

3.5.12 Presentation of Data

Depending on data user needs, data presentation may consist of any of the following formats:

- Tabulated results of data summaries or raw data
- Figures showing concentration isopleths or location-specific concentrations
- Tables providing statistical evaluation or calculation results
- Presentation tools, such as ArcMap or similar analysis/presentation aids

In addition to laboratory data, other physical data will be collected during field efforts. The information will be stored in the project database. Other types of data elements may be added as the field investigation needs and activities evolve.

3.5.13 Assessment and Audit Tasks

See Worksheet #31, 32 & 33.

3.5.14 Data Review Tasks

The laboratory will make sure that the data are complete for all samples received. Laboratory data will be validated by Laboratory Data Consultants, Inc. Validated data and field logs will be reviewed to assess total measurement error and determine the overall usability of the data for project purposes. Final data are placed in the database with qualifiers. See Worksheets #34 through #37 for the tasks.

3.5.15 Documentation and Records

Records and field measurements of all samples will be collected in notebooks. Chains of custody and sample logs will be prepared and retained for each sample. A copy of the final QAPP will be kept at the Ahtna Monterey office. Field forms are shown in Attachment B.

3.5.16 Project Schedule

A general project schedule for long-term monitoring is presented below.

<table>
<tr><th>Activity</th><th>Responsible Party</th><th>Frequency</th><th>Deliverable(s)</th><th>Deliverable Due Date</th></tr>
<tr><td>Sites 2/12 SVETS O&M</td><td rowspan="2">Ahtna</td><td>Ongoing</td><td rowspan="2">Quarterly and Annual Reports</td><td rowspan="2">Quarterly Report (Final only) due 60 days after sampling event concludes*
Annual Report (Pre-Draft) due 60 days after sampling event concludes*</td></tr>
<tr><td>Sites 2/12 SGMP</td><td>Quarterly</td></tr>
</table>

Notes:
* The conclusion of the sampling event is defined as the last day samples are collected for the event.
O&M = operations and maintenance
SGMP = soil gas monitoring program

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

Matrix: Soil Gas
Analytical Method: TO-15 5&20[1]

Analyte (CAS #)	Soil Gas Screening Level[2] (SG-SL) µg/m³	SG-SL Reference	Soil Gas Cleanup Level[3] (SGCL) µg/m³	Laboratory Limits[4]		
				DL (µg/m³)	LOD[5] (µg/m³)	LOQ (µg/m³)
Tetrachloroethene (127-18-4)	603	CHHSL	1,800	9.9	20.4	34
Trichloroethene (79-01-6)	888	Calculated	1,000	11.2	16.2	26.9

Matrix: Soil Gas
Analytical Method: TO-15 Low-Level[6] (SVTU influent and treated soil gas at SVTU effluent)

Analyte (CAS #)	Discharge Limit Compliance (total VOCs)			Laboratory Limits[4]		
	lbs/day	HI	Risk	DL (µg/m³)	LOD[5] (µg/m³)	LOQ (µg/m³)
Tetrachloroethene (127-18-4)	<25	<1	$<1x10^{-5}$	0.07	0.48	0.68
Trichloroethene (79-01-6)				0.11	0.38	0.54

Notes:
µg/m³ = micrograms per cubic meter
Calculated = see RI/FS Addendum (AES, 2015)
CAS #: Chemical Abstracts Service Number
CHHSL = California Human Health Screening Levels Table 3: Soil-Gas Screening Numbers for Volatile Chemicals below Buildings Constructed without Engineered Fill below Sub-slab Gravel (September 23, 2010; https://oehha.ca.gov/chhsltable).
DL = detection limit
LOD = limit of detection
LOQ = limit of quantitation
µg/m³ = microgram per cubic meter
[1]See Worksheet #19 & 30 for descriptions of modified TO-15 methods.
[2]SG-SL data from the RI/FS Addendum (AES, 2015). SG-SLs are conservative and based on a 5-foot sample depth.
[3]SGCLs are based on soil gas as a source of groundwater contamination and are presented in the RI/FS Addendum (AES, 2015) and ESD No. 1 (Army, 2016).
[4]Laboratory limits listed are base values. The final laboratory limits are determined by applying a dilution factor calculated from the SUMMA® canister pressurization measured upon receipt by the laboratory (see Attachment A, SOP 1).
[5]The LODs listed are Eurofins instrument-specific.
[6]There are no chemical-specific screening levels for treated soil gas at the SVTU effluent; discharge requirements are defined in Worksheet #11, Section 3.2.5.4.

4.0 Sample Design

4.1 Worksheet #17: Sampling Design and Rationale

A total of 167 permanent soil gas probes were installed at Site 12 in 24 locations with seven nested probes at each location.[11] The nested probes were installed at approximately 10-foot intervals from 10 feet bgs to a depth of approximately 70 feet bgs (Figure 1 and Table 1).[12] The installed soil gas probe locations were selected to delineate the PCE and TCE soil gas plumes identified initially in 1992 (HLA, 1995) and expanded upon the initial soil gas investigations (USACE, 2013), as summarized below.

Probe ID	Location	Rationale
SG-12-01	125 feet east-southeast of Michaels entrance	Delineate northwestern vertical and horizontal extent of soil gas plume.
SG-12-02	Target roadway in between previous borings FOO-S212-SG-22 and FOO-S212-SG-23	Delineate northeastern vertical and horizontal extent of soil gas plume between locations where previous detections of PCE in soil gas exceeded screening level.
SG-12-03	40 feet northwest of previous boring FOO-S212-SG-36	Delineate eastern vertical and horizontal extent of soil gas plume.
SG-12-04	5 feet east of previous boring FOO-S212-SG-11	Delineate western vertical extent of soil gas plume at a location where previous detections of PCE and TCE in soil gas exceeded screening levels.
SG-12-05	15 feet west of previous boring FOO-S212-SG-35	Delineate eastern vertical and horizontal extent of soil gas plume.
SG-12-06	10 feet north of previous boring FOO-S212-SG-12	Delineate western vertical extent of soil gas plume at a location where a previous detection of PCE in soil gas exceeded screening level.
SG-12-07	100 feet west of previous boring FOO-S212-SG-33	Delineate vertical and horizontal extent of soil gas plume between locations where previous detections of PCE in soil gas exceeded screening level.
SG-12-08	75 feet south-southeast of previous boring FOO-S212-SG-33	Delineate southern vertical and horizontal extent of soil gas plume.
SG-12-09	75 feet south-southeast of previous boring FOO-S212-SG-32	Delineate vertical and horizontal extent of soil gas plume near location where previous detection of PCE in soil gas exceeded screening level.
SG-12-10	250 feet south of previous boring FOO-S212-SG-38, in the undeveloped area across from General Stilwell Dr.	Screen for potential vapor intrusion issues in an area of proposed construction.
SG-12-11	40 feet east of Old Navy entrance	Delineate southwestern vertical and horizontal extent of soil gas plume.

[11] One location has six nested probes (SG-12-09) due to a shallower saturated soil depth.
[12] Several locations have different depths of the deepest two probes due to shallower or deeper saturated soil depth.

Probe ID	Location	Rationale
SG-12-12	150 feet north-northwest of previous boring FOO-S212-SG-34	Delineate southern vertical and horizontal extent of soil gas plume.
SG-12-13	175 feet south-southwest of previous boring FOO-S212-SG-32, in the undeveloped area south of General Stilwell Dr.	Screen for potential vapor intrusion issues in an area of proposed construction.
SG-12-14	25 feet west of previous boring FOO-S212-SG-34	Delineate vertical and horizontal extent of soil gas plume at location where previous detection of TCE in soil gas exceeded screening level.
SG-12-15	120 feet southeast of previous boring FOO-S212-SG-34, in the undeveloped area across from General Stilwell Dr.	
SG-12-16	Most southern east-west line of parking spaces, 65 feet from furthest east landscape area.	
SG-12-17	Between SG-12-16 and FOO-S212-SB-44	
SG-12-18	100 feet east of FOO-S212-SB-44	
SG-12-19	200 feet east of Kohl's south entrance	Delineate vertical and horizontal extent of soil gas plume in central parking lot area.
SG-12-20	465 feet east of Old Navy	
SG-12-21	100 feet north of Blaze Pizza	
SG-12-22	245 feet east of Best Buy entrance	
SG-12-23	100 feet north of Cinemark	Delineate vertical and horizontal extent of soil gas plume in undeveloped area south of parking lot area.
SG-12-24	90 feet southwest of Blaze Pizza	

Locations of SG-12-19 through SG-12-24 were partly determined through modeling the vertical and lateral extent of the PCE and TCE soil gas plumes using data collected from SG-12-01 through SG-12-16 and GMS Software Version 9.03. Inverse Distance Weighted Gradient Plane interpolation.

All 167 soil gas probes were sampled during the Remedial Investigation (RI) Addendum at Sites 2/12 and quarterly sampling was initiated in 2015.[13] Two nested probe locations (SG-12-10 and SG-12-21; 14 probes total) were decommissioned in 2016. Five other probes (SG-12-04-30, SG-12-07-10, SG-12-12-50, SG-12-13-70, and SG-12-17-75) are no longer functional and cannot be sampled due to an obstruction or the screen interval becoming submerged in groundwater.

Ten permanent SVE wells were installed during pilot study construction and SVETS construction. The SVE pilot study well locations were selected to provide data to support design and construction of the full-scale SVETS. The SVETS well locations were selected to maximize COC removal from the vadose zone based on the results of the pilot study. The SVTU was installed to apply vacuum to the SVE wells and process extracted soil gas for treatment through GAC (Figure 1 and Table 2). The sampling design rationale for SVE wells and the SVTU is described in detail in the RAWP Addendum (AEI, 2015), as summarized below.

[13] RI soil gas analytical results are presented in the RI/FS Addendum report (AES, 2015).

Sampling Location	Activity	Rationale[3]
SVTU-212-INF	SVTU monitoring[1]	To measure influent COC concentrations and evaluate STVU efficiency.
SVTU-212-MID		To measure COC concentrations downstream from the GAC vessel and schedule GAC change-outs.
SVTU-212-EFF		To comply with discharge limits.
VE-12-01	Soil gas monitoring[2]	To measure changes in soil gas COC concentrations.
VE-12-02		
VE-12-03		
VE-12-04		
VE-12-05		
VE-12-06		
VE-12-07		
VE-12-08		
VE-12-09		
VE-12-10		

Notes:

[1] The sampling frequency is variable based on GAC breakthrough rates.

[2] Samples are collected quarterly or annually from the extraction wells based on the decision rules identified in Worksheet #11.

[3] The rationale for sampling locations and frequency is based on ESD No. 1, program history, and precedent established by the BRAC Cleanup Team, which includes the Army, USACE, and the regulatory agencies.

Samples will be analyzed for TCE and PCE by EPA Method TO-15. The sample analytical results will be assessed via the analytic approach in Worksheet #11 to determine:

- The lateral and vertical soil gas plume extent;
- Modifications to the sampling design;
- Discharge limit compliance;
- The schedule for GAC change-outs; and
- Site closure.

Site 12 soil gas probes and SVETS sampling locations are listed in Worksheet #18. All 167 soil gas probes were sampled during the RI Addendum and the First Quarter 2015 soil gas monitoring event; however, in subsequent events the locations to be sampled either quarterly or annually are determined through application of the analytic approach presented in Worksheet #11 (Section 3.2) to the soil gas analytical results from the previous monitoring event. The quarterly and annual events also include 10% duplicate soil gas sampling. The initial SVETS sampling schedule after startup of the SVETS is described in RAWP Addendum (AEI, 2015), with subsequent sampling to be determined through application of the analytic approach presented in Worksheet #11 (Section 3.2) to analytical results from the previous sampling events. Based on sampling results and implementation of the analytic approach to date, the number of soil gas samples collected annually is summarized in Table 3.

4.2 Worksheet #18: Sampling Locations and Methods

Sample Location ID	Soil Gas Probe ID	Analytical Method for PCE & TCE	Sampling Methods/SOPs
SG-12-01	SG-12-01-10	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-01-20	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-01-30	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-01-40	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-01-50	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-01-58	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-01-65	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
SG-12-02	SG-12-02-10	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-02-20	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-02-30	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-02-40	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-02-50	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-02-57	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-02-65	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
SG-12-03	SG-12-03-10	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-03-20.5	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-03-30	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-03-39.5	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-03-50	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-03-58	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-03-65	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802

Sample Location ID	Soil Gas Probe ID	Analytical Method for PCE & TCE	Sampling Methods/SOPs
SG-12-04	SG-12-04-10	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-04-20	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-04-30	N/A	See note *
	SG-12-04-40	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-04-50	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-04-58	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-04-65	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
SG-12-05	SG-12-05-10	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-05-20	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-05-30	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-05-40	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-05-50	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-05-60	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-05-70	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
SG-12-06	SG-12-06-10	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-06-20	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-06-30	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-06-40	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-06-50	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-06-60	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-06-70	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
SG-12-07	SG-12-07-10	N/A	See note *
	SG-12-07-20	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802

Sample Location ID	Soil Gas Probe ID	Analytical Method for PCE & TCE	Sampling Methods/SOPs
	SG-12-07-30	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-07-40	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-07-50	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-07-57.5	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-07-65	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
SG-12-08	SG-12-08-10	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-08-20	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-08-30	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-08-40	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-08-50	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-08-60	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-08-70	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
SG-12-09	SG-12-09-10	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-09-20	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-09-30	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-09-40	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-09-50	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-09-59	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
SG-12-11	SG-12-11-10	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-11-20	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-11-30	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-11-40	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802

Sample Location ID	Soil Gas Probe ID	Analytical Method for PCE & TCE	Sampling Methods/SOPs
	SG-12-11-50	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-11-60	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-11-70	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
SG-12-12	SG-12-12-10	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-12-20	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-12-30	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-12-40	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-12-50	N/A	See note *
	SG-12-12-60	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-12-70	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
SG-12-13	SG-12-13-10	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-13-20	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-13-30	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-13-40	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-13-50	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-13-60	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-13-70	N/A	See note *
SG-12-14	SG-12-14-10	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-14-20	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-14-30	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-14-40	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-14-50	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-14-60	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802

Sample Location ID	Soil Gas Probe ID	Analytical Method for PCE & TCE	Sampling Methods/SOPs
	SG-12-14-70	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
SG-12-15	SG-12-15-10	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-15-20	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-15-30	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-15-40	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-15-50	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-15-60	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-15-70	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
SG-12-16	SG-12-16-10	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-16-20	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-16-30	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-16-40	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-16-50	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-16-60	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-16-70	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
SG-12-17	SG-12-17-10	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-17-20	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-17-30	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-17-40	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-17-50	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-17-60	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-17-75	N/A	See note *

Sample Location ID	Soil Gas Probe ID	Analytical Method for PCE & TCE	Sampling Methods/SOPs
SG-12-18	SG-12-18-10	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-18-20	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-18-30	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-18-40	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-18-50	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-18-60	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-18-70	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
SG-12-19	SG-12-19-10	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-19-20	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-19-30	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-19-40	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-19-50	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-19-60	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-19-70	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
SG-12-20	SG-12-20-10	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-20-20	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-20-30	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-20-40	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-20-50	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-20-60	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-20-70	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
SG-12-22	SG-12-22-10	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802

Sample Location ID	Soil Gas Probe ID	Analytical Method for PCE & TCE	Sampling Methods/SOPs
	SG-12-22-20	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-22-30	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-22-40	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-22-50	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-22-60	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-22-70	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
SG-12-23	SG-12-23-10	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-23-20	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-23-30	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-23-40	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-23-50	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-23-60	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-23-70	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
SG-12-24	SG-12-24-10	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-24-20	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-24-30	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-24-40	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-24-50	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-24-60	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
	SG-12-24-70	TO-15 (5&20)	SUMMA®/SOPs 1-3,5, FSOP-001, FSOP-002, FSOP-802
VE-12-01	N/A	TO-15 (5&20)	SUMMA®/SOPs 1,4,5, FSOP-001, FSOP-002, FSOP-802
VE-12-02	N/A	TO-15 (5&20)	SUMMA®/SOPs 1,4,5, FSOP-001, FSOP-002, FSOP-802

Sample Location ID	Soil Gas Probe ID	Analytical Method for PCE & TCE	Sampling Methods/SOPs
VE-12-03	N/A	TO-15 (5&20)	SUMMA®/SOPs 1,4,5, FSOP-001, FSOP-002, FSOP-802
VE-12-04	N/A	TO-15 (5&20)	SUMMA®/SOPs 1,4,5, FSOP-001, FSOP-002, FSOP-802
VE-12-05	N/A	TO-15 (5&20)	SUMMA®/SOPs 1,4,5, FSOP-001, FSOP-002, FSOP-802
VE-12-06	N/A	TO-15 (5&20)	SUMMA®/SOPs 1,4,5, FSOP-001, FSOP-002, FSOP-802
VE-12-07	N/A	TO-15 (5&20)	SUMMA®/SOPs 1,4,5, FSOP-001, FSOP-002, FSOP-802
VE-12-08	N/A	TO-15 (5&20)	SUMMA®/SOPs 1,4,5, FSOP-001, FSOP-002, FSOP-802
VE-12-09	N/A	TO-15 (5&20)	SUMMA®/SOPs 1,4,5, FSOP-001, FSOP-002, FSOP-802
VE-12-10	N/A	TO-15 (5&20)	SUMMA®/SOPs 1,4,5, FSOP-001, FSOP-002, FSOP-802
SVTU-212-INF	N/A	TO-15 (Low-Level)	SUMMA®/SOPs 1,4,5,6, FSOP-001, FSOP-002, FSOP-802
SVTU-212-MID	N/A	TO-15 (Low-Level)	SUMMA®/SOPs 1,4,5,6, FSOP-001, FSOP-002, FSOP-802
SVTU-212-EFF	N/A	TO-15 (Low-Level)	SUMMA®/SOPs 1,4,5,6, FSOP-001, FSOP-002, FSOP-802

Notes:

*No longer functional and cannot be sampled due to an obstruction or the screen interval becoming submerged in groundwater.

Sampling schedule will be determined based on soil gas data analysis compared to the established analytic approach (Worksheet #11, Section 3.2).

SG = soil gas [probe]

VE = vapor extraction [well]

SVTU = soil vapor treatment unit

SVTU-212-INF = SVTU influent sampling location prior to treatment of extracted soil gas by GAC

SVTU-212-MID = SVTU sampling location between lead and lag GAC vessels (i.e., lead GAC vessel effluent and lag GAC vessel influent)

SVTU-212-EFF = SVTU effluent sampling location after GAC treatment

N/A = not applicable

5.0 Sampling Requirements

5.1 Worksheet #19 & 30: Sample Containers, Preservation, and Hold Times

Laboratory:
Eurofins Air Toxics, LLC
180 Blue Ravine Rd, Suite B
Folsom, CA 95630
(800) 985-5955

Contact:
Brian Whittaker
Project Manager
(916) 605-3355
BrianWhittaker@EurofinsUS.com

The analytical and preparation method/SOP and associated sample volume, container specifications, preservation requirements, and maximum holding time are listed.

Analysis	Matrix	Analytical Method	Container	Preservation	Holding Time (from sample date)
VOCs	Soil Gas[3]	EPA TO-15 (5&20)[1]	1-liter SUMMA® canister	None	30 days
VOCs	Soil Gas[4]	EPA TO-15 (Low-Level)[2]	1-liter SUMMA® canister	None	30 days

Notes:
[1]TO-15 (5&20): This method involves full scan gas chromatograph/mass spectrometer (GC/MS) analysis of whole air samples collected in evacuated stainless-steel canisters. Samples are analyzed for VOCs using EPA Method TO-14A/TO-15 protocols. An aliquot of up to 50 milliliters of air is withdrawn from the canister utilizing a volumetric syringe or mass flow controller. This volume is loaded onto a hydrophobic multi-bed sorbent trap to remove water and carbon dioxide and to concentrate the vapor sample. The focused sample is then flash heated to sweep adsorbed VOCs onto a secondary trap for further concentration and/or onto a GC/MS for separation and detection. The 5&20 analytical configuration has base LOQs of approximately 34 µg/m^3 for PCE and 26.9 µg/m^3 for TCE. The "5&20" associated with the analytical method designation refers to the laboratory instrumentation reporting limits of either 5 ppbv or 20 ppbv, depending on the compound. The methodology is described in more detail in Eurofins SOP #91 in Attachment A.
[2]TO-15 (Low-Level): This method involves full scan GC/MS analysis of whole air samples collected in evacuated stainless steel canisters. Samples are analyzed for VOCs using EPA Method TO-14A/TO-15 protocols. An aliquot of up to 400 milliliters of air is withdrawn from the canister utilizing a volumetric syringe, volumetric loop, or mass flow controller. This volume is loaded onto a hydrophobic multi-bed sorbent trap to remove water and carbon dioxide and to concentrate the vapor sample. The focused sample is then flash heated to sweep adsorbed VOCs onto a GC/MS for separation and detection. Compounds are detected using an MS operating in full scan mode. The Low-Level analytical configuration has base LOQs of approximately 0.68 µg/m^3 for PCE and 0.54 µg/m^3 for TCE. The methodology is described in more detail in Eurofins SOP #83 in Attachment A.
[3]Collected from soil gas probes and SVE wells.
[4]Collected from the SVTU influent and effluent.

5.2 Worksheet #20: Field Quality Control Summary

Matrix	Frequency – Field Duplicate Samples	Frequency – Trip Blanks	Frequency – Field Blanks
Soil Gas	10% or minimum of one per sampling event (4Q through 3Q)	N/A	N/A

Notes:
N/A = not applicable
Q = quarter

5.3 Worksheet #21: Field SOPs/Methods

SOPs associated with project sampling are listed. Copies of the SOPs are included in Attachment A. Sampling SOPs are numbered in the "Reference Number" column. The Reference Number is used throughout the QAPP to refer to a specific SOP.

SOP Reference Number	Title, Revision Date and/or Number	Originating Organization of Sampling SOP	Sample Type	Modified for Project Work? Yes/No	Comments
1	Guide to Air Sampling, June 27, 2014	Eurofins	Soil Gas	No	
2	Soil Gas Sampling, September 25, 2015	DTSC	Soil Gas	No	
3	Helium Shroud Spec Sheet, September 30, 2014	Eurofins	Soil Gas	No	
4	SVE Treatment System Sampling, September 25, 2015	Ahtna	Soil Gas	No	
5	DoD Environmental Field Sampling Handbook, Revision 1.0, April 2013, Chapter 3. "Common Sampling Procedures"	USACE	All	No	Includes sample documentation, packaging, shipping, and chain of custody
6	SVE Treatment System Flow Meter Use	Ahtna	NA	No	
FSOP-001	Fieldwork Documentation	Ahtna	NA	No	
FSOP-002	Sample Management	Ahtna	NA	No	
FSOP-802	Investigation-Derived Waste Management	Ahtna	NA	No	

SOP Reference Number	Title, Revision Date and/or Number	Originating Organization of Sampling SOP	Sample Type	Modified for Project Work? Yes/No	Comments
NA	Key Instruments 2500 Series Flowmeters; installation and operation manual	Key Instruments	NA	No	
NA	Oil-Less Diaphragm Vacuum Pump & Compressors Operation & Maintenance Manual	Gast Manufacturing	NA	No	

5.4 Worksheet #22: Field Equipment Calibration, Maintenance, Testing, and Inspection

Field equipment will be calibrated, maintained, tested, and inspected per the SOPs in Attachment A or manufacturer instructions. The following field equipment may be used during soil gas sampling and SVETS sampling:

Site Setup

- Personal protective equipment including high visibility vest, sun/wind protection (if necessary), steel-toe boots and nitrile gloves
- Tools to open soil gas probe vault if it is flush mount (¾-inch or 15⁄16-inch wrench)
- Traffic cones for delineation of exclusion zone

Soil Gas Probe Purging

- Vacuum pump
- Vacuum gauge
- Tubing (silicone and nylon)

Soil Gas Probe Integrity Test (Helium Test)

- Helium compressed gas cylinder (can be provided by laboratory)
- Helium cylinder regulator and tubing with connection to shroud (can be provided by laboratory)
- In-line helium detector (can be provided by laboratory)
- Shroud helium detector (can be provided by laboratory)
- Shroud assembly (provided by laboratory)
- Plastic sheeting to cover shroud
- Weights to hold shroud down

Sampling

- Sample containers – 1-liter SUMMA® canisters (provided by laboratory)
- Flow regulator – 100-200 milliliters per minute (part of shroud sampling manifold assembly)
- Sample manifold (T-manifold for duplicate samples) (provided by laboratory)
- Vacuum gauge
- Tools (9⁄16-inch wrench to remove canister caps and attach gauges, tubing, and/or flow regulators, tubing cutter)
- Tubing
    - ¼-inch Low Density Polyethylene, approximately 1 foot per probe and
    - ⅜-inch silicone, approximately 3 inches per probe
- Small zip ties
- Ferrules and ¼-inch compression caps (extras in case laboratory-provided ones do not work)

6.0 Analytical Requirements

6.1 Worksheet #23: Analytical SOPs

Laboratory SOP Number	Title, Revision Date, and/or Number	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis	Variance to QSM	Modified for Project Work? Yes/No
#50	Sample Receiving/Login Procedures	N/A	N/A	N/A	Eurofins	N/A	No
#63	Internal Sample Tracking, Transmittal and Custody Procedures	N/A	N/A	N/A	Eurofins	N/A	No
SOP #83	EPA Method TO-14A/TO-15 Volatile Organic Compounds (Low-Level), October 13, 2022, Revision 26	Definitive	SVTU Influent/ Effluent VOCs	GC/MS	Eurofins	No	No
SOP #91	EPA Method TO-14A/TO-15 Volatile Organic Compounds (5&20 ppbv), June 29, 2022, Revision 22	Definitive	Soil Gas VOCs	GC/MS	Eurofins	No	No

Laboratory SOPs #50, #63, #83, and #91 are in Attachment A. Additional laboratory SOPs, LOD studies, quality control acceptance limits, and the Quality Assurance Manual are maintained on-site by the laboratory and are included in Attachment A. Laboratories used for sample analysis maintain DoD Environmental Laboratory Accreditation Program (ELAP) certification (Attachment D). Laboratory SOPs are subject to revision and updates. For the duration of the project, the laboratory will use the most current version of the SOP at the time of analysis. Laboratory audits are performed as part of the DoD ELAP certification process and are beyond the scope of this QAPP. In the event a problem is encountered in the laboratory, the Army may request a special audit.

6.2 Worksheet #24: Analytical Instrument Calibration

Analytical Group/Test Method: VOCs by EPA Method TO-15
Matrix: Soil Gas
SOP Reference: #83 and #91 (Attachment A)
DoD QSM Version 5.4 Reference: Table B-21

Instrument	Calibration Procedure	Calibration Frequency	Acceptance Criteria	Corrective Action	Responsible Person(s)	SOP Reference[1]
Gas Chromatograph/ Mass Spectrometer (GC/MS)	Tuning Criteria	Prior to ICAL and prior to each 24-hour period of sample analysis	Specific ion abundance criteria of BFB from method.	Retune instrument and verify.	Laboratory Analyst/Section Manager	83/91 TO-15
GC/MS	Minimum 5-Point ICAL	At instrument set-up, prior to sample analysis	Calculated RSD for the RRF of each target analyte in the calibration must be less than 30%	Correct the problem, then repeat ICAL.	Laboratory Analyst/Section Manager	83/91 TO-15
GC/MS	ICV (second source)	After each initial calibration curve, and daily prior to sample analysis	All reported analytes within ± 30% of true value	Correct problem. Rerun ICV. If that fails, repeat ICAL.	Laboratory Analyst/Section Manager	83/91 TO-15

Instrument	Calibration Procedure	Calibration Frequency	Acceptance Criteria	Corrective Action	Responsible Person(s)	SOP Reference[1]
GC/MS	CCV	Daily before sample analysis; after every 24 hours of analysis time; and at the end of the analytical batch run	Concentration the same as the mid-point calibration standard (or lower). All reported analytes within ± 30% of true value.	Immediately analyze two additional consecutive CCVs. If both pass, samples may be reported without reanalysis. If either fails or if two consecutive CCVs cannot be run, perform corrective action(s) and repeat CCV and all associated samples since the last successful CCV. Alternately, recalibrate if necessary; then reanalyze all associated samples since the last acceptable CCV.	Laboratory Analyst/Section Manager	83/91 TO-15

Notes:

BFB = 4-bromofluorobenzene
CCV = Continuing Calibration Verification
ICV = initial calibration verification
GC/MS = gas chromatography/mass spectrometry
ICAL = initial calibration
RRF = relative response factor
RSD = relative standard deviation

6.3 Worksheet #25: Analytical Instrument and Equipment Maintenance, Testing and Inspection

Instrument/ Equipment	Maintenance Activity[1]	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP[2] Reference
GC/MS VOC	Change Trap	Analyze ICV, CCV, or sensitivity check	Daily	When responses start to drop	ICV, CCV, or sensitivity check passes criteria	Re-bake trap, replace trap, reanalyze ICV, CCV, or sensitivity check, recalibrate	Analyst or Department Manager	#83 #91
	Backflush Purge and Trap Lines	Analyze ICV, CCV, or sensitivity check	Daily	ICV, CCV, or sensitivity check will not pass, high level sample analyzed	ICV, CCV, or sensitivity check passes criteria, Blank clean	Backflush lines again, replace lines, recalibrate	Analyst or Department Manager	#83 #91
	Change septa and liner, clean injection port, clip column	Analyze ICV, CCV, or sensitivity check	Daily	After high level sample analyzed	ICV, CCV, or sensitivity check passes criteria	Re-inspect injection port, cut additional column, reanalyze ICV, CCV, or sensitivity check, recalibrate instrument	Analyst or Department Manager	#83 #91

Notes:
[1]When appropriate per method
[2]Laboratory SOPs are subject to revision and updates during the duration of the project. The laboratory will use the most current revision of the SOP at the time of analysis (Attachment A).
CCV = continuing calibration verification
GC/MS = gas chromatography/mass spectrometry
ICV = initial calibration verification
SOP = standard operating procedure
VOC = volatile organic compound

6.4 Worksheet #26 & 27: Sample Handling, Custody, and Disposal

Soil gas samples will be collected in laboratory-provided SUMMA® canisters using methods described in Worksheet #17 and Worksheet #19 & 30, and SOPs #1 through #6. Samples will be received and logged into the laboratory information management system for analysis as described in QSM Version 5.4 (DoD, 2021a). Chain of custody procedures will be performed in accordance with Worksheet #29.

Sample organization: Ahtna

Laboratory: Eurofins

Method of sample delivery (shipper/carrier): FedEx shipping

Number of days from reporting until sample disposal: No less than 30 days after final report sent to the client

Activity	Organization and Title or Position of Person Responsible for the Activity	SOP Reference
Sample Labeling	Ahtna Field Technicians	SOP #2, #5, FSOP-002
Chain of custody form completion	Ahtna Field Technicians	SOP #2, #5, FSOP-002
Packaging	Ahtna Field Technicians	SOP #5, FSOP-002
Shipping coordination	Ahtna Field Technicians	SOP #5, FSOP-002
Sample receipt, inspection, & log-in	Eurofins Sample Management Supervisor	SOPs #50
Sample custody and storage	Eurofins Sample Management Supervisor	SOPs #63
Sample disposal	Eurofins Sample Management Supervisor	SOPs #63

Notes:
N/A = not applicable
O&M = operations and maintenance

6.5 Worksheet #28: Analytical Quality Control and Corrective Action

Matrix	Soil Gas		
Analytical Group	VOCs	**Sampling Reference**	See Worksheet #21
Concentration Level	All	**Analytical Method**	TO-15

QC Sample	Frequency	Acceptance Limits	Corrective Action (CA)	Person Responsible	Data Quality Indicator
Method Blank (MB)	After analysis of standards and prior to sample analysis, or when contamination is present.	No analytes detected >½LOQ or >$^{1}/_{10}$ the amount measured in any sample or $^{1}/_{10}$ the regulatory limit, whichever is greater. Common contaminants must not be detected >LOQ.	Correct problem. If required, reprepare and reanalyze MB and all samples processed with the contaminated blank. Results may not be reported without a valid MB. Flagging is only appropriate in cases where the samples cannot be reanalyzed.	Laboratory Analyst/Section Manager	Laboratory Accuracy/Bias/ Contamination
Laboratory Control Samples (LCS) containing analytes of interest and surrogate compounds	Once per preparatory batch of up to 20 samples.	DoD QSM Version 5.4 Appendix C Limits will be used for batch control.	Results may not be reported without a valid LCS. Must contain all surrogates and all analytes to be reported. Check the system and reanalyze. Reprepare if necessary to determine the source of error. Recalibrate the instrument if the error is found.	Laboratory Analyst/Section Manager	Laboratory Accuracy/Bias
Laboratory Control Sample Duplicate (LCSD); Initial and Closing CCV	One per analytical batch.	LCS/LCSD - Use DoD QSM Version 5.4 published limits Table C-43; RPD <30% Initial and Closing CCV - see Worksheet #24	Investigate the cause and perform maintenance as required. If instrument maintenance is required, calibrate as needed.	Laboratory Analyst/Section Manager	Laboratory Accuracy/ Precision

QC Sample	Frequency	Acceptance Limits	Corrective Action (CA)	Person Responsible	Data Quality Indicator
can serve as the LCS/LCSD					
Surrogate Spike	All field and QC samples.	While surrogate compounds routinely demonstrate narrow recovery ranges, there are times where the surrogate recoveries in the samples are wider than the historical acceptance limits but within +/-30% of 100% for EPA method TO-15. In this case, the laboratory will default to the SOP surrogate control limits of 70-130%. Quantification achieved using a multipoint calibration at a single concentration, analogous to internal standards, DLs and LOQs are not established.	Correct problem, then reprep and reanalyze all failed samples for all surrogates in the associated preparatory batch, if sufficient sample material is available. If obvious chromatographic interference with a surrogate is present, reanalysis may not be necessary.	Laboratory Analyst/Section Manager	N/A
Internal Standards	Every field sample, standard and QC sample.	RT for blanks and samples must be within ±0.33 minutes of the RT in the CCV and within ±40 percent of the area counts of the daily CCV Internal Standards.	For blanks: inspect the system and reanalyze the blank. For samples: reanalyze the sample. If the Internal Standards are within limits in the reanalysis, report the second analysis. If Internal Standards are out-of-limits a second time, dilute the sample until Internal Standards are within acceptance limits and narrate.	Laboratory Analyst/Section Manager	N/A

Notes:

CA = corrective action
CCV = continuing calibration verification
DL = detection limit
LCS/LCSD = laboratory control sample/laboratory control sample duplicate
LOQ = limit of quantitation
MB = method blank
N/A = not applicable
QC = quality control
QSM = Quality Systems Manual
RPD = relative percent difference (absolute value of difference of two sample results divided by average result)
RT = retention time
SOP = standard operating procedure
VOC = volatile organic compound

7.0 Data Management and Data Review

7.1 Worksheet #29: Project Documentation and Records

At a minimum, the following documentation will be used for sample collection and field measurement activities. Examples of field forms are presented in Attachment B.

Sample Collection and Field Records			
Record	**Generation**	**Verification**	**Storage location/archive**
Field notes/logbook	Field Team Lead	Project Manager	Project File[1]
Chain of custody forms	Field Team Lead	Project Manager	Project File
Laboratory raw data package	Eurofins	Project Chemist	Project File
PDF copy of analytical data	Eurofins	Project Chemist	Fort Ord Administrative Record
Audit/assessment checklists/reports	Field Team Lead/Project Chemist	Project Manager	Project File
Corrective action reports	Field Team Lead/Project Chemist	Project Manager	Project File
Laboratory sample custody log	Eurofins	Project Chemist	Project File
Laboratory equipment calibration logs	Eurofins	Project Chemist	Project File
Sample preparation logs	Eurofins	Project Chemist	Project File
Run logs	Eurofins	Project Chemist	Project File
Sample disposal records	Eurofins	Project Chemist	Project File
Electronic Validated data/Manual Validated data/Data Validation Reports	Data Validation Subcontractor	Project Chemist	Fort Ord Data Integration System (FODIS) chemistry database
Quarterly/Annual Reports	Task Manager	USACE Project Manager	Fort Ord Administrative Record

Notes:

[1] The Project File is maintained on a secure server accessible at the Monterey Project Office.

7.2 Worksheet #31, 32 & 33: Assessments and Corrective Action

Planned project assessments will be completed for the work conducted using the Three Phase Quality Control Process, which consists of the following:

- Preparatory Phase: Activities and assessments during the preparatory phase are conducted prior to the start of a definable feature of work and are performed to ensure technical requirements and work prerequisites are completed prior to the start of the feature of work. Discrepancies will be resolved and corrective actions implemented and verified prior to the start of work.
- Initial Phase: Activities and assessments during the initial phase are performed during the first day of the definable feature of work and are conducted to verify compliance with the specifications and requirements described in this QAPP and approved project plans and procedures. Discrepancies will be resolved and corrective actions implemented and verified prior to work proceeding.
- Follow Up and Reporting Phase: Activities and assessments performed during the follow up and reporting phase are conducted to verify continued compliance with project requirements and to verify project reports meet client and regulatory requirements.
- An overview of the Three Phase Quality Control Process and related forms used to document the process are provided in Attachment C. The activities and assessments conducted during each phase of the Three Phase Quality Control Process are described below

7.2.1 Assessments and Corrective Action

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (Name, Title and Organization)	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (Name, Title and Organization)	Timeframe for Response
Phase I – Preparatory Phase						
Planning Document review	Internal Memo	Document Author	Prior to the start of field activities	Response to comments documentation and USACE approval of document as applicable	Derek Lieberman, Project Manager, Ahtna	One week

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (Name, Title and Organization)	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (Name, Title and Organization)	Timeframe for Response
Planning document (QAPP) sign-off by field staff, subcontractors, and laboratory	Memo	Andrew Mauck, Soil Gas Monitoring Task Lead Mark Fisler, Field Supervisor, Ahtna Brian Whittaker, Project Manager, Eurofins	Prior to the start of field activities	Obtain sign-off that document has been read and understood by field and laboratory personnel	Derek Lieberman, Project Manager, Ahtna	One week
Preliminary work activities performed	Memo	Andrew Mauck, Soil Gas Monitoring Task Lead	Prior to the start of field activities	Provide clearance forms, permit forms, site access communications	Derek Lieberman, Project Manager, Ahtna	Prior to the start of field activities
Review of lab and field staff readiness	Memo	Mark Fisler, Field Supervisor, Ahtna Andrew Mauck, Soil Gas Monitoring Task Lead Brian Whittaker, Project Manager, Eurofins	Prior to the start of field activities	Provide kick-off meeting notes from field and laboratory meetings	Derek Lieberman, Project Manager, Ahtna	One week
Review of field equipment	Memo	Mark Fisler, Field Supervisor, Ahtna Andrew Mauck, Soil Gas Monitoring Task Lead Brian Whittaker, Project Manager, Eurofins	Prior to the start of field activities	Provide checklist documenting field equipment is available and in good working order	Derek Lieberman, Project Manager, Ahtna	Prior to the start of field activities.

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (Name, Title and Organization)	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (Name, Title and Organization)	Timeframe for Response
Phase II – Initial Phase						
Work performed according to project plans	Memo	Mark Fisler, Field Supervisor, Ahtna Andrew Mauck, SSHO/Soil Gas Monitoring Task Lead Derek Lieberman, Project Manager, Ahtna Bruce Wilcer, QC Manager, Ahtna	Within 24 hours of observation	Communications with USACE	Erin Corr, Technical Lead, USACE James Specht, Project Manager, USACE	One week
Field and laboratory audit	Field and Lab audit report	Mark Fisler, Field Supervisor, Ahtna Brian Whittaker, Project Manager, Eurofins Eric Schmidt, Project Chemist. Ahtna Derek Lieberman, Project Manager, Ahtna Andrew Mauck, Soil Gas Monitoring Task Lead	Within 48 hours of audits	Field and laboratory to issue formal response to audit findings requiring corrective action	Derek Lieberman, Project Manager, Ahtna Bruce Wilcer, QC Manager, Ahtna	One week
Review of CQCRs	Memo	Mark Fisler, Field Supervisor, Ahtna Andrew Mauck, Soil Gas Monitoring Task Lead	Within 48 hours of review	Revision of CQCRs as needed	Derek Lieberman, Project Manager, Ahtna Erin Corr, Technical Lead, USACE James Specht, Project Manager, USACE	One week

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (Name, Title and Organization)	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (Name, Title and Organization)	Timeframe for Response
Review of project plans to reflect current site or lab activities	Memo	Mark Fisler, Field Supervisor, Ahtna Brian Whittaker, Project Manager, Eurofins Derek Lieberman, Project Manager, Ahtna Andrew Mauck, Soil Gas Monitoring Task Lead	Within 10 days of observations	Update project plans to reflect current conditions (may be addendum to existing document) or documentation of changes to field or laboratory protocol to be in accordance with project plans	Derek Lieberman, Project Manager, Ahtna Erin Corr, Technical Lead, USACE James Specht, Project Manager, USACE	Prior to next scheduled sampling event.
Field and laboratory audit	Field and Lab audit report	Mark Fisler, Field Supervisor, Ahtna Brian Whittaker, Project Manager, Eurofins Eric Schmidt, Project Chemist. Ahtna Derek Lieberman, Project Manager, Ahtna Andrew Mauck, Soil Gas Monitoring Task Lead	Within 48 hours of audits	Field and laboratory to issue formal response to audit findings requiring corrective action	Derek Lieberman, Project Manager, Ahtna Bruce Wilcer, QC Manager, Ahtna	One week
Phase III – Follow up and Reporting Phase						
Data reports prepared in accordance with project plans	Internal comments from staff	Document Author	Prior to issuance of report	Provide response to comments and revise report as needed	Commenting staff Derek Lieberman, Project Manager, Ahtna	Prior to issuance of report
Report meets client and regulatory agency requirements	External comments from client and regulatory agencies	Document Author Derek Lieberman, Project Manager, Ahtna	Within 30 days of receipt of report	Provide response to comments and revise report as needed	Commenting Client and or Agencies Derek Lieberman, Project Manager, Ahtna Erin Corr, Technical Lead, USACE James Specht, Project Manager, USACE	30 days

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (Name, Title and Organization)	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (Name, Title and Organization)	Timeframe for Response
Other definable features of work completed	Memo	Derek Lieberman, Project Manager, Ahtna	Before end of contract period	Complete definable features of work	Derek Lieberman, Project Manager, Ahtna Erin Corr, Technical Lead, USACE James Specht, Project Manager, USACE	Before end of contract period

7.2.2 QA Management

Type of Report	**Frequency (daily, weekly, etc.)**	**Projected Delivery Date(s)**	**Person(s) Responsible for Report Preparation (name, title and organization)**	**Report Recipient(s) (name, title and organization)**
Daily CQCR Field Report	Daily	At the end of each day of fieldwork. Original field reports will be kept on-site in the project file.	Mark Fisler, Field Supervisor, Ahtna Andrew Mauck, Soil Gas Monitoring Task Lead	Derek Lieberman, Project Manager, Ahtna Bruce Wilcer, QC Manager, Ahtna James Specht, Project Manager, USACE Erin Corr, Technical Lead, USACE Field Oversight Inspector, Chenega
Field Work Variance Report	As needed	Prior to implementation of proposed change or immediately following a variance implemented in the field. A copy of the Field Work Variance will also be included in the final report.	Mark Fisler, Field Supervisor, Ahtna Andrew Mauck, Soil Gas Monitoring Task Lead	James Specht, Project Manager, USACE Derek Lieberman, Project Manager, Ahtna Eric Schmidt, Project Chemist, Ahtna Erin Corr, Technical Lead, USACE
Non-Routine Occurrences Report	As needed	Within 48 hours of a Non-Routine Occurrence in the field or laboratory. A copy of this report will also be included in the final report.	Mark Fisler, Field Supervisor, Ahtna Andrew Mauck, Soil Gas Monitoring Task Lead	James Specht, Project Manager, USACE Derek Lieberman, Project Manager, Ahtna Eric Schmidt, Project Chemist, Ahtna Erin Corr, Technical Lead, USACE

7.3 Worksheet #34: Data Verification and Validation Inputs

This worksheet lists the inputs that will be used during data verification and validation. Inputs include planning documents, field records, and laboratory records. Data verification is a check that all specified activities involved in collecting and analyzing samples have been completed and documented and that the necessary records (objective evidence) are available to proceed to data validation. Data validation is the evaluation of conformance to stated requirements, including those in the contract, methods, SOPs, and the QAPP.

Item	Description	Verification (completeness)	Validation (conformance to specifications)
Planning Documents/Records			
1	Approved QAPP	X	
2	Contract	X	
4	Field SOPs	X	
5	Laboratory SOPs	X	
Field Records			
6	Field Logbooks	X	X
7	Equipment Calibration Records	X	X
8	Chain of Custody Forms	X	X
9	Sampling Diagrams/Surveys	X	X
10	Relevant Correspondence	X	X
11	Change Orders/Deviations	X	X
12	Field Audit Reports	X	X
13	Field Corrective Action Reports	X	X
Analytical Data Package			
14	Cover Sheet (laboratory identifying information)	X	X
15	Case Narrative	X	X
16	Sample Chronology (e.g., dates and times of receipt, preparation, and analysis)	X	X
17	LOD/LOQ Establishment and Verification	X	X
18	Standards Traceability	X	X
19	Instrument Calibration Records	X	X
20	Definition of Laboratory Qualifiers	X	X
21	Results Reporting Forms	X	X
22	QC Sample Results	X	X
23	CA Reports	X	X
24	Raw Data	X	X
25	Chromatograms	X	X

Item	Description	Verification (completeness)	Validation (conformance to specifications)
26	Electronic Data Deliverable	X	X

7.4 Worksheet #35: Data Verification Procedures

Records Reviewed	Requirement Documents	Process Description	Responsible Person, Organization
Methods	QAPP, SOP	Records support implementation of the SOP-sampling and analysis.	Project Chemist, Ahtna
Performance Requirements	QAPP, SOP	Verify laboratory method SOPs are sufficient to satisfy DQOs.	Project Chemist, Ahtna
Sampling Locations, Number of Samples	QAPP, SOP	Verify that sample locations and quantities will be sufficient to satisfy DQOs.	Project Chemist, Ahtna
Three-phase inspection forms and Other Field Documentation	QAPP, SOP	Review daily sampling activity reports including pertinent field sampling data.	Project Chemist, Ahtna
Chain of Custody	QAPP, SOP	Examine traceability of data from sample collection to generation of project reported data.	Project Chemist, Ahtna
Deviations	QAPP, SOP	Determine impacts of any deviations from methods.	Project Chemist, Ahtna
Sensitivity	QAPP, SOP	Verify that LODs and LOQs are achieved as outlined in the QAPP and that the laboratory successfully analyzed a standard at the LOD.	Project Chemist, Ahtna
Precision	QAPP, SOP	Review data against performance criteria and determine impact of any result out of criteria.	Project Chemist, Ahtna
Accuracy	QAPP, SOP	Review data against performance criteria and determine impact of any result out of criteria.	Project Chemist, Ahtna
QC samples	QAPP, SOP	Ensure that a sufficient number of QC samples are analyzed, as outlined in the QAPP, to meet DQOs.	Project Chemist, Ahtna
Field Change Requests	QAPP, SOP	Review any change request or corrective action documentation. Determine impact to project objectives.	Project/Program Chemist, Ahtna

Records Reviewed	Requirement Documents	Process Description	Responsible Person, Organization
Electronic Data Deliverables (EDDs)	QAPP	Verify that acceptable EDDs have been qualified. The Laboratory Data Consultants Automated Data Review (LDC ADR) EDD format files will be uploaded into the FODIS chemistry database, EDD files will be submitted to USACE. EDD File Specifications are provided in Attachment E.	Project Chemist, Ahtna

7.5 Worksheet #36: Data Validation Procedures

Analytical Group/Method:	Volatile Organics – TO-15 (TO-15 5&20)	Volatile Organics – TO-15 (Low Level)
Data deliverable requirements:	LDC ADR	LDC ADR
Analytical specifications:	Worksheet #28	Worksheet #28
Measurement performance criteria:	Worksheet #12	Worksheet #12
Percent of data packages to be validated:	100% Stage 2B	100% Stage 2B
Percent of raw data reviewed:	10% Stage 4	10% Stage 4
Percent of results to be recalculated:	10% Stage 4	10% Stage 4
Validation procedure:	DoD Data Validation Guidelines	DoD Data Validation Guidelines
Validation qualifiers:	See table below	See table below
Electronic validation program:	LDC ADR	LDC ADR

Notes:

DoD Data Validation Guidelines = Department of Defense General Data Validation Guidelines Environmental Data Quality Workgroup, Revision 1 (DoD, 2019), Data Validation Guidelines Module 1: Data Validation Procedure for Organic Analysis by GC/MS (DoD, 2020), and Data Validation Guidelines Module 1, 2, and 4 Revised Blank Qualification Table (DoD, 2021b)

LDC ADR = Laboratory Data Consultants Automated Data Review format

Summary of Data Qualifiers

Qualifier	Definition
U	The analyte was not detected and was reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.
J	The reported result was an estimated value with an unknown bias.
J+	The result was an estimated quantity, but the result may be biased high.
J-	The result was an estimated quantity, but the result may be biased low.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."

Qualifier	Definition
NJ	The analyte has been "tentatively identified" or "presumptively identified" as present and the associated numerical value was the estimated concentration in the sample.
UJ	The analyte was not detected and was reported as less than the LOD or as defined by the customer. However, the associated numerical value is approximate.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

7.6 Worksheet #37: Data Usability Assessment

The procedures, methods, and activities that will be used to determine whether data are of the right type, quality, and quantity to support project decisions are described below. Also described is how data quality issues will be addressed and how limitations on the use of the data will be handled.

The suitability of the environmental data collected for its intended use will be assessed by the Ahtna Project Chemist in consultation with the Project Manager. Data usability will comprise an evaluation of the quantity, type, and overall quality of the generated data against the project DQOs as presented in Worksheet #11. The usability of data associated with QC results outside of the established acceptance criteria is dependent on the degree of the exceedance, whether the potential bias is high or low, and whether the uncertainty implied by the exceedance is significant relative to project decisions and DQOs. Data usability will be assessed in accordance with the guidance provided in QSM Version 5.4 (DoD, 2021a) and additional applicable USACE and EPA guidance as well as the professional experience of the decision-maker during data validation. The following items will be assessed and conclusions drawn based on their results:

Step 1	**Review the project's objectives and sampling design** The goal for O&M activities at Fort Ord is to implement remedies as necessary to protect human health and the environment while maximizing the number of site closures or advance sites as close to site closure as practicable during the Period of Performance in a cost-effective manner. The site-specific QAPPs will indicate the project objectives and sampling design. To that end, the usability assessment will incorporate the activities listed below. **Field Certification** Field personnel will generate field forms, maps, and notes describing the daily procedures. The three-phase inspection forms (Attachment C), generated during sampling, will discuss any successes and/or deviations from the QAPP. The Task Lead will review all field documentation as it is generated for consistency and errors. Any anomalies identified will be discussed with the project team to determine if any changes to the sampling design are needed. Any changes will be documented in a QAPP amendment. **Data Quality Indicators: Precision, Accuracy, Representativeness, Comparability, Completeness, and Sensitivity (PARCCS)** The PARCCS parameters will be used to help identify deficiencies in the sample data that would affect the achievement of the project DQOs. Laboratory limits and QC samples will be used as part of the PARCCS assessment to detect anomalies in the dataset. In addition, the laboratory will create trend charts to track variability in laboratory processes and establish in-house precision and accuracy criteria. Laboratory limits used in the sensitivity review consist of the LOD and LOQ. Laboratory QC samples consist of method blanks, LCSs, surrogates, and laboratory duplicates. All samples will be spiked with surrogate compounds where recommended or required by the method. **Precision**

Precision is defined as the degree of mutual agreement between individual measurements of the same property under similar conditions and provides a measurement of the reproducibility of an analytical result. Precision will be evaluated through the analysis of field duplicate samples and LCSs. Field duplicate samples will be collected at a frequency of one per 10 field samples of a given matrix. The duplicate sample will not be reanalyzed when the RPD criteria are not met. Discussion of QC failures will be documented in the laboratory case narrative. The Project Chemist will work with the laboratory to determine the cause of the failure and to determine if any of the QC failures are due to matrix or sampling error and if the failures have an impact on the project objectives.

The variance between the samples, in terms of RPD, is calculated according to the following equation:

$$RPD = \frac{|A - B|}{(A + B)/2} \quad x \quad 100\%$$

where:

A = First duplicate concentration

B = Second duplicate concentration

For this project, the goal for precision of field duplicates is listed in Worksheet #12. If both of the duplicate sample results are less than the LOD, the RPD will not be calculated.

Accuracy

Accuracy is the degree of agreement between an analytical measurement and a reference accepted as a true value. The accuracy of a measurement system can be affected by errors introduced by field contamination, sample preservation, sample handling, sample preparation, or analytical techniques. A program of sample spiking will be conducted to evaluate laboratory accuracy. Accuracy will be evaluated by the percent recovery of the spiked compounds in the LCSs, surrogates, and proficiency samples (if requested by the PM). LCSs and surrogates will be spiked prior to extraction. LCS samples will be spiked with the method target compounds indicated in this QAPP, and surrogates will be added to every sample and spike. Proficiency samples will be taken through the entire sample preparation and analysis process. LCS or blank spike samples will be analyzed at a frequency of 5%, or one per sample delivery group/analytical batch (sample sets can be up to 20 field samples). Proficiency samples will be analyzed once per sampling event if required. The results of the spiked and proficiency samples are used to calculate the percent recovery for evaluating accuracy, using the following equation:

where:

S = Measured spike sample concentration

C = Sample concentration

T = True or actual concentration of the spike or proficiency

Worksheet #12 presents accuracy goals for this investigation based on the percent recovery of LCSs and surrogate spikes. The data reviewer will use the accuracy results to

help determine if any of the QC failures are due to matrix or sampling error and if the failures have an impact on the project objectives.

The presence of high levels of target compounds in the sample chosen for spiking may necessitate a dilution of the sample or may otherwise result in errors in spiked compound recovery. Discussion of laboratory QC failures will be documented in the laboratory case narrative. The Project Chemist will work with the laboratory to determine the cause of the failure and to determine if any of the QC failures are due to matrix or sampling error and if the failures have an impact on the project objectives.

Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represent the characteristics of a population, variations in a parameter at a sampling point, or an environmental condition that the data are intended to represent. For this project, representative data will be obtained through careful selection of sampling locations and analytical parameters, through proper collection and handling of samples to avoid interference and minimize cross-contamination, and through consistent application of the appropriate established field and laboratory procedures.

To aid in evaluating the representativeness of the sample results, laboratory blank samples will be evaluated for the presence of contaminants. Laboratory procedures will be reviewed to verify that SOPs were followed, and method requirements were met during the analysis of project samples. Laboratory sample storage practices, holding times, sub-sampling procedures, and method blanks will be assessed for potential impacts on the representativeness of the data. Data determined to be non-representative will be used only if accompanied by appropriate qualifiers and limits of uncertainty.

Representativeness (as it relates to field procedures) refers to the collection of samples that allow accurate conclusions to be made regarding the composition of the sample media at the entire site. Representativeness will be assessed qualitatively by evaluating whether the procedures described in this QAPP were followed.

Completeness

Completeness is a measure of the percentage of project-specific data that are valid. Valid data are obtained when samples are collected and analyzed in accordance with the procedures outlined in this QAPP and when none of the QC criteria used to determine the usability of the data is critically exceeded to the point of rejection.

When data validation is completed, the percent completeness value will be calculated by dividing the number of usable sample results by the total number of sample results planned for this investigation. The evaluation of completeness will help determine whether any critical deficiencies identified during the validation process resulted in non-attainment of project objectives.

Completeness will be evaluated by reviewing the tasks that contribute to the sampling event, such as sample handling and storage procedures, chain of custody procedures, analytical procedures, and data validation procedures. The procedures and determined impact on the sample results will be used to identify any problems along the data path that will render the decision-making process useless and the data set incomplete. The

	completeness goal for this project that still allows for attainment of the project objectives is 90%. $\frac{\text{Number of possible analyte results – Number of rejected and unreported results} \times 100}{\text{Possible number of analyte results}}$ The project team may determine that an individual sampling point or area is more critical than others for decision-making. Any sampling locations identified as such will have a completeness goal of 95% as determined by the validation process. **Comparability** Comparability expresses the confidence with which one dataset can be compared with another. Comparability of data will be achieved by following standard field and laboratory procedures outlined in SOPs and published methods. In addition, standard units of measurement will be used in reporting analytical and field data. Analytical and field methods selected for this investigation are consistent with the methods used during previous investigations of this type. Oversight by experienced team members will ensure that the procedures are conducted in a manner appropriate to attaining the project objectives. Any deviations from field or laboratory methods will be documented on a change request form. The project team will review the change request to determine if the change will impact the comparability of the data. **Sensitivity** The LOD and LOQ will be evaluated by the project team prior to sample analysis to determine if the laboratory is able to attain the sensitivity required for the project. If project decision limits are too sensitive, it will be determined prior to sample analysis whether a sensitivity variance will be issued to the laboratory based on the method chosen and the technology available. The LOD is the minimum quantity of an analyte that can be reliably detected for a specific analytical method at a 99% confidence level that the value is not a false negative. The LOQ represents the smallest quantity of an analyte that can be quantified accurately and reproducibly in a given sample matrix (e.g., three to five times the LOD). The LOD and/or the LOQ shall be sensitive enough to meet the project decision limits. The LOD and LOQ will be evaluated after sample analysis to determine if there were any matrix effects, operator errors, or analytical process errors that interfered with the ability to compare the results to the project decision limits. The LOD will be used to determine if detectable amounts of analytes are present. If no detectable amounts are reported, and all data are acceptable (as determined by the verification and validation process), then the data are usable. The LOD will be used to determine if any detectable amounts of contaminants of concern are present. If detectable amounts are reported and the verification and validation are acceptable, then the data are usable. Any detections falling between the LOD and LOQ will be qualified as estimated. If anomalies in sensitivity are present, the rationale for use or non-use of the affected samples will be discussed in the data validation reports. Worksheet #15 presents the laboratory LODs and LOQs for the selected analytical method(s) used to support the project decision limits.
Step 2	**Review the data verification and data validation outputs**

	The outputs from the verification and validation process will be used to determine data usability. Data validation reports and three phase inspection forms will be reviewed. Data will be summarized as necessary using graphs, maps, and/or tables. The entire project team is responsible for assessing whether the data meet the project objectives. Personnel at all levels will generate data and documentation that will be reviewed to identify trends, relationships, and/or anomalies in the dataset.
Step 3	**Implement the statistical method** For each analytical method, the laboratory will use the LCS data to track and analyze trends in the laboratory. From these trends, they can recognize deficiencies in the method and create in-house acceptance criteria. For this project, the limits are based on laboratory control limits. The precision and accuracy of the entire dataset will be used to determine if any systemic problems have occurred during the sampling event that will result in deficiencies in the dataset. The occurrence of systemic problems and the resulting consequences will be discussed in the data validation report. The data reviewer will make every effort to identify any critical elements or trends that would result in non-usability of data as early as possible.
Step 4	**Document data usability and draw conclusions** Again, the entire project team is responsible for assessing whether the data meet the project objectives. The site-sampling layout, including sampling locations, frequency of sampling, and timing of sampling activities, will be reviewed by the project team. Data usability will be assessed in accordance with the guidance provided in QSM Version 5.4 (DoD, 2021a) and additional applicable USACE and EPA guidance as well as the professional experience of the decision-maker during data validation. The conclusions will be discussed in the final annual report. If the data indicate anomalies, the impacted data will be qualified as described in DoD Data Validation Guidelines (DoD, 2019), Data Validation Guidelines Module 1 (DoD, 2020) and Data Validation Guidelines Module 1, 2, and 4 Revised Blank Qualification Table (DoD, 2021b). The impact will be documented along with the rationale for limited use of the data.

6.0 References

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TABLES

Table 1. Soil Gas Probe Identification, Sample Schedule, and Purge Specifications

Soil Gas Location ID	Soil Gas Probe ID	Screen Depth (ft bgs)	Updated Sample Schedule[1]	Previous Sample Schedule[2]	Purge Volume[3] (mL)	Purge Rate[4] (mL/min)	Purge Time (min)
SG-12-01	SG-12-01-10	10	R	R	21,810	200	109
	SG-12-01-20	20	R	R	21,973	400	55
	SG-12-01-30	30	R	R	22,136	400	55
	SG-12-01-40	40	R	R	21,112	400	53
	SG-12-01-50	50	R	R	23,054	400	58
	SG-12-01-58	58	R	R	22,592	400	56
	SG-12-01-65[5]	65	Q	A	23,892	400	60
SG-12-02	SG-12-02-10[6]	10	Q	Q	22,403	200	112
	SG-12-02-20	20	A	A	22,566	400	56
	SG-12-02-30	30	A	A	22,729	400	57
	SG-12-02-40	40	A	A	22,892	400	57
	SG-12-02-50	50	A	A	23,054	400	58
	SG-12-02-57	57	A	A	23,168	400	58
	SG-12-02-65	65	R	R	23,299	400	58
SG-12-03	SG-12-03-10	10	R	R	22,403	200	112
	SG-12-03-20.5	20.5	R	R	22,574	400	56
	SG-12-03-30	30	R	R	22,729	400	57
	SG-12-03-39.5	39.5	R	R	19,918	400	57
	SG-12-03-50	50	R	R	22,461	400	58
	SG-12-03-58	58	R	R	23,185	400	58
	SG-12-03-65	65	R	R	23,299	400	58
SG-12-04	SG-12-04-10[6]	10	Q	Q	21,810	200	109
	SG-12-04-20	20	Q	Q	21,973	400	55
	SG-12-04-30	30	N	N	22,136	400	55
	SG-12-04-40	40	Q	Q	22,892	400	57
	SG-12-04-50	50	Q	Q	22,461	400	56
	SG-12-04-58	58	Q	Q	22,592	400	56
	SG-12-04-65	65	Q	Q	20,333	400	51
SG-12-05	SG-12-05-10	10	R	R	22,403	200	112
	SG-12-05-20	20	R	R	22,566	400	56
	SG-12-05-30	30	R	R	22,729	400	57
	SG-12-05-40	40	R	R	22,892	400	57
	SG-12-05-50	50	R	R	23,054	400	58
	SG-12-05-60	60	R	R	23,217	400	58
	SG-12-05-70	70	R	R	20,415	400	51

Table 1. Soil Gas Probe Identification, Sample Schedule, and Purge Specifications

Soil Gas Location ID	Soil Gas Probe ID	Screen Depth (ft bgs)	Updated Sample Schedule[1]	Previous Sample Schedule[2]	Purge Volume[3] (mL)	Purge Rate[4] (mL/min)	Purge Time (min)
SG-12-06	SG-12-06-10[6]	10	Q	Q	22,403	200	112
	SG-12-06-20	20	R	R	22,566	400	56
	SG-12-06-30	30	R	R	22,729	400	57
	SG-12-06-40	40	R	R	22,892	400	57
	SG-12-06-50	50	R	R	23,054	400	58
	SG-12-06-60	60	R	R	23,217	400	58
	SG-12-06-70	70	Q	Q	20,415	400	51
SG-12-07	SG-12-07-10	10	N	N	21,810	200	109
	SG-12-07-20	20	R	R	36,799	400	92
	SG-12-07-30	30	R	R	22,136	400	55
	SG-12-07-40	40	R	R	22,298	400	56
	SG-12-07-50	50	R	R	23,054	400	58
	SG-12-07-57.5	57.5	R	R	20,211	400	51
	SG-12-07-65	65	I	R	20,333	400	51
SG-12-08	SG-12-08-10	10	R	R	22,403	200	112
	SG-12-08-20	20	R	R	22,566	400	56
	SG-12-08-30	30	R	R	22,729	400	57
	SG-12-08-40	40	R	R	22,892	400	57
	SG-12-08-50	50	R	R	23,054	400	58
	SG-12-08-60	60	R	R	23,217	400	58
	SG-12-08-70	70	R	R	20,415	400	51
SG-12-09	SG-12-09-10	10	R	R	22,403	200	112
	SG-12-09-20	20	R	R	22,566	400	56
	SG-12-09-30	30	R	R	22,729	400	57
	SG-12-09-40	40	R	R	22,298	400	56
	SG-12-09-50	50	R	R	20,089	400	50
	SG-12-09-59	59	R	R	20,236	400	51
SG-12-11	SG-12-11-10	10	R	R	21,810	200	109
	SG-12-11-20	20	R	R	22,566	400	56
	SG-12-11-30	30	R	R	22,729	400	57
	SG-12-11-40	40	R	R	22,892	400	57
	SG-12-11-50	50	R	R	23,054	400	58
	SG-12-11-60	60	R	R	23,217	400	58
	SG-12-11-70	70	R	R	20,415	400	51

Table 1. Soil Gas Probe Identification, Sample Schedule, and Purge Specifications

Soil Gas Location ID	Soil Gas Probe ID	Screen Depth (ft bgs)	Updated Sample Schedule[1]	Previous Sample Schedule[2]	Purge Volume[3] (mL)	Purge Rate[4] (mL/min)	Purge Time (min)
SG-12-12	SG-12-12-10	10	R	R	21,810	200	109
	SG-12-12-20	20	R	R	22,566	400	56
	SG-12-12-30	30	R	R	22,729	400	57
	SG-12-12-40	40	R	R	22,298	400	56
	SG-12-12-50	50	N	N	22,461	400	56
	SG-12-12-60	60	R	R	22,624	400	57
	SG-12-12-70	70	R	R	20,415	400	51
SG-12-13	SG-12-13-10	10	R	R	22,996	200	115
	SG-12-13-20	20	R	R	23,159	400	58
	SG-12-13-30	30	R	R	23,322	400	58
	SG-12-13-40	40	R	R	25,857	400	65
	SG-12-13-50	50	R	R	22,461	400	56
	SG-12-13-60	60	R	R	26,183	400	65
	SG-12-13-70	70	N	N	20,415	400	51
SG-12-14	SG-12-14-10	10	R	R	21,810	200	109
	SG-12-14-20	20	R	R	21,973	400	55
	SG-12-14-30	30	R	R	22,136	400	55
	SG-12-14-40	40	R	R	22,892	400	57
	SG-12-14-50	50	R	R	23,054	400	58
	SG-12-14-60	60	R	R	22,624	400	57
	SG-12-14-70	70	R	R	20,415	400	51
SG-12-15	SG-12-15-10	10	R	R	25,368	200	127
	SG-12-15-20	20	R	R	25,531	400	64
	SG-12-15-30	30	R	R	25,694	400	64
	SG-12-15-40	40	R	R	25,857	400	65
	SG-12-15-50	50	R	R	22,461	400	56
	SG-12-15-60	60	R	R	26,183	400	65
	SG-12-15-70	70	R	R	23,973	400	60
SG-12-16	SG-12-16-10	10	R	R	25,368	200	127
	SG-12-16-20	20	R	R	21,973	400	55
	SG-12-16-30	30	R	R	22,136	400	55
	SG-12-16-40	40	R	R	23,485	400	59
	SG-12-16-50	50	R	R	22,461	400	56
	SG-12-16-60	60	R	R	23,217	400	58
	SG-12-16-70	70	R	R	20,415	400	51

Table 1. Soil Gas Probe Identification, Sample Schedule, and Purge Specifications

Soil Gas Location ID	Soil Gas Probe ID	Screen Depth (ft bgs)	Updated Sample Schedule[1]	Previous Sample Schedule[2]	Purge Volume[3] (mL)	Purge Rate[4] (mL/min)	Purge Time (min)
SG-12-17	SG-12-17-10	10	R	R	22,403	200	112
	SG-12-17-20	20	R	R	25,531	400	64
	SG-12-17-30	30	R	R	22,729	400	57
	SG-12-17-40	40	R	R	25,857	400	65
	SG-12-17-50	50	R	R	26,020	400	65
	SG-12-17-60	60	I	R	23,217	400	58
	SG-12-17-75	75	N	N	20,496	400	51
SG-12-18	SG-12-18-10	10	R	R	22,996	200	115
	SG-12-18-20	20	R	R	23,159	400	58
	SG-12-18-30	30	R	R	22,729	400	57
	SG-12-18-40	40	R	R	22,892	400	57
	SG-12-18-50	50	R	R	23,648	400	59
	SG-12-18-60	60	R	R	26,183	400	65
	SG-12-18-70	70	R	R	20,415	400	51
SG-12-19	SG-12-19-10	10	R	R	21,810	200	109
	SG-12-19-20	20	R	R	21,973	400	55
	SG-12-19-30	30	R	R	22,136	400	55
	SG-12-19-40	40	R	R	23,485	400	59
	SG-12-19-50	50	R	R	23,648	400	59
	SG-12-19-60	60	R	R	22,624	400	57
	SG-12-19-70	70	R	R	20,415	400	51
SG-12-20	SG-12-20-10	10	A	A	22,996	200	115
	SG-12-20-20	20	A	A	21,973	400	55
	SG-12-20-30	30	R	R	22,136	400	55
	SG-12-20-40	40	R	R	23,485	400	59
	SG-12-20-50	50	R	R	23,648	400	59
	SG-12-20-60	60	R	R	23,810	400	60
	SG-12-20-70[7]	70	I	R	20,415	400	51
SG-12-22	SG-12-22-10	10	R	R	21,810	200	109
	SG-12-22-20	20	R	R	23,159	400	58
	SG-12-22-30	30	R	R	23,322	400	58
	SG-12-22-40	40	R	R	22,298	400	56
	SG-12-22-50	50	R	R	23,648	400	59
	SG-12-22-60	60	R	R	23,810	400	60
	SG-12-22-70	70	R	R	21,601	400	54

Table 1. Soil Gas Probe Identification, Sample Schedule, and Purge Specifications

Soil Gas Location ID	Soil Gas Probe ID	Screen Depth (ft bgs)	Updated Sample Schedule[1]	Previous Sample Schedule[2]	Purge Volume[3] (mL)	Purge Rate[4] (mL/min)	Purge Time (min)
SG-12-23	SG-12-23-10	10	R	R	22,996	200	115
	SG-12-23-20	20	R	R	23,159	400	58
	SG-12-23-30	30	R	R	23,322	400	58
	SG-12-23-40	40	R	R	22,298	400	56
	SG-12-23-50	50	R	R	22,461	400	56
	SG-12-23-60	60	R	R	21,438	400	54
	SG-12-23-70	70	R	R	22,787	400	57
SG-12-24	SG-12-24-10	10	R	R	22,966	200	115
	SG-12-24-20	20	R	R	23,159	400	58
	SG-12-24-30	30	R	R	23,322	400	58
	SG-12-24-40	40	R	R	23,485	400	59
	SG-12-24-50	50	R	R	23,648	400	59
	SG-12-24-60	60	R	R	23,810	400	60
	SG-12-24-70	70	R	R	20,415	400	51

Notes:

[1] The soil gas probe sample schedule as of October 2022 and subject to change based on the analytic approach.

[2] The soil gas probe sample schedule presented in Revision 7 of the SG QAPP (Administrative Record: BW-2792S)

[3] Purge volume calculation is detailed in Figure 4.

[4] Purge rates were determined based on guidance in the Advisory, Active Soil Gas Investigations (DTSC, 2015): shallow (10-foot) soil gas probes purged at approximately 200 mL/min due proximity to the surface where ambient air intereference is more likely; deeper soil gas probes purged at 400 mL/min or less. Purge vacuums will not exceed maximum of 7.4 inches mercury (100 inches water).

[5] Probe sampling frequency has changed from Revision 7 of the QAPP.

[6] Soil gas probe located vertically and laterally adjacent to the front of a building with historic results above soil gas cleanup level and sampled quarterly for the duration of the SGMP.

[7] Soil gas probe is in investigation status, and will be sampled quarterly.

Acronyms and Abbreviations:

A: Annual (third quarter event)

ft bgs: feet below ground surface

I: Investigation; After the soil gas rebound study completion, regulatory agencies requested to continue monitoring this soil gas probe.

ID: identification

min: minutes

mL: milliliters

N: Non-functional, cannot be sampled due to an obstruction or the screen interval submerged in groundwater

Q: Quarterly

R: Removed from sampling program

SGMP: soil gas monitoring program

Table 2. Soil Vapor Extraction Treatment System Identification and Sample Schedule

SVETS Group	SVETS Sample Point ID	Screen Depth (ft bgs)	Top of Screen Elevation (ft MSL)	Sample Schedule[1]
Southern Well Field[2]	VE-12-01	47.9-67.9	37.77	R
	VE-12-02	50-70	37.07	QO
	VE-12-03	50.6-70.6	35.01	R
	VE-12-04	30-50	55.64	R
	VE-12-05	30.3-50.3	55.62	R
Northern Well Field[3]	VE-12-06	45-65	29.69	QO
	VE-12-07	45-65	32.1	R
	VE-12-08	45-65	34.01	QO
	VE-12-09	45-65	27.95	QO
	VE-12-10	45-65	26.99	R
SVTU	SVTU-212-INF	N/A	N/A	QO
	SVTU-212-EFF	N/A	N/A	QO

Notes:

[1] The SVETS sample schedule as of October 2022; subject to change based on the analytical approach in Worksheet #10.

[2] These SVE wells are located near the historical trichloroethene soil gas plume footprint.

[3] These SVE wells are located in the tetrachloroethene groundwater plume footprint.

Acronyms and Abbreviations:

ft bgs: feet below ground surface
ID: identification
N/A: not applicable
QO: Quarterly if in operation - operation is scheduled to commence once the GAC vessels are repaired/replaced.
R: Removed from sampling program (unless online)
SVE: soil vapor extraction
SVETS: soil vapor extraction treatment system
SVTU: soil vapor treatment unit

Table 3. Summary of Soil Gas and SVETS Samples Collected

Sample Location Type	Total Number of Sample Locations by Type	Number of Army-Owned Sample Locations	Total Number of Locations Currently Sampled	Number of Locations Sampled Quarterly	Number of Locations Sampled Annually	Number of Locations Not Sampled	Number of Samples Collected Annually[1,2]
Soil gas probe	153	153	20	10	7	133	52
Soil vapor extraction well	10	10	0	0	0	10	0
Soil vapor treatment unit	3	3	1	0	0	2	0
Total	**166**	**166**	**21**	**10**	**7**	**145**	**52**

Notes:

[1] Total Includes duplicate samples collected during soil gas sampling at a frequency of 10 percent (%) per quarterly event at soil gas probes.

[2] The soil gas probe and SVETS sample schedule as of October 2022 and subject to change based on the analytic approach in Worksheet #10.

FIGURES

Legend

- Soil Gas Probe Cluster
- Soil Vapor Extraction Well
- Soil Vapor Extraction Pipeline
- Soil Vapor Treatment Unit

N

0 62.5 125 250
Feet

Site 12 Location,
Soil Vapor Extraction and Treatment System and Soil Gas Monitoring Map

Quality Assurance Project Plan
Former Fort Ord, California Volume I, Appendix C, Revision 8 Soil Gas Monitoring at Sites 2 and 12

Ahtna

Figure
1

Service Layer Credits: Source: Esri, Maxar, Earthstart Geographics, and the GIS User Community. Imagery date: 09/09/2022

AC-2330
AIR COOLER
HEAT EXCHANGER

DF-2104
DILUTION AIR FILTER
4 INCH

DS-2302
DISCHARGE SILENCER
8 INCH

DS-2321
DISCHARGE SILENCER
8 INCH

M/B-2320
BLOWER—POSITIVE DISPLACEMENT
W/SOUND ENCLOSURE
60 HP, 480V, 3ø, 1,100 CFM

M/P-2220
TRANSFER PUMP
2 HP, 120V, 1ø
25 GPM @ 26 FT

M/P-2420
TRANSFER PUMP
⅛ HP, 120V, 1ø
2 GPM @ 26 FT

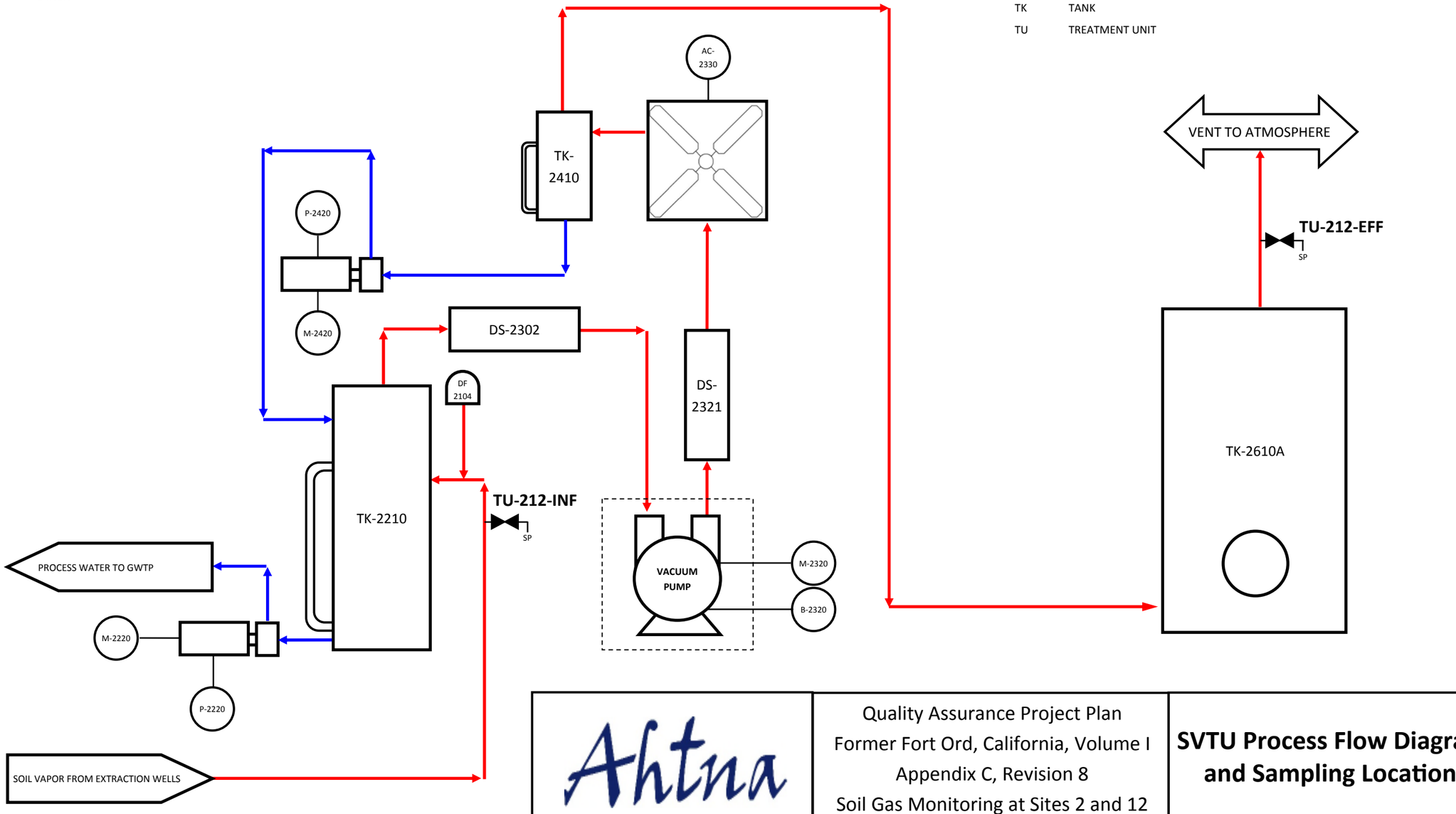
TK-2210
SEPERATOR—LIQUID
100 GAL

TK-2410
SEPERATOR—LIQUID
10 GAL

TK-2610A/B
VAPOR-PHASE CARBON VESSEL
3,000 LB GRANULAR ACTIVATED CARBON EACH

AC	AIR COOLER
B	BLOWER
DF	DILUTION AIR FILTER
DS	DISCHARGE SILENCER
EFF	EFFLUENT
GWTP	GROUNDWATER TREATMENT PLANT
INF	INFLUENT
M	MOTOR
MID	MID-POINT
P	PUMP
SP	SAMPLE PORT
TK	TANK
TU	TREATMENT UNIT

PROCESS AIR (SOIL VAPOR)
PROCESS WATER (CONDENSATE)
SAMPLE PORT



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Quality Assurance Project Plan
Former Fort Ord, California, Volume I
Appendix C, Revision 8
Soil Gas Monitoring at Sites 2 and 12

SVTU Process Flow Diagram and Sampling Locations

Figure
2

ATTACHMENTS

ATTACHMENT A

Standard Operating Procedures (SOPs)

Sampling SOPs

SOP No.	SOP Title	Author Organization
1	Guide to Air Sampling	Eurofins
2	Soil Gas Sampling	Ahtna
3	Helium Shroud Spec Sheet	Eurofins
4	SVE Treatment System Sampling	Ahtna
5	Common Sampling Procedures (Chapter 3 from DoD Environmental Field Sampling Handbook)	DoD
6	SVE Treatment System Flow Meter Use	Ahtna
FSOP-001	Fieldwork Documentation	Ahtna
FSOP-002	Sample Management	Ahtna
FSOP-802	Investigation Derived Waste Management	Ahtna

Soil Gas

Vapor Intrusion

Property Redevelopment

Ambient Air Monitoring

Indoor Air Quality

Waste-to-Energy

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Guide to Air Sampling

Canisters and Bags

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Eurofins Air Toxics, Inc.
Guide to Whole Air Sampling – Canisters and Bags

Revision 6/27/14

Contents

Section 1.0 Introduction

Eurofins Air Toxics Inc. presents this guide as a resource for individuals engaged in air sampling. Air sampling can be more involved than water or soil sampling due to the reactivity of chemical compounds in the gas matrix and sample interaction with the equipment and media used. Ensuring that air samples are collected properly is an important step in acquiring meaningful analytical results. This guide is not a substitute for experience and cannot sufficiently address the multitude of field conditions. Note that this guide is intended for projects involving whole air sampling of volatile organic compounds (VOCs) in canisters and Tedlar® bags. Eurofins Air Toxics provides the "Guide to Sorbent-Based Sampling - Volatiles and Semi-Volatiles" for other types of sampling.

1.1 Whole Air Sampling of VOCs

There are three general ways to collect compounds in a gas phase sample. A sampler may collect the gas sample in a container, actively pump the vapor through a sorbent tube, solution or filter, or rely on passive sample collection onto a sorbent bed. This guide focuses on collecting a sample in the most common air sampling containers, Summa canisters and bags. The sample may be collected in the container either passively, relying on an evacuated canister to drive the sample collection, or actively using a pump to fill the container. The container is subsequently sealed and transported to the laboratory for analysis. The sample is referred to as a "whole air sample" and the compounds remain in the gas matrix inside the container.

As a general rule, whole air sampling is appropriate when target compounds are chemically stable and have vapor pressures greater than 0.1 torr at 25°C and 760mm Hg (EPA standard ambient conditions). Performance of a given compound in a whole air sample is dependent upon its chemical properties, the matrix of the sample, and the degree of inertness of the sample container.

1.2 Choosing Between Canisters and Bags

Table 1.2 compares the features and performance of Summa canisters and bags. Summa canisters or similarly treated canisters are rugged containers designed to provide superior inertness and extended sample storage times. Evacuated canisters also do not require a sampling pump for sample collection. By contrast, bags require a sample pump, but can be purchased inexpensively in bulk, require little preparation or cleaning, and take up little space prior to use. Unlike canisters, bags are typically not appropriate for ppbv-level VOC measurements due to their background artifacts and short hold-times. Over time, low molecular weight gases can diffuse through the bag material while chemicals with lower vapor pressures can condense on the bag surface thereby compromising analyte recoveries. Call your Project Manager at 800-985-5955 if you have questions regarding the appropriate sampling media.

Table 1.2 Comparison of Canisters to Bags

	Canisters	Bags
Type of Sampling	Passive (vacuum)	Active (pump required)
Media Hold Time	Up to 30 days recommended	Indefinite
Hold Time to Analysis	Up to 30 days	Up to 3 days
Surface Inertness	Excellent	Fair
Cleanliness	Batch or 100% certified to ppbv/pptv levels	Some VOCs present in the ppbv range
Sampling Application	Ambient air, soil/landfill gas	Soil/landfill gas, stationary sources, SVE systems
Rule of Thumb	"ppbv device"	"ppmv device"
Advantages	Inertness, hold time, ruggedness, no pump	Purchase/shipping cost, availability, convenience

Section 2.0 Canisters and Associated Media

This section provides a description of air sampling canisters, practical considerations for sampling, and step-by-step instructions for collecting grab and integrated samples. Photographs illustrate the correct way to assemble the various sampling components. Tables provide detailed information on many operational factors that ultimately influence the quality of the data obtained from a canister sample.

2.1 Introduction to Canisters

An air sampling canister is a container for collecting a whole air sample. A canister may be spherical or cylindrical and is constructed of specially treated stainless steel. The canister is prepared for sampling by evacuating the contents to a vacuum of approximately 29.9 inches of Mercury (in Hg). Opening the stainless steel bellows valve allows the air sample to enter the canister. Flow controllers can be utilized to restrict the flow and allow for collection at a desired flow rate or over a desired range. When the sample has been collected, the valve is closed and the canister is returned to the laboratory. Canisters range in volume from less than 1 liter (L) to 6 L. In general, 6 L canisters are used to collect ambient air samples and samples requiring time integration greater than 2 hours. One liter canisters are typically used for taking high concentration (i.e., greater than 5 ppbv) samples not requiring time integration such as soil vapor.

2.1.1 Summa Canister

A Summa canister is a stainless steel container that has had the internal surfaces specially passivated using a "Summa" process. This process combines an electropolishing step with a chemical deactivation step to produce a surface that is nearly chemically inert. A Summa surface has the appearance of a mirror: bright, shiny and smooth. The degree of chemical inertness of a whole air sample container is crucial to minimizing reactions with the sample and maximizing recovery of target compounds from the container. Eurofins Air Toxics maintains a large inventory of Summa canisters in 1 and 6 L volumes.

2.1.2 Canister Certification

Eurofins Air Toxics provides two types of canister cleaning certification, batch and 100%, depending upon the requirements of the project. The batch certification process is most appropriate for routine ambient air applications and high concentration applications such as soil vapor and landfill gas monitoring. The batch certification process begins by cleaning a set of canisters using a combination of dilution, heat and high vacuum. The cleaning batch is certified by analyzing a percentage of canisters for approximately 60 VOCs using GC/MS. The batch meets cleaning requirements if the target compound concentrations are below 0.2 ppbv. Alternatively, the 100% certification (i.e., individual certification) process is typically required for ambient and indoor air applications driven by risk assessment or litigation requiring pptv (parts per trillion by volume) sensitivity. If 100% certification is required, canisters are individually certified for a client-specific list of target compounds using GC/MS. When the 100% certified canisters are shipped, the analytical documentation demonstrating that they are free of the target compounds down to the project reporting limits is emailed to the client. When sampling with certified media, it is important to note that all media is certified as a train and must be sampled as such (i.e., a particular flow controller goes with a particular canister and is labeled as such).

Specify whether your project requires batch or 100% canister certification.

2.1.3 Canister Hold Time

Media Hold Time: Unlike water and soil environmental samples, which are collected in single-use, disposable vials and jars, air samples are collected in reusable summa canisters. Eurofins Air Toxics requires that canisters be returned within 15 days of receipt to effectively manage our inventory and to insure canisters meet performance requirements in the field. Evacuated canisters have a finite timeframe before the canisters naturally lose

vacuum during storage. Using canisters beyond 15 days increases the risk of having unacceptable initial vacuum at the start of sampling.

Sample Hold Time: EPA Method TO-15 cites a sample hold time of up to 30 days for most VOCs. Several non-routine compounds, such as bis(chloromethyl)ether, degrade quickly and demonstrate low recovery even after 7 days. Reactive sulfur compounds such as hydrogen disulfide and methyl, ethyl, and butyl mercaptan are not amenable to storage in stainless steel summa canister, and either fused silica lined (FSL) canisters or Tedlar bags are required for sample collection.

2.2 Associated Canister Hardware

Associated hardware used with the canister includes the valve, brass cap, particulate filter and vacuum gauge. (Flow controllers are covered in detail in section 3.2.)

2.2.1 Valve

An industry standard 1/4" stainless steel bellows valve is mounted at the top of the canister. The valve maintains the vacuum in the canister prior to sampling and seals the canister once the sample has been collected. No more than a half turn by hand is required to open the valve. Do not over-tighten the valve after sampling or it may become damaged. A damaged valve can leak, possibly compromising the sample. Some canisters have a metal cage near the top to protect the valve.

To protect the valve and provide secure connections in the field, a replaceable fitting is attached to all canisters. As threads wear and require replacement, new fittings can be installed at the laboratory prior to shipping to the field. You will need a 1/2" wrench to secure the fitting while connecting or removing the required equipment to the canister.

2.2.2 Brass Cap

Each canister comes with a brass cap (i.e., Swagelok 1/4" plug) secured to the inlet of the valve assembly. The cap serves two purposes. First, it ensures that there is no loss of vacuum due to a leaky valve or a valve that is accidentally opened during handling. Second, it prevents dust and other particulate matter from damaging the valve. The cap is removed prior to sampling and replaced following sample collection.

Always replace the brass cap following canister sampling.

2.2.3 Particulate Filter

Particulate filters should always be used when sampling with a canister. Separate filters are provided to clients taking a grab sample, and filters are built into the flow controllers for clients taking integrated samples. The 2 micron filter is a fritted stainless steel disk that has been pressed into a conventional Swagelok adapter. This device has a relatively high pressure drop across the fritted disk and restricts the flow into the canister even when sampling without a flow controller. Table 2.2.3 lists the typical fill time for a grab sample using a 2 micron particulate filter.

Table 2.2.3 Grab Sample Fill Times for Canisters

CANISTER VOLUME	2 micron filter
6 L	<5 minutes
1 L	<1 minute

2.2.4 Fittings

All fittings on the sampling hardware are 1/4” Swagelok, and a 9/16” wrench is used to assemble the hardware. A 1/2” wrench is also required to tighten fittings onto a union connector. Compression fittings should be used for all connections. Never use tube-in-tube connections. It is critical to avoid leaks in the sampling train. Leaks of ambient air through fittings between pieces of the sampling train will dilute the sample and cause the canister to fill at a faster rate than desired. Eurofins Air Toxics can provide the necessary fittings and ferrules if requested.

2.2.5 Vacuum Gauge

A vacuum gauge is used to measure the initial vacuum of the canister before sampling, and the final vacuum upon completion. A gauge can also be used to monitor the fill rate of the canister when collecting an integrated sample. Eurofins Air Toxics provides 2 types of gauges. For grab sampling, a test gauge checks initial and final vacuums only and is not to be sampled through. For integrated sampling a gauge is built into the flow controller and may be used for monitoring initial and final vacuums, as well as monitoring the fill rate of the canister. Both gauges are considered to be rough gauges, intended to obtain a relative measure of vacuum change. Accuracy of these field gauges are generally on the order of +/- 5 in Hg. Individuals with work plans that outline specific gauge reading requirements are strongly encouraged to purchase and maintain their own gauges in the field. In special cases, a laboratory-grade, NIST-traceable vacuum gauge can be provided upon request.

The vacuum gauges that are routinely provided are intended as a rough gauge measurement device (+/-5 in Hg accuracy).

Section 3.0 Sampling with Canisters

There are two basic modes of canister sampling: grab and integrated. A grab sample is taken over a short interval (i.e., 1-5 minutes) to provide a point-in-time sample concentration, while an integrated sample is taken over a specified duration or utilizing a specified flow rate. In both modes the canister vacuum is used to draw the sample into the canister. This is commonly referred to as passive canister sampling. Sections 3.1 and 3.2 detail procedures for grab and integrated sampling, and section 3.3 provides procedures specific to soil vapor collection.

Regardless of the type of canister samples collected, the following rules apply:

- DO NOT use canister to collect explosive substances, radiological or biological agents, corrosives, extremely toxic substances or other hazardous materials. It is illegal to ship such substances and you will be liable for damages.
- ALWAYS use a filter when sampling. NEVER allow liquids (including water) or corrosive vapors to enter canister.
- DO NOT attach labels to the surface of the canister or write on the canister; you will be liable for cleaning charges.
- DO NOT over tighten the valve, and remember to replace the brass cap.
- IF the canister is returned in unsatisfactory condition, you will be liable for damages.
- DO NOT make modifications to the equipment connections and/or use Teflon tape unless approved by the laboratory.
- AND, if you have any questions or need any support, our experienced project management team is just a phone call away at 800-985-5955.

Use a 9/16” and 1/2” wrench to tighten Swagelok connections on the canister sampling train.

3.1 Grab Sampling Using Canisters

The most common hardware configuration used to take a grab sample is to simply attach a particulate filter to the canister inlet. A particulate filter is shown in section 2.2.3 and is used to prevent particulate matter from fouling the valve and entering the canister.

3.1.1 Step-By-Step Procedures for Canister Grab Sampling

These procedures are for a typical ambient air sampling application; actual field conditions and procedures may vary.

Before you get to the field:

1. Verify contents of the shipped package (e.g., chain-of-custody, canister, particulate filter, and gauge – if requested).
2. Make sure you include a 9/16” and 1/2” wrench in your field tool kit.
3. Verify the gauge is working properly.
4. Verify the initial vacuum of canister as described in the following section:

- **Verify Initial Vacuum of the Canister**: Prior to shipment, each canister is checked for mechanical integrity. However, it is still important to check the vacuum of the canister prior to use. Eurofins Air Toxics recommends doing this before going to the field if possible. The initial vacuum of the canister should be greater than 25 in Hg. If the canister vacuum is less than 25 in Hg, ambient air may have leaked into the canister during storage or transport and the sample may be compromised. Contact your Project Manager if you have any questions on whether to proceed with sample collection. If

sampling at altitude, there are special considerations for gauge readings and sampling (see Section 5.2). The procedure to verify the initial vacuum of a canister is simple but unforgiving.

1. Confirm that valve is closed (knob should already be tightened clockwise).
2. Remove the brass cap.
3. Attach gauge.
4. Attach brass cap to side of gauge tee fitting to ensure a closed train.
5. Open and close valve quickly (a few seconds).
6. Read vacuum on the gauge.
7. Record gauge reading on “Initial Vacuum” column of chain-of-custody.
8. Verify that canister valve is closed and remove gauge.
9. Replace the brass cap.

When ready to sample:

1. Confirm that valve is closed (knob should already be tightened clockwise).
2. Remove brass cap.
3. Attach particulate filter to canister.
4. Open valve 1/2 turn (6 L canister normally takes less than 5 minutes to fill).
5. Close valve by hand tightening knob clockwise.
6. Verify and record final vacuum of canister (repeat steps used to verify initial vacuum). For grab samples, the ending vacuum is typically close to ambient pressure (0 in Hg).
7. Replace brass cap.
8. Fill out canister sample tag (make sure the sample ID and date of collection recorded on the sample tag matches what is recorded on the COC exactly).
9. Return canister in box provided.
10. Return sample media in packaging provided.
11. Fill out chain-of-custody and relinquish samples properly (it is important to note the canister serial numbers on the chain-of-custody).
12. Place chain-of-custody in box and retain pink copy.
13. Tape box shut and affix custody seal (if applicable) across flap.
14. Ship accordingly to meet method holding times.

Return all equipment used or unused to the laboratory. Unreturned canisters and associated hardware will result in additional charges as outlined in the media agreement.

3.2 Integrated Sampling with Canisters and Flow Controllers

As an alternative to an “instantaneous” grab sample, an air sample collected at a controlled rate is referred to as an integrated sample. Flow controllers or flow restrictors are devices which provide sample collection at a desired flow rate and/or sampling interval. By using a flow controller at a specified flow rate, air samples can provide information on average compound concentrations over a defined period. For example, an 8- or 10-hour integrated sample can be used to determine indoor air quality in the workplace. Similarly, a 24-hour integrated sample may be collected to determine residential exposure to indoor or outdoor air sources. In addition to using a flow controller for time-integrated sample collection, a flow controller may be required for soil gas collection to restrict the vacuum applied to the soil and pore water and to collect a representative sample with minimal intrusion of ambient air.

Eurofins Air Toxics provides two general types of flow controllers: mass flow controllers and critical orifice devices. Both devices are driven by differential pressure between ambient conditions and vacuum in the canister.

3.2.1 Mass Flow Controller

A mass flow controller employs a diaphragm that actively compensates to maintain a constant mass flow rate over the desired time period. As the differential pressure decreases, the flow rate decreases and the diaphragm responds by opening up to allow more air to pass through to maintain a stable flow rate. Mass flow controllers are calibrated in the laboratory to provide flow rates suitable for durations up to 24 hours. Durations greater than 24 hours are possible, however, performance of the flow controller is less reliable due to the low flow rates required.

3.2.2 Critical Orifice Devices

Eurofins Air Toxics has two types of critical orifice controllers – "capillary column" and "frit pressed". Both types restrict the flow rate and the canister fill rate decreases as the canister fills to ambient pressure. These controllers are suitable for applications not requiring constant flow rate over the sampling period such as soil vapor collection or at sites in which temporal variability of VOCs is not expected. Critical orifice devices can cover intervals from 0.5 to 12 hours and flow rate from 10 to 250 ml/min. The "capillary column" device (also known as the Blue Body Flow Controller) restricts air flow by forcing the sample to enter a capillary column of minute radius. The flow rate is a function of the length of inert capillary column. The frit pressed device has a critical orifice machined to meet a set flow rate.

3.2.3 Sampling Interval and Flow Controller Setting

When you request canisters and flow controllers from Eurofins Air Toxics, you will be asked for the flow rate (soil vapor) or sampling interval (ambient air), and the flow controllers will be pre-set prior to shipment. The flow rate is set at standard atmospheric conditions (approximately sea level and 25°C). If samples will be collected at elevation or at ambient temperatures significantly different than 25°C, the canister will fill faster or slower depending on sample conditions. If you specify unusual sample conditions at the time of project set-up, we can set the flow controller accordingly. (See Section 5.2 for a discussion of collecting a sample at elevation.) Mass flow controllers should not be utilized for source or process samples in which the collection point is under vacuum or pressure. Please discuss these specific non-standard field conditions with your Project Manager at the time of project set-up.

Table 3.2.3 Flow Rates for Selected Sampling Intervals (mL/min)

Sampling Interval (hrs)	4 min.	0.5	1	2	4	8	12	24
6 L Canister	NA	167	83.3	41.7	20.8	11.5	7.6	3.8
1 L Canister	167	26.6	13.3	6.7	-	-	-	-

Note: Target fill volumes for 6 L and 1 L canisters are 5,000 mL and 800 mL, respectively.

3.2.4 Final Canister Vacuum and Flow Controller Performance

For time-integrated sample collection using a mass flow controller, the final vacuum of a canister should ideally be approximately 5 in Hg or greater. The flow rate will remain constant as the canister fills and will start to decrease as the canister vacuum approaches

5 in Hg. At this point, the differential pressure between the canister and ambient air is not sufficient to maintain the set flow rate. Because of normal fluctuations in the flow rate due to changes in field temperature and pressure, the final vacuum typically ranges between 3 and 10 in Hg.

- **If the residual canister vacuum is greater than 10 in Hg** (i.e., more vacuum), the actual flow rate is lower than the set point and less sample volume is collected. When the canister is pressurized prior to analysis, the pressurization dilution will be greater than normal. This will result in elevated reporting limits.
- **If the residual canister vacuum is near ambient pressure** for a time-integrated sample, the canister filled faster than calibrated. Once the vacuum decreases below 5 in Hg, the flow rate begins to decrease from its set point. This scenario indicates that the sample is weighted toward the first portion of the sampling interval. The sampler cannot be certain the desired sampling interval was achieved before the canister arrived at ambient conditions. Although the actual sampling interval is uncertain, the canister still contains a sample from the site.

Table 3.2.4 Relationship between Final Canister Vacuum, Volume Sampled, and Dilution Factor (6 L Canister)

Final Vacuum (in Hg)	0	2.5	5	7.5	10	12.5	15	17.5	20
Volume Sampled (L)	6	5.5	5.4	5	4	3.5	3	2.5	2
Dilution Factor*	1.34	1.46	1.61	1.79	2.01	2.30	2.68	3.22	4.02

*Canister pressurized to 5 psig for analysis

$$\text{Final Reporting Limit} = \text{Method Reporting Limit} \times \text{Dilution Factor (Canister Pressurization)} \times \text{Dilution Factor (Sample Analysis)}$$

$$\text{Dilution Factor (Canister Pressurization)} = \frac{\text{Final Pressure}}{\text{Receipt Pressure}} = \frac{14.7 \text{ psig} + \text{Final Pressure (psig)}}{14.7 \text{ psig} \left[\frac{\text{1-Receipt Vacuum (in Hg)}}{29.9 \text{ in Hg}} \right]}$$

3.2.5 Considerations for Integrated Sampling with Canisters

Collecting an integrated air sample is more involved than collecting a grab sample. Sampling considerations include verifying that the sampling train is properly configured, monitoring the integrated sampling progress, and avoiding contamination.

- **Avoid Leaks in the Sampling Train**: A leak in any one of these connections means that some air will be pulled in through the leak and not through the flow controller. (Follow the leak check step #4 in 3.2.6).
- **Verify Initial Vacuum of Canister:** See Section 3.1.1 for instructions on verifying initial canister vacuum. A separate gauge is not necessary as both the mass flow controllers and critical orifice flow controllers have built-in rough gauges.
- **Monitor Integrated Sampling Progress**: When feasible, it is a good practice to monitor the progress of the integrated sampling during the sampling interval. The volume of air sampled is a linear function of the canister vacuum. For example, when using a 24-hour mass flow controller, at a quarter of the way (6 hours) into a 24-hour sampling interval, the canister should be a quarter filled (1.25 L) and the gauge should read approximately 6 in Hg lower than

the starting vacuum (~22 in Hg). More vacuum indicates that the canister is filling too slowly; less vacuum means the canister is filling too quickly. If the canister is filling too slowly, a valid sample can still be collected (see Section 3.2.4). If the canister is filling too quickly because of a leak or incorrect flow controller setting, corrective action can be taken. Ensuring all connections are tight may eliminate a leak. It is possible to take an intermittent sample; the time interval need not be continuous.

- **Avoid Contamination**: Flow controllers should be cleaned between uses. This is done by returning them to the laboratory.
- **Caution When Sampling in Extreme Temperatures**: Field temperatures can affect the performance of the mass flow controllers. Laboratory studies have shown that flow rates can increase slightly with decreasing temperatures. A flow rate increase of approximately 10% is expected when sampling at field temperatures of 5 to 10°C.

3.2.6 Step-by-Step Procedures for Integrated Sampling

These procedures are for a typical ambient air sampling application; actual field conditions and procedures may vary.

Before you get to the field:

1. Verify contents of the shipped package (e.g., chain-of-custody, canister, and flow controller)
2. Make sure you include a 9/16" and 1/2" wrench in your field tool kit.
3. Verify the gauge is working properly
4. Verify the initial vacuum of canister (section 3.1.1)

When ready to sample:

1. Confirm that valve is closed (knob should already be tightened clockwise).
2. Remove brass cap from canister.
3. Attach flow controller to canister. The flow controller is securely attached if the flow controller body does not rotate.
4. Place the brass cap at the end of the flow controller creating an air tight train, and quickly open and close the canister valve in order to check for leaks. If the needle on the gauge drops, your train is not airtight. In this case, try refitting your connections and/or tightening them until the needle holds steady.
5. Once the sample train is airtight remove the brass cap from the flow controller and open the canister valve a ½ turn.
6. Monitor integrated sampling progress periodically.
7. Verify and record final vacuum of canister (simply read built-in gauge).
8. When sampling is complete, close valve by hand tightening knob clockwise.
9. Detach flow controller and replace brass cap on canister.
10. Fill out canister sample tag (make sure the sample ID and date of collection recorded on the sample tag matches what is recorded on the COC exactly).
11. Return canisters and associated media in boxes provided. **Failure to return all of the provided equipment will result in a replacement charge as outlined in the media agreement.**
12. Fill out chain-of-custody and relinquish samples properly (it is important to note the canister serial numbers on the chain-of-custody).
13. Place chain-of-custody in box and retain pink copy.
14. Tape box shut and affix custody seal at each opening (if applicable).
15. Ship accordingly to meet method holding times.

3.3 Soil Gas Sample Collection

Canisters can be used for the collection of soil vapor by attaching the sampling train to the soil gas probe. Typically, a critical orifice flow controller is used to minimize the applied vacuum in order to minimize partitioning of VOCs from the soil or pore water to the soil vapor. Additionally, lower flow rates help to minimize the intrusion of ambient air into the soil vapor probe. In general, time-integration is not required for soil gas samples; however, there may be exceptions to this rule of thumb. For example, some regulatory guidance documents recommend concurrent indoor air and sub-slab soil vapor collection over a

24-hour period. This means that a mass flow controller calibrated for a 24-hour sample would be required for the sub-slab as well as the indoor air sample.

3.3.1 Canister to probe connection – Tubing

Collection of a soil gas sample requires the use of tubing to connect the soil gas probe to the sample train. Teflon FEP tubing is recommended based on its low background and its inertness. Alternative tubing can be used if shown to meet data quality objectives. Please note that Low Density Polyethylene or flexible Tygon tubing is not recommended due to VOC adsorption during sample collection. Teflon tubing is provided by the laboratory upon request at the time of order. A charge based on the length will be assessed. It is important to store the tubing away from VOC sources during storage and transport to the site to minimize contamination.

3.3.2 Canister to probe connection –Fittings

To connect the tubing to the canister sampling train, a Swagelok fitting and a pink ferrule are used. The position of the ferrule is key to ensure the fitting is securely connected to the canister. See the figure below for the correct positioning and connection. The pink ferrule is flexible and cannot be over-tightened.

3.3.3 Leak Check Compounds Considerations

To determine whether ambient air is introduced into soil gas sample, a leak check may be used. Leak check compounds may be liquid or gaseous tracers. Liquid compounds are challenging to use effectively in the field and can be introduced into the sample due to improper handling in the field, erroneously indicating a leak in the sampling train. Liquid tracers such as isopropanol should never be directly applied to connections in the sampling train. Rather, the liquid is carefully applied to a cloth and placed near the connection or on the ground next to the probe. Great care must be used in the field to insure the liquid tracer is not handled during sampling train assembly or disassembly. Even a trace amount of a liquid tracer on a glove used to replace a canister brass cap can contaminate the sample. Liquid leak check compounds can interfere with the analytical runs, and even small leaks may result in analytical dilution and raised reporting limits when measuring ppbv target compound levels.

Gaseous tracers such as helium are typically used with shroud placed over the sampling equipment and/or borehole. To quantify the leak, the concentration of the tracer gas in the shroud should be measured.

Specify the leak check compound planned for your soil gas sampling event and record on the COC.

3.3.4 Step-by-Step Procedures for Soil Vapor Sampling

These procedures are for a typical soil vapor sampling application; actual field conditions and procedures may vary. Please consult your specific regulatory guidance for details.

Before you get to the field:

1. Verify contents of the shipped package (e.g., chain-of-custody, canister, tubing, fittings, and flow controller).
2. Make sure you include a 9/16" and 1/2" wrench in your field tool kit.
3. Verify the gauge is working properly.
4. Verify the initial vacuum of canister.

Prior to vapor collection:

- **Purge tubing adequately**. A long length of tubing has significant volume of "dead air" inside. Without purging, this air will enter the canister and dilute the sample. Consider using a handheld PID/FID to confirm that you have purged the tubing and are drawing sample air through the tubing. A standard rule of thumb is to utilize 3 purge volumes prior to sample collection. However, under certain circumstances, purge volumes of 1 to 10 may be appropriate. Please review your regulatory guidance and your site specific conditions in determining the appropriate purge volumes.
- **Don't sample water**. If moisture is visible in the sample tubing, the soil gas sample may be compromised. Soil gas probes should be at an appropriate depth to avoid reaching the water table. Additionally, subsurface vapor should not be collected immediately after measurable precipitation.

When ready to sample:

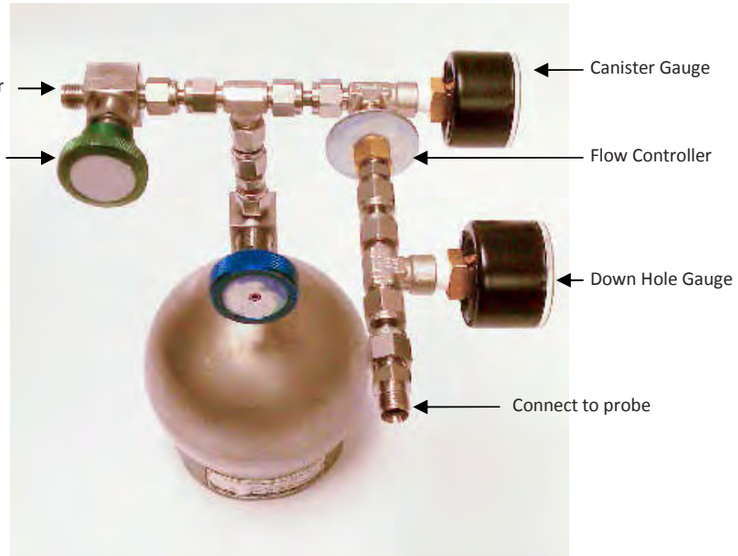
1. Confirm that valve is closed (knob should already be tightened clockwise).
2. Remove brass cap from canister.
3. Attach flow controller to canister if needed. The flow controller is securely attached if the flow controller body does not rotate. (Note: The frit-press flow controller and 1 L canister may be pre-assembled by the laboratory.)
4. Place the brass cap at the end of the flow controller creating an air tight train, and quickly open and close the canister valve in order to check for leaks. If the needle on the gauge drops, your train is not airtight. In this case, try refitting your connections and/or tightening them until the needle holds steady.
5. Once the sample train is airtight remove the brass cap from the flow controller and attach the probe tubing to the flow controller using the pink ferrule and Swagelok nut. (See 3.3.2 for proper positioning of the ferrule.)
6. Once the probe line has been purged and appropriate leak check measures have been implemented, open the canister valve a ½ turn.
7. Verify and record final vacuum of canister (simply read built-in gauge).
8. When canister fills to the desired end vacuum, close valve by hand tightening knob clockwise.

   Please note: Some projects require residual vacuum of approximately 5 in Hg at the end of sample collection even if time-integrated samples are not required. The residual vacuum serves to provide a check of the integrity of the canister during transport to the laboratory to insure no leaks occurred during shipment. A field vacuum reading similar to the lab receipt vacuum reading demonstrated that no leak occurred.

9. Detach tubing and flow controller and replace brass cap on the canister.
10. Fill out canister sample tag (make sure the sample ID and date of collection recorded on the sample tag matches what is recorded on the COC exactly).
11. Return canisters and associated media in boxes provided. **Failure to return all of the provided equipment will result in a replacement charge as outlined in the media agreement.**
12. Fill out chain-of-custody and relinquish samples properly (it is important to note the canister serial numbers on the chain-of-custody).
13. Place chain-of-custody in box and retain pink copy
14. Tape box shut and affix custody seal at each opening (if applicable)
15. Ship accordingly to meet method holding times

3.4.4 Collecting Soil Gas Samples with Sampling Manifolds

If required, Eurofins Air Toxics can provide a sampling manifold to assist with leak checking the sampling train, purging the sampling line, and monitoring the vacuum applied to the soil gas bore hole during sample collection. The manifold is shown below:



The 'Down Hole Gauge', located prior to the flow restrictor, is a vacuum gauge that monitors the vacuum applied to the soil gas probe. Because this is not a flow meter but a measure of pressure/vacuum, the gauge should read at zero if there is sufficient flow from the soil. If the gauge begins to read a vacuum, then the flow is being restricted. Low flow, high vacuum conditions can be encountered when sampling in low permeability soil. The 'Canister Gauge', in line after the flow controller and prior to the purge canister, is a vacuum gauge that indicates to the sampler whether or not the canister is filling properly at the expected rate. This setup enables the sampler to evaluate the lithologic conditions at the site and determine if a valid soil gas sample is being taken. Finally, when duplicate samples are required, the manifold can be used as a duplicate sampling "T" by simply replacing the purge canister with another sample canister.

There are several options to use as a purge vacuum source to attach to the purge valve connection – a Summa canister, sampling pump or sampling syringe. The below instructions assume a Summa canister will be used as a purge volume source since other sources are generally provided by the client.

When ready to sample:

Leak Check Test

1. Confirm that canister valves are closed (knob should already be tightened clockwise).
2. Remove brass caps from both the sample canister and the purge canister. (Unless using certified media, there is no difference between the two).
3. Attach manifold center fitting to sample canister.
4. Attach purge canister to the Purge Valve end of the manifold by attaching provided Teflon tubing and compression fittings.
5. Confirm that there is a brass cap secured at the inlet of the manifold creating an air tight train, make sure the manifold valve above the purge canister is open, and quickly open and close the purge canister valve in order to check for leaks. If the needle on the gauge drops, your train is not airtight. In this case, try refitting your connections and/or tightening them until the needle holds steady.

Purging

6. Once the sample train is airtight remove the brass cap from the manifold inlet, connect the tubing from the sample port using a compression fitting and open the purge canister valve, 1/2 turn.
7. Monitor integrated sampling progress periodically. *Please note, because the purge canister is inline after the flow restrictor the line will not purge faster than at a rate of 167 ml/min.

8. Once the desired purge volume is met close both the manifold valve and the purge canister valve by hand tightening the knobs clockwise.

9. If sampling at multiple locations, the purge canister can be disconnected from the manifold and used to begin purging the next sample location without compromising the sample train.

Sampling

10. The line is now ready to be sampled. Open the sample canister valve and monitor sampling progress periodically.

11. When the sampling is complete close the valve and replace the brass cap on the canister; record final vacuum of canister (simply read built-in gauge).

12. Fill out canister sample tag (make sure the sample ID and date of collection recorded on the sample tag matches what is recorded on the COC exactly).

13. Return canisters in boxes provided and all parts of the soil gas manifold. **Unreturned media will result in a replacement charged assessed as described in the media agreement**.

14. Fill out chain-of-custody and relinquish samples properly (it is important to note the canister serial numbers on the chain-of-custody).

15. Place chain-of-custody in box and retain pink copy.

16. Ship accordingly to meet method holding times.

Section 4.0 Sampling with Bags

This section provides a description of the types of air sampling bags, selecting the right bag for your application, practical considerations for sampling, and step-by-step instructions for collecting a grab sample. Photographs illustrate the correct way to assemble the various sampling components.

4.1 Introduction to Bags

Air sampling bags are containers used to collect whole air samples for landfill gas, soil gas and stationary source applications. Bags can be constructed from various materials which can differ in terms of stability characteristics and cleanliness. In general, air sampling bags are best suited for projects involving analysis of compounds in the ppmv range. They can be used to collect sulfur compounds, but only if the fittings are non-metallic (e.g., polypropylene, Teflon®, or Nylon).

Air sampling bags are equipped with a valve that allows for filling. Sample collection requires a pressurized sampling port, a low flow rate pump or a lung sampler. The bag expands as the vapor sample is pulled in. When the target volume of the sample is collected, the valve is closed and the bag is returned to the laboratory. Bag materials should be selected based on the specific application. Common air sampling bags include Tedlar film and FlexFoil. Eurofins Air Toxics maintains a limited inventory of air sampling bags in 1 L, 3 L and 5 L volumes.

4.1.1 Tedlar® Film

Tedlar® is a trade name for a polyvinyl fluoride film developed by DuPont Corporation in the 1960's. This patented fluoropolymer has been used in a wide variety of applications including protective surfacing for signs, exterior wall panels and aircraft interiors. Tedlar® film is tough yet flexible and retains its impressive mechanical properties over a wide range of temperatures (from well below freezing to over 200°F). Tedlar® exhibits low permeability to gases, good chemical inertness, good weathering resistance and low off-gassing.

Tedlar® bags may be used to collect samples containing common solvents, hydrocarbons, chlorinated solvents, sulfur compounds, atmospheric and biogenic gases and many other classes of compounds. Compounds with low vapor pressures such as Naphthalene are not appropriate for Tedlar bags as recovery is very low even under short sample storage times. Low molecular compounds such as Helium and Hydrogen can diffuse through the Tedlar bag material resulting in poor storage stability.

4.1.2 Tedlar® Bag Suppliers and Re-use

Compounds commonly detected from analyzing new Tedlar® bags include methylene chloride, toluene, acetone, ethanol, 2-propanol, phenol, and dimethylacetamide. While levels of these common artifacts are typically in the ppbv range, the cleanliness of bags can vary significantly between vendors, and purchasing bags directly from an unknown vendor should be avoided. Once the Tedlar® bag is used for sample collection, the surface has been exposed to moisture and possible VOCs. It may irreversibly adsorb many VOCs at the low ppbv level. A series of purges with certified gas may not remove the VOCs from the surface. Consider your data quality objectives to determine whether re-using Tedlar® bags is appropriate.

4.1.3 Hold Time for a Tedlar® Bag

The media hold time for a Tedlar® bag is indefinite if stored out of sunlight in a cool, dry location.

The sample hold time to analysis varies by method and compound. See Table 4.1.3 for recommended sample storage times for commonly requested parameters.

Table 4.1.3 Recommended Maximum Sample Storage Times for Tedlar® Bags

Analytical Method	Chemical Class	Storage Time
ASTM D5504	Suite of sulfur compounds including Reactive Sulfur compounds (Hydrogen sulfide, Methyl mercaptan)	24 hours
ASTM D1946 ASTM D1945	Atmospheric and natural gases: CO, CO2, CH4, C2-C5 hydrocarbons (He and H_2 not recommended)	Up to 3 days
Modified TO-14A, TO-15, TO-3, TO-12	Volatile Organic Compounds (VOCs)	Up to 3 days

4.1.4 FlexFoil Bags

FlexFoil bags are made from an opaque and flexible material with 4-ply construction resulting in high physical strength to minimize rupture and leakage and low permeability to provide good stability for low molecular weight compounds. FlexFoil bags are ideal for target compounds such as Hydrogen and Helium and can be used for the suite of atmospheric and natural gas components. While the reactive sulfur compounds, Hydrogen Sulfide and Methyl Mercaptan, show good stability over 24 hours in FlexFoil bags, other sulfur compounds demonstrate low recovery. Table 4.1.4 summarizes the compounds and the hold times amenable to FlexFoil bags.

Table 4.1.4 Recommended Maximum Sample Storage Times for FlexFoil Bags

Analytical Method	Chemical Class	Storage Time
ASTM D5504	Hydrogen sulfide, Methyl mercaptan only Not recommended for full sulfur list.	24 hours
ASTM D1946 ASTM D1945	Atmospheric and natural gases Full List	Up to 3 days

4.2 Air Bag Sampling

Using a bag to collect an air sample normally involves “active” sampling, unlike an evacuated canister that can be filled “passively” by simply opening the valve. There are two methods commonly used to fill a bag: a pump or a lung sampler.

- **Sampling with a Pump**: The most common method for filling a bag is to use a small pump with low flow rates (50-200 mL/min) and tubing to fill the bag. Eurofins Air Toxics, Inc. does not provide pumps but pumps may be rented from equipment providers or purchased from manufacturers such as SKC or Gilian.
- **Sampling with a Lung Sampler**: A “lung sampler” may be used to fill a bag. Although a little more complicated than simply using a pump, the main advantage to using a lung sampler to fill a bag is that it avoids potential pump contamination.

A bag with attached tubing is placed in a small airtight chamber (even a 5-gallon bucket can work) with the tubing protruding from the chamber. The sealed chamber is then evacuated via a pump, causing the bag to expand and draw the sample into the bag through the protruding tube. The sample air never touches the wetted surfaces of the pump. Eurofins Air Toxics does not provide lung samplers, but they can be rented from equipment suppliers or purchased by manufacturers such as SKC Inc.

4.2.1 Considerations for Bag Sampling

Some considerations for collecting a bag sample:

- **Fill the bag no more than 2/3 full**: Allow for possible expansion due to an increase in temperature or decrease in atmospheric pressure (e.g., the cargo hold of a plane)
- **Keep the Tedlar® bag out of sunlight**: Tedlar® film is transparent to ultraviolet light (although opaque versions are available) and the sample should be kept out of sunlight to avoid any photochemical reactions
- **Protect the bag**: Store and ship the bag samples in a protective box at room temperature. An ice chest may be used, but DO NOT CHILL
- **Fill out the bag label**: It is much easier to write the sample information on the label before the bag is inflated. Make sure to use a ball-point pen, never a Sharpee or other marker which can emit VOCs.
- **Provide a "back-up" bag**: Consider filling two bags per location in the rare occasion that a defective bag deflates before analysis. The "hold" sample does not need to be documented on the Chain-of-Custody and should have an identical sample ID to the original sample indicating that it is the "hold" sample
- **Avoid Contamination**: Care should be taken to avoid contamination introduced by the pump or tubing. Begin sampling at locations with the lowest compound concentrations (e.g., sample the SVE effluent before the influent). Decontaminate the pump between uses by purging with certified air for an extended period; better yet, use a lung sampler. Use the shortest length possible of Teflon® tubing or other inert tubing. DO NOT REUSE TUBING. If long lengths of tubing are used, consider purging the tubing with several volumes worth before sampling. If you are concerned about sampling for trace compounds, you shouldn't be using a Tedlar® bag (see Section 1.2)
- **Don't Sample Dangerous Compounds in a Bag**: Do not ship any explosive substances, radiological or biological agents, corrosives or extremely hazardous materials to Eurofins Air Toxics. Bag rupture during transit to the laboratory is possible and the sampler assumes full liability.

4.2.2 Step-by-Step Procedures for Bag Sampling (Pump)

Note: These procedures are for a typical stationary source (e.g., SVE system) sampling application; actual field conditions and procedures may vary.

Before you get to the field:

1. Verify contents of the shipped package (e.g., chain-of-custody, bag, and tubing/fittings – if requested).
2. Verify pump cleanliness and operation (Eurofins Air Toxics does not provide pumps).

When ready to sample:

3. Purge sample port.
4. Attach new Teflon® tubing from sample port or probe to low flow rate pump.
5. Purge tubing.
6. Fill out bag sample tag.
7. Attach additional new Teflon® tubing from the pump outlet to the bag valve.
8. Open bag valve.
9. Collect sample (FILL NO MORE THAN 2/3 FULL).
10. Close bag valve by hand tightening valve clockwise.
11. Return filled bags in a rigid shipping container (DO NOT CHILL).
12. Fill out chain-of-custody and relinquish samples properly.
13. Place chain-of-custody in box and retain pink copy.

14. Tape box shut and affix custody seal (if applicable) across flap.
15. Ship first overnight or priority overnight to meet method holding times.

Expedite delivery of air sampling bags to the laboratory for analysis.

Section 5.0 Special Sampling Considerations

This section provides recommendations for the collection of field QC samples such as field duplicates. Considerations for sampling at altitude, sampling SVE ports and using sample cylinders are presented.

5.1 Field QC

To measure accuracy and precision of the field activities, project plans often include field duplicates, field blanks, ambient blanks, trip blanks and/or equipment blanks.

5.1.1 Field Duplicate

A field duplicate is a second sample collected in the field simultaneously with the primary sample at one sampling location. The results of the duplicate sample may be compared (e.g., calculate relative percent difference) with the primary sample to provide information on consistency and reproducibility of field sampling procedures. Due to the nature of the gas phase, duplicate samples should be collected from a common inlet. The configuration for collecting a field duplicate includes stainless steel or Teflon® tubing connected to a Swagelok "T". If integrated samples are being collected and the sample duration is to be maintained, the sample train should be assembled as follows: each canister should have a flow controller attached, then the duplicate sampling T should be attached to the flow controllers. If the collection flow rate from the sample port is to be maintained then the duplicate sampling T should be connected to the canisters; then the flow controller is connected to the inlet of the sampling T.

Alternatively, if the project objective is to assess spatial or temporal variability, then field duplicates may be deployed in close proximity (ambient air sampling) or samples may be collected in succession (soil vapor).

5.1.2 Field Blank

A field blank is a sample collected in the field from a certified air source. Analysis of the field blank can provide information on the decontamination procedures used in the field. Clean stainless steel or Teflon® tubing and a certified regulator should be used. It is imperative that individually certified canisters (the sample canister and the source canister/cylinder, if applicable) be used to collect a field blank.

5.1.3 Ambient Blank

An ambient blank is an ambient air sample collected in the field. It is usually used in conjunction with soil gas or stationary source (e.g., SVE system) sampling. Analysis of the ambient blank can provide information on the ambient levels of site contaminants. It is recommended that an individually certified canister be used to collect an ambient blank.

5.1.4 Trip Blank

When sampling for contaminants in water, the laboratory prepares a trip blank by filling a VOA vial with clean, de-ionized water. The trip blank is sent to the field in a cooler with new sample vials. After sampling, the filled sample vials are placed back in the cooler next to the trip blank and returned to the laboratory. Analysis of the trip blank provides information on decontamination and sample handling procedures in the field as well as the cleanliness of the cooler and packaging.

When sampling for compounds in air, a trip blank provides little, if any, of the information above. A trip blank canister can be individually certified, evacuated, and sent to the field in a box with the sample canisters. Since the valve is closed and the brass cap tightened, it is questionable if the trip blank canister contents are ever "exposed" to sampling conditions. The trip blank VOC concentrations essentially provide information regarding the cleanliness and performance of the trip blank canister. Results cannot necessarily be applied to the associated field sample canisters accompanying the trip blank. **Eurofins Air Toxics does not recommend collecting a trip blank for air sampling.**

5.2 Considerations for Sampling at Altitude

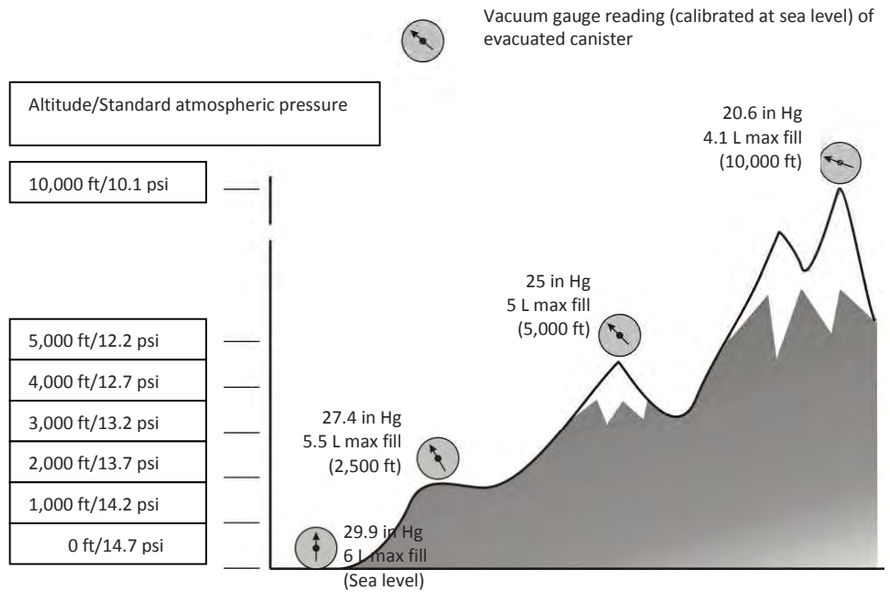
Sampling at altitudes significantly above sea level is similar to sampling a stationary source under vacuum in that target fill volumes may be difficult to achieve. The figure to the right illustrates the relationship between increasing altitude and decreasing atmospheric pressure. Ambient conditions in Denver at 5,000 ft altitude are quite different from ambient conditions at sea level. Canister sampling is driven by the differential pressure between ambient conditions and the vacuum in the canister.

There is less atmospheric pressure in Denver and 5 L is the maximum fill volume of standard air assuming the canister is allowed to reach ambient conditions (i.e., final gauge reading of 0 in Hg). Theoretically, if you sample high enough (e.g., in space), no sample would enter the canister because there is no pressure difference between the evacuated canister and ambient conditions. To fill a canister to 6 L in Denver, you would need to use an air pump.

Sampling at altitude also affects gauge readings. The gauges supplied by Eurofins Air Toxics, Inc. (see Section 2.2.4) measure canister vacuum relative to atmospheric pressure and are calibrated at approximately sea level. Before sampling at altitude, the gauges should be equilibrated (see Section 3.1). But even after equilibrating the gauge, verifying the initial vacuum of a canister at altitude is misleading. In Denver at 5,000 ft, expect the gauge to read 25, not 29.9 in Hg. You do not have a bad canister (i.e., leaking or not evacuated properly). The canister is ready for sampling and the gauge is working properly.

Rule of Thumb: For every 1,000 ft of elevation, the gauge will be off by 1 in Hg and the fill volume will be reduced by 1/5 L.

If you have questions about sampling at altitude, please call your Project Manager at 800-985-5955.



5.3 Considerations for SVE/LFG Collection System Sampling

There are some additional sampling considerations for collecting grab samples (canister or bag) from a Soil Vapor Extraction (SVE) system or landfill gas (LFG) collection system. The general challenge with these samples arises from the need to employ a length of tubing to direct the landfill gas or process air to the canister or bag. Tubing introduces the potential for contamination and diluting the sample.

- **Use inert tubing**. Teflon® tubing is recommended. Tubing with an outer diameter of ¼" works best with the fittings on the particulate filter. (See Section 3.3.1).
- **Do not reuse tubing**.
- **Purge tubing adequately**. A long length of tubing has significant volume of "dead air" inside. Without purging, this air will enter the canister and dilute the sample. Consider using a handheld PID/FID to confirm that you have purged the tubing and are drawing sample air through the tubing.
- **Avoid leaks in the sampling train**. Leaks of ambient air through fittings between pieces of the sampling train (e.g., tubing to particulate filter) will dilute the sample.
- Always use compression fittings for all connections; never use tube in tube connections.
- **Purge the sample port**. A sample port on an SVE system or LFG collection system can accumulate solids or liquids depending upon the location of the port in the process and the orientation of the port. An influent sample port located upstream of a filter or moisture knock-out can be laden with particulates or saturated with water vapor. Heavy particulate matter can clog the particulate filter and foul the canister valve. It is important to prevent liquids from entering the canister. A sample port oriented downward may have liquid standing in the valve. Purge the sample port adequately before connecting the sampling train.
- **Consider the effects of sampling a process under vacuum or pressure**. When collecting a grab sample from a stationary source such as an SVE system or LFG collection system, some sample ports may be under vacuum or pressure relative to ambient conditions. When the sample port is under vacuum, such as the header pipe from the extraction well network, it may be difficult to fill the canister with the desired volume of sample. A vacuum pump may be used to collect a canister grab sample from a sample port under considerable vacuum. See the related discussion on sampling at altitude in Section 5.2. When the sample port is under pressure, such as the effluent stack downstream of the blower and treatment system, you may inadvertently pressurize the canister. Only a DOT-approved sample cylinder should be used to transport pressurized air samples (see Section 5.4). Under no circumstances should a Summa canister be pressurized more than 15 psig. Bleed off excess pressure by opening the valve temporarily while monitoring the canister with a pressure gauge.

5.4 Considerations for Sample Cylinder Sampling

Sample cylinders, also known as "sample bombs", are DOT-approved, high pressure, thick-walled, stainless steel cylinders with a valve at each end. They were intended for collecting a pressurized sample for petroleum gas applications. Sample cylinders differ from sample canisters in that they do not have a Summa-passivated interior surface and are not evacuated prior to shipment. Sample cylinders are not suitable for analysis of hydrocarbons at ppbv levels. Sample cylinders can be used for analysis of natural gas by ASTM D-1945 and calculation of BTU by ASTM D-3588. Eurofins Air Toxics assumes that clients requesting a sample cylinder have a pressurized process and sample port with a built-in gauge and 1/4" Swagelok fitting to attach to the sample cylinder. Eurofins Air Toxics has a limited inventory of 500 mL sample cylinders that are particularly suited for landfill gas collection systems (i.e., LFG to energy applications). This section provides step-by-step procedures for sampling with a sample cylinder.

Inform the lab during project set up if hazardous samples (e.g. high Hydrogen Sulfide concentrations) will be collected to verify the lab can safely handle the samples.

Step-by-Step Procedures for Sample Cylinder Sampling

These procedures are for a typical stationary source sampling application and actual field conditions; procedures may vary. Follow all precautions in the site Health and Safety Plan when dealing with a pressurized sample port and sample cylinder. Follow required DOT guidelines for packaging and shipping.

1. Verify contents of the shipped package (e.g., chain-of-custody, sample cylinder, particulate filter).
2. Verify that gauge on sample port is working properly.
3. Purge sample port.

4. Remove brass caps on either end of cylinder.
5. Attach particulate filter to upstream valve.
6. Attach filter/cylinder assembly directly to the sample port.
7. Open both valves 1/2 turn.
8. Allow sample air to flow through sample cylinder (approximately 10 L for a 500 mL cylinder).
9. Close downstream valve of sample cylinder by hand tightening knob clockwise.
10. Allow sample cylinder to pressurize to process pressure (max 100 psig).
11. Close upstream valve of sample cylinder and sample port.
12. Detach filter/cylinder assembly from sample port and remove particulate filter.
13. Replace brass caps.
14. Fill out sample cylinder sample tag.
15. Fill out chain-of-custody and relinquish samples properly.
16. Include the chain-of-custody with the samples and retain pink copy.
17. Pack, label, and ship according to DOT regulations.

Follow DOT regulations for packaging and shipping hazardous samples.

Standard Operating Procedure (SOP) #2

Soil Gas Sampling

Introduction

Reference guidance provided in the main Quality Assurance Project Plan (QAPP). This SOP was developed using the following guidelines as references:

- California Department of Toxic Substances Control (DTSC) and California Environmental Protection Agency (Cal EPA), 2011. *Final Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air (Vapor Intrusion Guidance)*. October. Available from:https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/01/Final_VIG_Oct_2011.pdf;
- DTSC/Cal EPA, 2015. *Advisory Active Soil Gas Investigations*. April. Available from: https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/01/VI_ActiveSoilGasAdvisory_FINAL.pdf; and
- Department of Defense (DoD), 2009. *DoD Vapor Intrusion Handbook*. January. Available from: http://www.clu-in.org/download/char/dodvihdbk200901.pdf.

Since Site 12 is located in a public retail location, the likelihood of sampling site visitors is high. Visitors to the sampling site may include shareholders such as project personnel, clients, regulators, property owners or managers, property employees, property customers, other temporary site workers (e.g., construction workers, delivery drivers, painters, landscapers, etc.), or members of the public. If there are visitors to the site during sampling, who ask questions, direct them to the BRAC Office Community Relations department or fortordcleanup.com. Unauthorized visitors may not enter a safety exclusion zone. Notify project manager of any visitor encounters.

Materials

The following materials should be utilized during soil gas sampling:

- Site Setup
    - Tools to open well if it is a flush mount well box (3/4" or 15/16" wrench usually)
    - Cones for delineation of exclusion zone
- Soil Gas Probe Purging
    - Vacuum pump
    - Vacuum gauge
    - Tubing (small piece of Silicone and long piece of Nylon tubing)
- Soil Gas Probe Integrity Test (Helium Test)
    - Helium compressed gas cylinder (can be provided by lab)
    - Helium cylinder regulator and tubing with connection to shroud (can be provided by lab)
    - In-line helium detector (can be provided by lab)
    - Shroud helium detector (can be provided by lab)
    - Shroud assembly (provided by lab) Plastic sheeting to cover shroud
    - Weights to hold shroud down

    - Cardboard cover for stickup wells
- Sampling
    - Sample containers – 1.0 Liter (L) SUMMA canisters provided by laboratory
    - Flow regulator – between 100 and 200 milliliters per minute (mL/min) (usually a part of the shroud sampling manifold assembly)
    - Sample manifold (T-manifold for duplicate samples) provided by laboratory
    - Vacuum gauge
    - Tools (9/16" wrench to remove canister caps and attach gauges, tubing, and/or flow regulators, tubing cutter)
    - Tubing
        - 1/4" Nylon or Teflon approximately 1 foot (ft) per probe and
        - 3/8" Silicone tubing approximately 3" per probe
    - Small zipties
    - Ferrules and ¼" compression caps (extras in case lab provided ones don't work)
- Documentation
    - Chain of Custodies (COCs)
    - Sample Logbook
    - Soil Gas Sample Collection Log
    - SUMMA Sample Train Shut-In Test Log
    - Soil Gas Probe Integrity Testing Log
    - Sample labels (typically attached to sample canisters provided by laboratory)
- Sample Handling
    - Shipping boxes
    - Shipping labels
    - Custody seals
    - Laboratory contact information

Sample Locations and Schedule

Soil gas sampling shall be conducted in the Site 12 area at soil gas probes installed below ground surface according to the sampling schedule provided in the QAPP Table 2. Soil gas sampling should not be conducted during a significant rain event, which is defined as ½ inch or greater of precipitation in a 24 hour period unless infiltration has not occurred beneath high-integrity pavement. Shallow soil gas probes (10-foot probes) should not be sampled within five days of a significant rain event.

Sampling Procedures

The following procedures will be followed for each soil gas probe sample collected:

1. Gather materials listed above.
2. Once onsite, follow safety guidelines in the Accident Prevention Plan. Wear high visibility safety vest, steel toe boots, and eye protection as necessary. Setup safety cones around the site to delineate pedestrians and vehicles around the sampling site. Do not block building entrances or exits or parked vehicles from exiting.

3. Install a vacuum gauge on the SUMMA canister to check for proper vacuum (minimum -25 inches mercury [”Hg]).
4. Before sampling begins, attach the SUMMA canister to the sample manifold fitting, making sure the sample manifold assembly flow valve is turned off.
5. Perform the Equipment Test (Shut-In Test) by observing the starting vacuum does not drop over 1”Hg after 15 minutes of observation.
6. After the Shut-In Test passes, setup shroud in soil gas sample location. If the Shut-In Test fails, re-assemble connections, and retry test. If the initial vacuum is now less than the minimum -25”Hg, do not use the canister. Try a different flow regulator or different ferrules and compression caps if necessary. Contact the laboratory for further guidance if Shut-In Test failures become a consistent problem.
7. Once shroud is in place, attach soil gas probe tubing to Silicone and Nylon tubing (securing tubing connections with small zipties) and attach to sample manifold inlet compression fitting with compression cap and ferrule. Tighten connections with appropriate wrench to a ¼ turn after it is hand tight, do not over tighten.
8. Each soil gas probe must be purged for a calculated volume of soil gas prior to sampling by the purge volumes listed in QAPP Table 1. Attach the vacuum pump and gauge assembly to the outlet of the sample manifold and turn the sample manifold valve to purge. Make sure flow rates are at or below 200 mL/min[1] for 10 foot soil gas probes and at or below 400 mL/min[2] for 20 foot or deeper soil gas probes.
9. During the soil gas probe purging, the Soil Gas Probe Integrity Test (SGPI Test or Helium Test) may be completed. This SGPI Test will take 15 minutes to complete if it passes. Attach the helium compressed gas cylinder to the regulator and connect it to the helium inlet on the shroud. Insert the shroud helium detector in the shroud and turn it on, it should read 0 percent helium (% He). Turn on the inline helium detector and record the %He reading on the SGPI Test form. Attach the inline helium detector to the sample manifold outlet tubing before the vacuum pump.
10. Windy conditions can cause leaks in the shroud and use more helium than desired, as possible block any gaps and weigh down the shroud to prevent helium leaks.
11. Begin applying helium to the shroud at approximately 30% He (as measured by the shroud helium detector). Do not to let the helium go below 20% He in the shroud during the 15 minute SGPI Test, so apply helium during test as necessary.
12. Record the shroud and inline helium detector readings every 5 minutes for 15 minutes. A 5% ambient air leak is acceptable, therefore when the shroud helium detector reads 20% He, a 1% He reading from the inline detector is acceptable. If all measurements pass, then the SGPI Test is passed. If one of the measurements does not pass, then corrective action is necessary prior to

[1] 200 mL/min was selected for 10-foot soil gas probes based on guidance (DTSC, 2012) suggesting 100 to 200 mL/min purge rates and because these probes are closest to the surface where ambient air is more likely to dilute soil gas.

[2] 400 mL/min was selected for deeper soil gas probes based on guidance (DTSC, 2012) suggesting flow rates greater than 200 mL/min may be used when purging times are excessive for deeper wells or larger diameter tubing. A vacuum of 100” water or 7.4” Hg should not be exceeded.

sampling similar to the Shut-In Test corrective action. Sometimes laboratory provided shroud assemblies have a leak that may not be remedied in the field, in this case a new shroud assembly should be attempted.

13. If the SGPI test cannot be completed, the sample may be analyzed for He by the laboratory to determine if there were leaks during sampling. If analyzing for He in the lab, the shroud must be filled with He to approximately 20% He during the time the sample is being collected.
14. After the allotted soil gas purge time is completed, sampling may begin by turning the sample manifold valve to the sample position, record the sample collection start time and vacuum. Make sure sampling flow rates are between 100 and 200 mL/min and vacuum rate is not above 100 inches water ("H_20) or 7.4 "Hg. The laboratory provided flow regulators are usually already set for this, check with lab for compliance.
15. During soil gas sampling, periodically monitor the sample for vacuum remaining to make sure to turn it off at approximately between -4 and -8"Hg or as recommended by the laboratory. Depending on the formation of the subsurface conditions, sampling may take longer at different probes. Calculated sample time for a 200 mL/min flow rate and a 1.0L canister is 5 minutes.
16. Once sampling is completed, shut off shroud valve, record sample collection end time and vacuum.
17. Disassemble sample manifold and shroud and cap SUMMA canister (if necessary) and replace well cover.
18. Follow documentation and sample handling procedures below.

Duplicate Samples

Duplicate samples will be collected at a frequency of 10% for each quarterly event. Duplicate samples must be collected at the same soil gas probe as the original sample and at the same time using a duplicate "T" splitter sample manifold provided by the lab.

Documentation

Documentation includes the sampler's logbook, COCs, sample labels, and sampling forms. Each type of documentation will include at a minimum for each soil gas sample taken:

- Sampler's name (first initial and last name);
- Sample date;
- Sample time (in military time format, start time of collection);
- Sample identification (as described below);
- Canister identification (number should be labeled or stamped on canister by lab)
- Analytes (PCE and TCE); and
- Analysis method (EPA TO-15).

The sampler's logbook will also have additional information including:

- Project name (Site 12 Soil Gas Monitoring);
- Sampling event (e.g., 2015-3Q);

- Weather conditions (e.g., Sunny low 70's, wind approx. 15 mph from the NW, overcast and upper 60s after 1400);
- Sample location description;
- Probe ID
- Canister ID (number should be labeled or stamped on canister by lab);
- Canister equipment test (shut-in test) results (pass or fail);
- Flow meter ID (number should be labeled or stamped on canister by lab);
- Canister volume (typically 6L);
- Sample volume (start and end vacuum in inches mercury ["Hg]);
- Sample duration (start and end sampling times); and
- Identify any conditions that may affect the sample representativeness (e.g., proximity of vehicles to the sample).

Sample form Soil Gas Sample Collection Log should be filled out accordingly, one per soil gas sample. One line on a COC for each soil gas sample should also be filled out accordingly. The SUMMA Sample Train Shut-In Test Log should also have a record for the passed soil gas sample train equipment test. The Soil Gas Probe Integrity Testing Log should also have a record for the passed soil gas probe helium test.

Sample numbering shall follow the same convention as the Groundwater QAPP numbering system which is described below:

Example: 1535M212204F

- 15: This is a two digit reference to the year the sample is collected in
- 35: This is a two digit reference to the week of the year the sample is collected in
- M: This is a one letter reference to the sampler's identity
- 212: This is a three digit reference to the sample site (Sites 2/12)
- 204: This is a three digit reference to sample number collected by that sampler for the year (e.g., this is sampler M's 204th sample in 2015)
- F: This is a one letter reference to the type of sample as described below:
    - F: Field Sample: a regular soil gas sample
    - D: Duplicate Sample: a duplicate soil gas sample

Sampling Handling

Once the sample has been collected and it is secured with all documentation in place, notify the lab of expected sample transfer method. EPA Method TO-15 has a hold time of 30 calendar days from the time of sample collection (stop time), however laboratories recommend returning SUMMA canisters within 15 days of receipt for quality assurance. Samples are typically collected by a laboratory courier. No preservation or ice is required, so a cooler is not necessary. Make sure the canister compression cap is securely tightened and the finish vacuum is recorded on all documentation. Include the COC with the samples. The laboratory will send a sample receipt confirmation with the identity and conditions of the sample received along with an estimated date the results will be available.

eurofins | Air Toxics

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Standard Operating Procedure (SOP) 3

Eurofins Air Toxics Helium Shroud Spec Sheet

Items included:

- Two hand, zipper lock closure inflatable glove box bag. Dimensions: 32 in. × 42 in. average inflated height 12 in. Zippered opening diameter is 19.5 in.
- Port to cover soil vapor well 12 cm diameter at ground level.
- 2 additional ports allow for ¼"tubing to be inserted for charging the shroud with helium and purging with an external canister or pump.
- Zip ties to hold tubing in place

Instructions for use:

1. Open the zippered end of the shroud bag and place port 1 over the soil vapor point. Seal to the ground as needed.
2. Reach into bag and Push port 2 outwards, and snip a hole in the end. Place the tubing from your Helium tank or canister into this port, and zip tie securely.
3. Push port 3 outwards, and snip a hole in the end. Place the purge line through port 2, and zip tie securely.
4. Place your sample canister and manifold into the shroud through the zippered opening. Attach the purge tubing to the purge valve on the manifold. Attach the sample tubing to the manifold inlet.
5. Proceed with purging the lines according to your workplan.
6. Seal the shroud zipper. Charge the shroud with Helium.*
7. If necessary, Helium concentration can be confirmed by portable meter or additional summa canister sample collected inside the shroud.
8. Place your hands into the shroud gloves, and open the sample canister valve to begin sampling.
9. Close the canister valve when sampling is complete.
10. Open the shroud to remove the canister. Shroud can be moved to the next sampling point.
11. Return all shroud components to the laboratory with the samples. Full replacement cost will be charged for any unreturned items.

* The shroud can be charged using a 6L summa filled with helium to 15 psi (resulting shroud atmosphere is 10-15% Helium). Alternately the shroud can be charged with a pressurized cylinder fitted with a regulator set to 20 psi (resulting shroud atmosphere is 70-75% Helium).

Special features:

1. Inflatable shroud can be reused at multiple points, the sample does not come into contact with shroud components
2. Minimizes Helium use, easily remains inflated for 10 minutes without recharging.

3. Canister and flow controller are inside the shroud; consistent with the California DTSC Advisory.
4. "Glove Box" design allows for sampling to be carried out without disturbing the shroud environment, consistent with California DTSC Advisory.

Standard Operating Procedure (SOP) #4

SVE Treatment System Sampling

Since Site 12 is located in a public retail location, the likelihood of sampling site visitors is high. Visitors to the sampling site may include shareholders such as project personnel, clients, regulators, property owners or managers, property employees, property customers, other temporary site workers (e.g., construction workers, delivery drivers, painters, landscapers, etc.), or members of the public. If there are visitors to the site during sampling who ask questions, direct them to the BRAC Office Community Relations department or fortordcleanup.com. Unauthorized visitors may not enter a safety exclusion zone. Notify project manager of any visitor encounters.

I. Equipment List

- Personal protective equipment including safety vest, sun/wind protection (if necessary), steel-toe boots and nitrile gloves
- 1-Liter SUMMA® canisters, vacuum gauges, and fittings. Order extra equipment and materials in the event of failure during checkout and use.
- 1/4" Nylaflow® tubing and PTFE tape
- Clamps and tools
- Field logbook, indelible ink pen, field forms and camera.

II. Procedure

1) Wear new disposable gloves to prevent contamination during leak testing, and dispose of gloves after each test, in a trash bag for proper disposal. Wear new gloves for each VOC sampling event and location.
2) Confirm the valve on the SUMMA® canister is closed (knob should be tightened clockwise).
3) Remove the brass cap and attach the closed-loop vacuum gauge with the appropriate size wrenches.
4) Open the SUMMA valve to verify there is sufficient vacuum greater than -25 inches mercury (inHg) and that the vacuum does not decrease within 15 minutes, which would indicate a leak in the sampling train of the SUMMA® canister. If a leak is detected at any time, resample using all new sampling equipment; re-used canisters may have been contaminated (use professional judgement). Record the results of this shut-in test on the field logbook and sampling forms.
5) Record the SUMMA® canister vacuum after a passed shut-in test is completed as "Initial Vacuum" on the Chain of Custody form, field forms, and in the field logbook.
6) Close the SUMMA® valve and remove the brass cap on the manifold.
7) Attach an approximately 1-foot long piece of 1/4" Nylaflow® tubing with the compression fitting and Swagelok®. Use wrenches to assure a tight seal, but do not over-tighten.

8) Wrap the Swagelok®- Nylaflow® tubing union with PTFE tape.
9) Insert the tubing into the sample port at the SVE wellhead with the sample valve off.
10) Open the SUMMA® canister valve to make sure there are no leaks in the system. A leak will be identified by any vacuum drop on the canister gauge, whereas a leak free system will exhibit a stable vacuum reading for a period of 2 minutes.
11) If a leak is detected, close the SUMMA® canister valve. Re-tighten all fittings then repeat the above step with a new SUMMA® canister.
12) If no leak is noted, open the sample port valve and allow at least 3 minutes for the SUMMA® canister to fill.
13) Verify the final vacuum of the SUMMA® canister (repeat steps 2 through 4 above). For grab samples, the ending vacuum may be close to ambient pressure (0 inHg).
14) Record the SUMMA® canister final vacuum after sampling is completed as “Final Vacuum” on the Chain of Custody form, field forms, and in the field logbook.
15) Only perform VOC monitoring on the SVE wells and SVE system influent and effluent monitoring points while the SVE System is in operation to ensure proper purging.
16) Tubing associated with VOC sampling may be designated to one location or disposed of and new tubing used at the next VOC sampling event based upon event conditions.

Chapter 3. Common Sampling Procedures

3.1. Purpose

This chapter presents specific sampling procedures and items common to the sampling events covered in Chapters 4 – 12. Section 1.5 and Figure 1-1 of this handbook illustrate the relationships among these chapters. Additional references include facility standard operating procedures (SOPs) and special requirements contained in regulatory programs and site permits.

3.2. Preparations for Field Sampling

The success of a field sampling program depends on the level of preparation prior to entering the field. Implementation of the SAP begins with preparing for the field sampling operation. The following preliminary steps are vital to the success of the project:

- **Preliminary Off-Site Evaluation.** Prior to implementing the SAP, the Program Manager and Health and Safety Supervisor should review any Historical Overview and Site Description sections of the SAP. This review may result in the decision for an on-site evaluation to assess the sampling procedures, relevant safety equipment, and PPE.
- **Equipment Verification.** The SAP should specify an equipment list, including sampling equipment, sample containers, and PPE. This list should be reviewed in detail by the entire sampling team and the Health and Safety Supervisor to verify that necessary items are included and appropriate for the site being sampled.
- **Inventory.** The Equipment Technician (however named) shall gather all the specified equipment and containers into one place and verify that it is on hand. Reagents, supplies, and quality control materials shall be checked and verified as appropriate. The designated technician shall notify the Program Manager that equipment preparations are complete.
- **Sign-Over of Materials.** The designated individual shall check the equipment inventory, and sign for custody if required.
- **Staffing and Scheduling.** The Program Manager shall consider the impact of specified sampling requirements on staff and schedule.
- **Screening or Field Measurements**. Sample screening or field testing for pH, dissolved oxygen (DO), sulfite, conductivity, disinfection chemicals, and temperature require additional field time. The need for additional personnel is based on time demands, training requirements and degree of difficulty. Significant field testing requirements may justify the procurement of a field laboratory and a trained field chemist to relieve other team members of this responsibility.
- **Preservation.** Preservation, either chemical or thermal, is required for most water samples. Thermal preservation usually requires icing the samples after collection and storing samples at $\leq 6°$ Celsius (C). For chemical preservation, two practices exist for adding preservative: 1) addition of the chemicals to the samples in the field, and 2) addition of the chemicals to the sampling containers prior to sending the containers to the field. Adding the reagents to the sample containers at the time the samples are collected requires the sampler to maintain records of addition and quality of the reagents and to follow proper chemical handling techniques. In some cases it may be advisable to have the laboratory add the reagents to specially labeled sample containers before they are sent to the field. This may reduce the fieldwork required and the possibility of field error resulting from contaminating the preservatives. Addition of the correct amount of preservative can be estimated for samples collected on a routine basis having little to no outside environmental or process effects.

WARNING: When using containers filled with preservative, use caution when filling the bottles to ensure the preservative is not released to the environment and the correct amount of preservative has been added to adequately fix the sample.

- **Time.** Many samples have short holding times prior to analysis. Review the holding time requirements and coordinate the schedule with the laboratory so the samples are analyzed within the required holding times. Holding times are dictated by the regulatory program and data may be invalidated if holding times are not met.

Note: Refer to Appendix B of this handbook for specific information on hold times, preservation, and containers.

3.2.1. Preparing for a Sampling Event

Preparing for a sampling event requires planning and a thorough knowledge of the regulatory program. The key elements for such preparation include:

- **Objectives.** The objectives should be thoroughly understood by all sampling personnel prior to sample collection. Knowledge of the compliance scope, boundaries, geography, and area roads and bridges will facilitate sampling.
- **Map of Study Area.** A map of the study area is essential for sampling. The map should be detailed enough so that sample locations and landmarks are clearly identifiable.
- **Permits and Regulations.** The person collecting samples should have a working knowledge of applicable permits, required monitoring, and other specified conditions. Regulations that potentially impact the sampling area, such as right of entry, should be reviewed by the sample collector.
- **Waste Sources.** When the objective of a project is to determine the nature, extent, or impact of a waste source upon an environmental medium, knowledge of waste source(s) within the area, as well as those sources upstream or upgradient that may impact the area, is essential. This knowledge entails knowing waste source discharge points or areas, type of waste, volume of discharge, and constituent concentration. When this information is not readily available, it may be necessary to collect background information.
- **Environmental Medium Characteristics.** If the study is of a waterway, the physical characteristics of the waterway should be known prior to sample collection. These important physical characteristics include whether the receiving waterway resembles a lake, reservoir, pond, small stream, or a river. Average and maximum recorded flow, width and depth, type of benthic substrate, and type of predominant aquatic vegetation also should be noted.
- If the study area is limited to land, it is important to have knowledge of the terrain, soils classification, geology, terrestrial vegetation, industrial and residential development, predominant land use, and wildlife.
- **Sampling Information.** A sampler must know the types of samples to be collected, (e.g., water, wastewater, soil, or solid waste). The sampler also must know whether the samples are to be collected nocturnally or during the daytime, and where within the environmental medium the samples are to be collected (including both horizontal and vertical collections) as well as the preferred method of collection.
- **Laboratory Arrangements.** Arrangements must be made with the analytical laboratory to ensure that the laboratory is expecting the samples when they arrive and has a description of the types of samples (e.g., liquid, semi-solid, solid, or biological), an approximation of the number of samples for each sample type, and the analyses requested on each sample type. Arrangements must be made for the appropriate number of sample containers and preservatives where required. Regulations on transportation of samples from the point of collection to the laboratory must be considered, and the COC record must be traceable, as detailed in the SAP.

- **Equipment.** Prior to going to the sampling location, the sampling gear should be examined to ensure that it is appropriate for the task and in good working order. Verify that any preventative maintenance has been completed according to the SOPs. Label, mark, and otherwise identify all equipment, instruments, reference materials, and associated supplies for measurement processes to indicate calibration or standardization status. Expiration dates of reagents and solutions should be checked and verified as to usability. If a boat is required, an appropriate boat, motor, and life jackets must be available, and preliminary boat launch locations should be known before going to the sampling site. All equipment should be examined prior to starting the sampling event.

Note: When in use, sampling equipment should be anchored to prevent loss in the event the rope or equipment slips through the hands of the sample collector.

- **Safety.** The safety of sampling personnel is paramount. During wading operations, a rope should be attached to the sampler and extended to an anchored person on shore. In boating operations, at least two people should be present, one to collect the samples and another to operate the boat motor. Boat personnel are required to wear life preservers and take care to avoid overloading the craft. When collecting samples, beware of snakes, stinging insects, ticks, or other animals that may cause injury to the sample collectors.
- **Personnel Transportation and Lodging.** The Program Manager must consider arrangements for transporting sampling personnel and equipment to the sampling site, and for lodging when the sampling extends beyond a working day.

3.2.2. Preliminary On-Site Evaluation

When sampling for the first time at a new location, a preliminary on-site evaluation should be conducted prior to the sampling event to ensure that all aspects of the sampling process are addressed.

Upon arrival at the site, the Program Manager (or designee) and the Health and Safety Supervisor shall check with facility personnel to determine whether there have been any recent changes at the sampling locations that would influence the SAP or modify the expected hazards.

3.2.3. Preliminary Site Safety Evaluation

After a preliminary hazard analysis, sampling locations should be inspected to develop the Safety Plan or HASP as appropriate to the scope of the project. PPE information specified may not be completely reliable, and additional air monitoring may be required. When air monitoring activities are needed, focus first on identifying conditions that present an acute health hazard, and then evaluate exposure to chemicals such as carcinogens that could create long-term health problems.

If samples are to be collected in a confined spot, testing the air within the space for oxygen content should be a priority. Tests for explosive levels of flammable vapors should be conducted next, followed by testing for the presence of hazardous concentrations of specific toxic agents (depending upon the nature of the space and its contents or previous contents).

Note: Real-time instrumentation is available for making these measurements. Air samples should be collected to evaluate the levels of other chemicals in the air that may require respiratory protection. Some organic chemicals such as gasoline vapors can be monitored with standard field instruments. However, monitoring for carcinogens will normally require the use of a field gas chromatograph or the collection of test samples for laboratory analysis.

In general, the air monitoring program to evaluate worker exposures to toxic chemicals should be designed by an industrial hygienist familiar with the facility and potential hazards to which the field sampling team will be exposed.

Review physical hazards that may be present at the site, such as unstable footing near river embankments, water safety practices, first aid supplies, equipment safety practices, and other physical hazards.

3.2.4. Explosive Safety Evaluation

The possibility of encountering explosive hazards must be considered in all sampling plans. When the presence of energetic materials is suspected from the history of a site, appropriate precautions can be incorporated during the planning stages.

Consideration should also be given to situations that can lead to the formation of unstable materials from constituents that are not originally energetic compounds. Formation of peroxides in ethers and metal picrates are two examples that have been known to create safety hazards.

3.2.5. Preliminary Sampling Evaluation

Sampling locations should be inspected to ensure the information in the SAP is correct. All equipment should be checked prior to mobilization and the day before the sampling event to ensure proper equipment operation, parts, and records are available for the sampling operation. If needed, preventative maintenance should be performed.

Reagents, supplies, reference materials, and consumable materials should be verified as to expiration dates, quality, and applicability to the assigned equipment.

Locate all the sample locations during the on-site evaluation to determine site accessibility with the designated equipment, sample location, and possible background contamination for the contaminants of interest. Electromagnetic interferences, volatile air pollutants from locations off site, weather, and climate may affect the sampling event and should be planned for, as much as practical, to avoid delays in sampling.

3.3. The Sampling Event

A typical sampling event should include the following sequential activities:

- Complete all preparation and preliminary evaluation activities as needed
- Arrive at the sampling site with appropriate equipment, supplies, materials, and sample containers
- Set up equipment, work areas, and safety areas, as described in the SAP
- Collect samples at the locations specified in the SAP or reference procedure
- Immediately following sample collection, ensure that each sample container is labeled as described in the SAP. The sample label must be traceable to the sample number, date/time sampled, sampler's name, preservative, and site name, location or unique project identifier.
- Document the exact location of the collected sample(s) in the field logbook or field notebook (FLB/FN). Also, record in the FLB/FN other observations of environmental conditions that could affect or contribute to knowledge of the sampling area and the environment where the sample is collected. Prevailing weather conditions at the time of sampling should also be recorded.
- Preserve or ice samples as appropriate and record preservation method
- Perform field tests or field screening measurements and record all observations in the FLB/FN
- Complete the COC record and other field records
- Pack and seal the shipping container with collected samples, and transport the shipping container with the COC record and any laboratory required forms to the laboratory. Retain copies of all transmitted forms.
- Return all forms and copies of relevant FLB/FN pages to the Program Manager or designee
- Clean sampling equipment for the next sampling event or storage
- Breakdown all work area and safety areas as required and return the site to the condition found at the start of the sampling event
- Dispose of all waste materials using appropriate procedures.

3.4. Sampling Procedures

The SAP refers to detailed sampling procedures or includes the details of the sampling operation. A standard SOP format should be used to incor-

porate the following items for each type of sampling operation:

- Sampling locations, sample numbers or identifiers
- Type, volume, and number of sample containers to be filled at each sampling location and the records to be maintained
- Contaminants to be measured and special handling procedures to ensure proper collection
- Safety, health, and hazard cautions
- Sampling equipment (construction material, type, etc.) and records to be maintained for status, maintenance, and corrective action
- Step-by-step sample collection procedures (grab, composite, continuous for specified period, etc.)
- Sampling frequency for repeated sampling at the same sample location
- Special sampling requirements (e.g., the collection of initial runoff samples after a rain for contamination)
- Sample handling procedures for each sample container (e.g., screened, filtered, sequence for filling groundwater sample containers, etc.)
- Preservatives required for each sample container and contaminant
- Reagents, supplies and support services quality, verification and validation criteria to ensure materials are used properly
- Equipment decontamination procedures to be used between sample locations and between sampling events
- Recordkeeping requirements, documentation handling, and retention requirements
- Sample, equipment, and materials storage requirements
- Provisions for storage or disposal of wastes generated during field sampling.

3.4.1. Sampling Strategies

See Appendix A for sampler and sampling recommendations and strategies for waste materials. Sampling strategies for drinking water, wastewater, groundwater and TSCA materials are permit or compliance dependent. The Scope or Purpose section of the sampling procedures should describe the rationale for the sampling strategy to ensure that all personnel involved with the project have an understanding of the sampling event.

3.4.2. Sampling Procedure Checklist

Following is a checklist of the minimum steps to address in SOP format.

- **Sampling Approach**
  - Objective
  - Design of sampling plan
  - Statistics
- **Material to be Sampled**
  - Physical state
  - Volume
  - Hazardous properties
  - Composition
- **Site**
  - Accessibility
  - Waste generation and handling
  - Transitory events, startup, shutdown
  - Maintenance
  - Climate
  - Hazards
- **Equipment**
  - Maintenance
  - Preparation and cleaning
  - Operation
  - Calibration and standardization
- **Sample Handling, Transportation, Storage and Preservation**
  - COC
  - Seals
  - Forms
  - Containers
  - Preservatives, reagents, and supplies
- **QA/QC**
  - Controls on process
  - Audits
  - Training
  - Samples, blanks, duplicates, and spikes
- **Health and Safety**
  - Personnel protection

  - Safety procedures
  - Emergency procedures
- **Laboratory**
  - Document transfer
  - Sample arrival schedule, transfer
  - Sample preservation, handling and storage
  - Analytical methods and QC
  - Reporting format and schedule.

3.5. Sample Documentation and COC Procedures

Thorough documentation of a sample's custody is required to support sample validity. The documentation must verify that the samples are representative, were collected in accordance with the requirements of the SAP, and are not vulnerable to tampering before being received by the laboratory. The COC begins when the sample is taken and ends when the sample is disposed of. Sample documentation and COC procedures include the following.

- A completed sample collection label attached to all sample containers
- Records of sampling operations written in FLB/FN or related forms as designated for the operation in the SAP. Records include sample type, sample matrix, sampling method, field test methods, and QC procedures. A table may be used to present this information.
- Identification of every sample container on a COC record and all custody transfers documented
- Custody of the samples with all discrepancies in the field operations resolved or duly recorded.

The following should be used to generate the required sample documentation.

Note: EPA's "Field Operations and Records Management System II Lite (FORMS II Lite™)" software is an electronic COC and may also be used to simplify and accelerate the sample documentation process.

3.5.1. Pre-Assigned Sample Numbers

Each sample consists of all of the material collected for analysis at one place, at one time, and of one matrix, except for composite samples, which may contain components collected at different locations or time.

The Program Manager shall establish a system for assigning a unique sample number to each sample collected in the field. The numbering system will be defined in the SAP, in case additional samples are generated in the field. The number for each sample will be used to identify the sample in the FLB/FN, on the sample container, and on the COC record. The number may be used on other forms and reports presenting measurements, test data, or evaluations.

The sample numbers of field QC samples like a field duplicate should be transparent to the laboratory. The sample numbers should not reveal whether a sample is a blank sample or two field samples are duplicate/split pairs to avoid potential biasing of analytical results.

The sample number provides a common identifying code for all of the analytical results for a single sample. This is particularly useful when the results are entered into a computer database, which should include:

- Sample number
- Sample container number
- COC record number
- Matrix
- Location
- Sample type
- Sample date and time
- Sampler's name
- Parameter
- Analytical result
- QC data
- Compliance limit and
- Data qualifier code (optional).

Results from analysis of trip blanks, field blanks, equipment decontamination blanks, split samples and MS/matrix spike duplicate (MSD) samples may be entered into a computer database. In some testing programs, these results are used to

generate the data qualifier code for the analytical results from test and duplicate samples.

It is recommended that the information associated with each sample number consists of elements describing the sample type, matrix, location, and the time and date of sample collection as required.

Note: If the sampling and analytical data are to be added to an existing database, sample numbers should be consistent with database requirements.

3.5.2. Sample Container Labeling

Sample labels are an important part of proper documentation to reduce the possibility of confusing sample containers, and to provide the necessary handling information. Sample containers should be pre-labeled as much as practical before sample collection. The labels may be protected from the sample matrix with a clear tape covering. For volatile samples, check with the laboratory to ensure that any labels being used do not interfere with their auto-samplers. Sample labels should include sample number, date and time sampled, location, sample type, preservative and the sampler's initials or signature.

Sample numbers may be unique to the sample location, to the sample type or to the container. In some labeling processes, a unique sample number is written on the container label, and all information recorded on the accompanying form(s) is traceable to the unique sample number.

Some number schemes uniquely number each sample container. All data reported for the sample includes the sample container number for traceability to the container measured. This is useful when sample containers are cleaned and lot controlled, and traceability from container preparation, preservation, sampling, and testing is required.

A designated Field Sample Custodian or sampler should label the sample containers when they are filled. Preprinted, adhesive, multiple part labels formatted as shown in Figure 3-1 may be used. Each part includes the unique sample container number that may be pre-numbered to avoid duplication.

Note: Because 40-mL volatile organic analysis (VOA) vials may be stuck in an autosampler, the field sampling team leader needs to contact the laboratory to make sure if applying a clear tape over a sample label of 40-mL VOA vials is acceptable. Use waterproof ink to make label entries. FLB/FN notations should provide an explanation if a pencil was used to fill out the sample container label due to field weather conditions. Because waterproof ink may contain target VOAs such as xylene, toluene, or alcohols as a solvent, great care is needed to prevent VOA samples from contamination by the solvent of waterproof ink or permanent marker.

Figure 3-1. Multiple Part Container Label

PROJECT NAME
Sample #: XXXXX
Container #: XXXXX Sample #: _____ Date: _____ Time: _____ Location: _____ Cont. Size: _____ Cont. Type: _____ Matrix: _____ Type of Sample: _____ Preservative: _____ Signature: _____

3.5.3. FLB/FN

The FLB/FN is the written record of all field data, observations, field equipment calibrations, and sample collection activities. Potential for future legal actions dictates that the FLB/FN be site-specific and that they be hardbound (e.g., ledger, composition book, diary, etc.). All pages (front and back) shall be serially numbered so removal will be apparent. Samplers shall adhere to the following guidelines when using FLB/FN.

- The FLB/FN shall be assigned to the QA/QC Coordinator or designee. Additional log books may be assigned by the Program Manager or designee to the Field Chemist and the Health and Safety Supervisor. The QA/QC Coordinator or designee shall note in each FLB the individual to whom it was assigned. The FLBs may be controlled by the QA/QC Coordinator or the Program Manager.

- Each FLB shall be annotated with the sampling program name or number.
- Key personnel and telephone numbers shall be listed on the first page.
- Entries shall be written in waterproof blue or black ballpoint pen. Avoid felt tip pens. *Do not use pencil.*
- Start a new page at the beginning of each day.
- Entries should be chronological – a time notation should introduce each entry.
- Sketch or obtain a map of the area or facility. Include sketches of layout, structural features, and points of interest or contamination. Include a north arrow and a rough scale. If possible, obtain a site map (reduced if necessary) and permanently place it in the FLB/FN.
- Language should be objective, factual, and free of personal feelings or other inappropriate terminology. Speculation or personal observations may be included if they are clearly identified as such.
- Do not erase or scratch out errors. Draw a single line through the error, then insert corrected material. The person who made the error shall initial and date the correction as well as clearly state the reason for the error.
- Entries or corrections made by individuals other than the person to whom the FLB/FN was assigned shall be signed and dated by the individual making the entry or correction. An explanation for the correction should be noted.
- The last entry for each day should include a short summary of the day's activities, weather conditions and the time the site was left. As appropriate, the last entry for each week should be a summary of the week's activities. Weekly summaries should be thorough and descriptive.
- The FLB/FN shall be signed at the end of each day. Signatures shall be written on a single diagonal line drawn across the blank portion of the page following the day's last entry.
- All FLBs/FNs shall be returned to the individual designated for review and final storage when sampling is completed as described in the SAP.
- FLB/FN entries will contain a variety of information. Information to be entered at the start of each day of sampling includes the following:
    - Date of the sampling event
    - Time sampling started and approximate time for set up of equipment
    - Weather conditions
    - Level of PPE being used
    - Names of field sampling team members and others present during the sampling.
- Fully document all deviations from the SAP or changes in sampling procedures. Problems, delays, or any unusual occurrences such as improper equipment or breakdowns should be included, along with resolutions and recommendations. Summarize the content and conclusions of all relevant meetings, discussions, and telephone conversations in which you are involved. Include the names and affiliations of all personnel involved. Thoroughly document all directives and/or guidance from EPA or other government personnel. Directives that give personnel specific authority to make critical decisions must be documented in the FLB/FN.
- Whenever a sample is collected or a measurement is made, a detailed description of the location must be recorded. The source from which the sample is collected should be clearly identified to maintain traceability and allow another person to locate the exact sampling location. The ability to relocate the sample site ensures duplication of future sampling events. Measurements from permanent features (e.g., center line of road, numbered utility pole, etc.) to the sample point must be made and entered into the FLB/FN. Coordinates on a map, or an accurate site sketch with distance measurements to known locations are other options to ensure the exact location of each sample is recorded.

- Describe the site thoroughly so another person will be able to locate the exact sample location. Note signs of contamination such as oily discharges, discolored surfaces, unusual odors, dead or distressed vegetation including types of plants, if possible. Photographs may be taken to provide evidence of visual observations, record site conditions, and assist with locating the sample site in the future. Photographs taken of sample locations should be noted along with the picture number. Log the record in the FLB/FN to identify which sampling site is depicted in the photograph.

Note: A series of photographs can be identified by taking the first photograph of an informational sign with the sampling program name, number, and the project number on it.

- Each time a sample container is filled and labeled, a copy from the multiple part form of the sample container label or reference number label with all information recorded shall be put into the FLB/FN.
- All equipment used to make measurements must be identified by type, manufacturer, and serial number, along with the date of calibration. Details of field calibration procedures and results shall also be included in the FLB/FN.
- Note decontamination or disposal procedures for all equipment, samples, protective clothing, and personnel decontamination procedures.
- For each delivery or shipment of samples to a laboratory, record the following information in the FLB/FN:
    - Custody procedures and serial numbers
    - Packing and shipping procedures (record air bill numbers)
    - Name, address, telephone number, and contact of the laboratory performing the analysis.

Note: The laboratory address should be the sample receipt address, which may not be the same as the mail receipt address.

3.5.4. Field Notes/Field Sampling Forms

Field notes or field sampling forms are used in addition to or in lieu of field log notes. When field notes are used in lieu of an FLB, the record keeping practices presented in Section 3.5.3 should be followed. The field form provides a place for the sampler to record the information required for the project. Field forms are specially designed for any given project and may be completed one per sample or one per sampling event. The forms include blank lines for recording the information necessary for the project to ensure the proper information is recorded. All blanks must be completed on a field form to ensure proper documentation. The sampler completes the field form for all samples collected including QC samples. An example of a field form for a well sampling activity is presented in Figure 3-2 below.

Note: A review of the regulatory program's specific requirements must be conducted to ensure that all documentation requirements are met. Some programs do not allow the use of loose field forms as the sole documentation vehicle and require hardbound logbooks.

The field form lists the sample number, location, matrix, the type and number of sample containers filled (including QC samples), any chemical preservatives added and checked for each sample container, sampling procedure reference, deviations to the procedures and all field measurements and observations.

The Field Sample Custodian indicates acceptance of the information on the field form by signing and dating the form. In cases where multiple part forms are used for the sample label, for each sample container filled, one part of the multiple part adhesive sample container label is placed on the field form at the appropriate location. The completed field forms are returned to the Program Manager as soon as possible and by the means indicated in the SAP. Deviations or problems encountered during the sampling event must be communicated promptly in writing to the Program Manager or designee. This may be completed by sending the field form by facsimile or other means to communicate the deviations, as

well as allow for continuation of the project and ensure sample holding times are not jeopardized.

Note: The field form becomes part of the permanent project records, but is not usually sent to the laboratory.

3.5.5. Chain of Custody (COC)

An overriding consideration for environmental measurement data is the ability to demonstrate that samples have been obtained from the locations stated and that they have reached the laboratory without alteration. Documentation of security, field handling criteria, shipment, laboratory receipt, and laboratory custody until disposal, provides evidence of proper processing. The degree of custody documentation is dependent on the regulatory program, data use, and needs. Many state programs for sampling wastewater and drinking water do not require "legal custody," but recommend legal custody whenever data is known to be used for evidence. A review of data use and risk of legal proceedings will dictate the type of custody procedure to be employed. Documentation consists of a COC record that is completed by the Sample Custodian.

3.5.5.1. Field Custody Procedures

The Field Sample Custodian or sampler is personally responsible for the care and custody of the samples until they are transferred or properly dispatched. As few people as possible should handle the samples. A sample is considered to be "in custody" for legal proceedings if it is:

- In a person's actual possession
- In view after being in physical possession
- Locked up so that no one can tamper with it after having been in physical custody
- In a secured area, restricted to authorized personnel only.

If any one of these is not in place at all times, the COC is broken.

The Program Manager or designee shall review all field activities to determine whether proper custody procedures were followed during the fieldwork and whether additional samples are required. The sampler or Sample Custodian shall notify the Program Manager of any breach or irregularity of COC procedures described in the SAP.

Figure 3-2. Field Form

Sheet _1__ of __1_

MICROPURGE/LOW-FLOW SAMPLING LOG

PROJECT:		**WELL ID:**	
EPA ID NO:			
Proj./Task No.		Well Condition:	
Date:		Well Riser Dia. (ID):	
Weather:		Screened Interval:	
Samplers:		S.W.L. Measuring Pnt:	
		Well Bottom Depth:	
Purge Method: Micropurge			
Sample Collection Method:			
Sampling Device:		**STATIC WATER LEVEL:**	
Tubing:	**Pump Intake Depth:**	Initial Purge Volume:	
Total Recovered Purge Water This Well:		Approximate Pump Throttle Setting:	

Groundwater Sample Data:

Sample ID	Analysis	Primary	QC	MS/MSD	Blank	Sample ID	Analysis	Primary	QC	MS/MSD

Instrumentation/Equipment Data: **Calibration Date:**

Field Test Results:

Hach Kit Tests:

D.O.		mg/L			
Total Iron:		mg/L			
Ferr. Iron:		mg/L			
CO2:		mg/L			

Comments:

Observations: Clarity: Odor: Floating Product: Sheen:

PURGE WATER DATA TABLES

Stabilization Parameters	Units	Minutes	Minutes	Minutes	Minutes	Minutes	Minutes	Minutes	Minutes
Temperature	C								
Sp. Cond.	ms/cm								
D.O.	ppm								
pH									
ORP (Eh)	mV								
Turbidity	NTU								
Clock Time									
Static W.L.									
Flow Rate	ml/min.								

Stabilization Parameters	Units	____ Minutes	____ Minutes	____ Minutes	____ Minutes	____ Minutes	____ Minutes	____ Minutes	____ Minutes
Temperature	C								
Sp. Cond.	ms/cm								
D.O.	ppm								
pH									
ORP (Eh)	mV								
Turbidity	NTU								
Clock Time									
Static W.L.									
Flow Rate									

3.5.5.2. COC Records

From time of collection through final sample disposal, there are many transfers of custody during the course of a sampling program. All sample containers must be accompanied by a COC record to document these transfers. A separate COC record shall be prepared by the Field Sample Custodian or sampler for each sampling event. In some programs, a COC record accompanies each shipping container and includes a pre-numbered COC record. This record lists the sample containers that are in the shipping container, and serves as the packing list for the container. The serial number on the form becomes the identifying number for the shipping package.

Figures 4-3 provides an examples of a sample COC record. The example has been used for a wide variety of regulatory programs and meets legal COC requirements. It tracks the samples from sample collection to disposal. All sampling, preservative, and test information is included. The SAP will indicate the individual responsible for completing each section. The following information relates to the numbered blocks:

COC Record–Figure 3-3.

(1) The **company/command** name and **code** for the source of the funding.

(2) The **contact name** for the Program Manager or designee indicated in the SAP.

(3) The **job order number** (**J.O. #**) is entered to trace the information to the specific job.

(4) The **signature** of the Program Manager or designee authorizing the funds.

(5) The **permit number** (**No.**), if applicable, for the samples collected. The number is issued by the regulatory agency for specific compliance reporting.

(6) The **sample ID/location** based on permit designations or actual site location name.

(7) The **sample taken date and time** are recorded for grabs on the start line only and for composites on the start date and time and stop date and time.

(8) The code for **sample type** such as grab, composite flowing and composite time (see Section 18).

(9) The initials for the **person sampled by**.

(10) The code for **sample matrix** such as liquid, solid, and gas (see Section 18).

(11) The code for **preservative** (see Section 18).

(12) The **# of samples** and **container** type are entered as "4-P" for four plastic containers (See Section 18).

(13) The **analysis** to be performed - may reference descriptions in the SAP.

(14) The field reading for **pH** for the sample containers indicated.

(15) The field reading for **temperature** with the unit of measure for the sample containers indicated. The SAP may indicate the temperature to be recorded in the outfall temperature and not the sample temperature.

(16) The field reading for **other** required measurements may be entered with the unit of measure. The SOP and name of the test must be indicated on the custody form.

(17) After the samples are preserved, the **preservation is verified**. The verification is noted per the SAP. This verification may be temperature, pH, or if all is correct an indication is made as "OK."

(18) This section of the custody form contains **common codes** to be used by the sampler when completing the custody record. When situations arise that do not match the code designations, alternates may be added for the one time use on the custody form.

(19) The expected **turnaround** for sample request is placed in this area. The reason is presented to determine if the turnaround time is regulatory, project specific, or based on holding time requirements.

(20) **Special instructions** or comments may be entered in this space.

(21) The **regulation applied** to the project is checked.

(22) The **sample collection/charge**, **possible sample hazard** and other **comments** relate to the command in charge of sampling, special sample hazards, or to other sample comments. Reference may be made to code or specific sections of the SAP.

(23) The **delivery order number** is entered.

(24) The **contract lab** and **contract number** (**No.**) are entered for testing work performed by a designated contract laboratory.

(25) The **sample disposal** method and the date completed.

(26) The signature and **company/command** of the person relinquishing custody (**relinquished by**).

(27) The signature of the person custody is **received** (**rec'd**) **by**.

(28) The **date/time** custody is transferred.

Figure 3-3. COC Record

CHAIN-OF-CUSTODY RECORD
& ANALYSIS REQUEST FORM

ENVIRONMENTAL

PWC ENVIRONMENTAL LABORATORY
CODE 930 BLDG Z-140
9142 MARYLAND A VENUE
NORFOLK, VA 23511-3095
PH: (004)4450851 FAX: (004)4450852

CLIENT INFORMATION

COMPANY/COMMAND: 1 CODE:
CONTACT: 2
PHONE: EXT: FAX:
J.O. #: 3
SIGNATURE: 4
PERMIT NO.: 5

LAB USE ONLY LINE ITEM #	SAMPLE NO	SAMPLE ID/LOCATION	SAMPLE TAKEN	ON DATE	AT TIME	TYPE	SAMPLED BY	MATRIX	PRESERVATIVE	# OF SAMPLES /CONTAINERS	ANALYSIS	FIELD READINGS pH	TEMPERATURE	OTHER	PRESERVATION VERIFIED BY
		6	START	7		8	9	10	11	12	13	14	15	16	17
			STOP												
			START												
			STOP												
			START												
			STOP												
			START												
			STOP												
			START												
			STOP												
			START												
			STOP												
			START												
			STOP												
			START												
			STOP												

TYPE (18)
G - GRAB
CF - COMPOSITE, FLOW
CT - COMPOSITE, TIME

MATRIX
L - LIQUID
S - SOLID
GS - GAS
SS - SEMI SOLID
SW - SWIPE

CONTAINER
P - PLASTIC
GL - GLASS
T - TEFLON
V - VOA
B - BAG
C - CARTRIDGE
TL - TEFLON LINED LID
H - HEXANE RINSED
A - AMBER(glass)

PRESERVATIVE
1 - COOL TO 4C
2 - HNO3, pH<2
3 - H2SO4, pH<2
4 - NaOH, pH>12
5 - HCL, pH<2
6 - 0.008% Na2S2O3, 4C
7 - FIELD FILTER
8 - NONE

TURNAROUND: 19 *(FOR RUSH TURNAROUND STATE REASON BELOW)*
SPECIAL INSTRUCTIONS: 20

REGULATION APPLIED: 21
RCRA ( ) HRSD ( )
SDWA ( ) TSCA ( )
CWA ( ) PHOTO ( )
CAA ( ) OTHER ( )

SAMPLING/COLLECTION CHARGE:
POSSIBLE SAMPLE HAZARDS: 22
COMMENTS:

SAMPLE DISPOSAL: ( )RETURN TO CLIENT ( )DISPOSAL BY LAB 25

D.O. NUMBER: 23
CONTRACT LAB: 24
CONTRACT NO.(S)

1. CUSTOMER IS RESPONSIBLE FOR ALL CHARGES NECESSARY FOR THE PROCESSING AND ANALYSIS OF SAMPLE(S).*
*ALL RUSH SAMPLES ARE SUBJECT TO SURCHARGE
2. SAMPLES RECEIVED AFTER 3:00PM MON. -- THURS. AND 2:00PM ON FRIDAY WILL REPROCESSED THE NEXT BUSINESS DAY (7:30 AM-- 4:00 PM).

RELINQUISHED BY:	COMPANY/COMMAND:	REC'D BY:	DATE/TIME:
26		27	28

The COC record identifies which pairs of sample containers were collected for the same analysis, and identifies the sample containers that were filled with sample for use as the MS/MSD QC samples. Based on the needs and data use, the COC record may not list any information as to the exact sample location or whether a sample is a field duplicate, field blank, trip blank or an equipment decontamination blank. This information is kept as blind information from the laboratory to ensure objective reporting. When this process is used, records must be maintained that trace the sample collected in the field with the sample as identified to the laboratory. Compliance data for drinking water or wastewater testing do not require blind submissions. The QC sample information is provided to the laboratory to ensure prompt notification when the QC data does not meet the SAP specifications.

Whenever samples are split with a second laboratory or government agency, a separate COC record may be prepared for the second set of samples. The additional set of COC records must be noted. Copies of the original may be sent with the split samples noted, or a separate form may be prepared by copying the appropriate information for the samples onto the additional form. In all cases, the use and need of the additional form should be noted.

Upon completion of the packing of each shipping container, the Field Sample Custodian shall confirm the completeness of the COC record by signing the COC record. If a multiple-part form is used:

- The original copy is put into the shipping container
- The first copy is sent immediately (preferably by fax) to the Program Manager or designee
- The second copy is kept with the FLB/FN or copy of the field form.

If a single part form is used, photo copies should be made for the Program Manager and the FLB.

After the COC record is completed and all samples are packaged and shipped to the appropriate locations, the person relinquishing the samples to the laboratory or agency shall request the representative's signature acknowledging sample receipt. If the representative is unavailable or refuses to sign, this is noted in the "received by" space.

Field COC terminates upon laboratory receipt of the samples. The laboratory should complete the "received by" sections and if appropriate, the "preservative checks" sections on the COC record and return the original signed record to the Program Manager. If there are any discrepancies between the COC record, the contents of the shipping container, and the SAP or contract requirements provided to the laboratory, the samples in question shall be segregated from normal sample storage, and the laboratory shall immediately notify the Program Manager. In some cases, the laboratory checks the sample submittal and recordkeeping to ensure adherence to the SAP. This added check is often used in drinking water and wastewater testing programs for compliance monitoring. Recordkeeping and information checks should be performed by the laboratory to ensure the samples received meet the requirements of the SAP.

3.5.5.3. Custody Seals (Optional)

Custody seals are narrow strips of adhesive paper used to indicate whether a shipping container has been opened during shipment. The seals are placed along the edges of the most exterior container in which samples are enclosed. It is not always necessary to place seals on individual sample containers in the shipping container.

Paper custody seals should be signed and applied before the shipping container is shipped to the laboratory. The preferred procedure includes use of a custody seal attached to the front-right and back-left of the container. Custody seals are covered with clear plastic tape. Another way to use custody seals, is to put all sample containers with packing and ice in a large garbage bag and seal the garbage bag with a signed custody seal.

3.5.5.4. Custody Transfer

Transfer of custody and shipment procedures are as follows.

- Each sample shipping container shall be accompanied by a properly completed COC record. The original of the record shall be included in the container. The Field Sample Custodian shall keep a copy of the completed form as part of permanent documentation and will send a copy of the COC record to the Program Manager.
- When transferring possession of samples, individuals relinquishing and receiving shall sign, date, and note the time of the transfer. This record documents custody transfer from the Field Sample Custodian to another person, to a mobile laboratory, to the permanent laboratory, or to a secure storage area.
- If the sample container is sent by common carrier, a bill of lading shall be used. Bill of lading receipts shall be sent to the Program Manager for permanent retention. If sent by mail, the package shall be registered with return receipt requested. Commercial carriers and the U.S Postal Service are not required to sign off on the COC record as long as it is sealed inside the package with the sample container and the custody seals remain intact (if used).

3.5.6. Request for Analysis

The Request for Analysis form is often incorporated into the COC record since the chain must accompany the samples. In more complex sampling programs, an additional form may be used to request testing.

When contracting for laboratory services and prior to submitting the samples, the laboratory should be contacted and the following information presented. The Request for Analysis form can be used as a preliminary contact mechanism to ensure that the scope of work is understood. This form:

- Specifies the analyses, procedures, and QC data to be performed on each sample container and the compliance protocols to be followed
- Specifies the laboratory accreditation/ certification required to be maintained during the period of the contract
- Authorizes the payment for the analyses
- Alerts the laboratory to any anticipated hazards associated with the samples and custody procedures to be followed while the samples are in the possession of the laboratory
- Specifies the reporting requirements and content for the final report from the laboratory
- Instructs the laboratory as to the disposition of the samples after the completion of the analyses.

3.6. Sample Packaging, Handling, and Transportation

The Field Sample Custodian is responsible for the proper field storage, security, packing, and shipping of the samples from the field to the laboratory or designated holding location. The packaging, labeling, and shipment of samples by common carrier are regulated by the DOT and the International Civil Aviation Organization (ICAO)/International Air Transport Association (IATA), when appropriate. Instructions for classification, labeling, and packaging of hazardous materials are contained in DOT regulations (49 CFR 172 and 173, and subsequent Parts). Overnight couriers generally accept materials shipped under these regulations. However, some couriers have additional restrictions for hazardous shipments. EPA also regulates the shipment of hazardous waste and hazardous material by requiring labeling on certain packages.

The procedure for determining whether a sample is hazardous under DOT regulations is complex, as is the determination of the proper shipping name, packaging requirements, and labeling requirements for DOT hazardous materials. A summary of specific requirements are addressed below. Should questions arise, assistance is available from the DOT (1-202-366-4000) and Federal Aviation Administration (FAA) (1-866-835-5322) hotlines.

Samples obtained at sites are classified for shipping purposes as either environmental (non-hazardous) samples or hazardous samples. If a material is being shipped for testing to determine its hazards, a tentative hazard class assignment

should be made based on knowledge of the material. Samples requiring special packaging or labeling are those containing chemicals that are listed as hazardous materials in:

- 49 CFR 172.101
- CERCLA RQ Hazardous Substances
- DOT CLASS 9 listed in 49 CFR 172.101 Appendix A, Poison DOT Class 6.1 and Flammable Liquids.

Environmental (non-hazardous) samples are those that are not classified as Hazardous Materials under DOT regulations, are packaged in quantities less than the CERCLA RQ, *and* for which a Hazardous Waste Manifest is not required by EPA. These samples require careful packing, but no special shipping procedures. In general, samples of groundwater, surface water (other than leachate or lagoons), and soil may be shipped as environmental samples (non-hazardous) to an analytical laboratory for testing if each of the sample containers contains less than 1 pound of soil or 1 gallon of water, and the entire shipping package weighs less than 66 pounds. Eventual analysis for a hazardous constituent does not necessarily classify a sample as a DOT hazardous material, nor does the classification of a material as a hazardous waste under EPA regulations. DOT regulations forbid the shipping of non-hazardous materials as hazardous. However, if any doubt exists as to whether the sample might be classified as a hazardous material, the sample should be treated as hazardous.

Note: For details on the shipping of non-hazardous waste, refer to *ASTM D6911-03: Standard Guide for Packaging and Shipping Environmental Samples for Laboratory Analysis*. This standard provides guidance in determining the most appropriate procedures for packaging and shipping environmental samples.

The storage and disposal of hazardous waste is regulated by the EPA. Hazardous waste, as specified in 40 CFR 262, is not exempted from EPA manifesting requirements. However, EPA RCRA regulations exempt samples collected for analysis or treatability testing from the RCRA requirements that otherwise apply to hazardous waste (including the requirement for a Hazardous Waste Manifest). The definitions for these exemptions are:

- **Samples for Analysis**. 40 CFR 261.4(d): Samples of solid waste, water, soil, or air, which are collected for the sole purpose of testing to determine their characteristics or composition, when samples are being sent to the laboratory for testing or are being returned to the collector after testing.
- **Samples for Treatability Testing**. 40 CFR 261.4(e): Samples collected for the purpose of conducting treatability studies when they are being transported to the testing facility provided they meet criteria for the quantity of material, packaging, and permit status of the receiving facility.

3.6.1. Sample Packaging Requirements

The Field Sample Custodian is responsible for the packing and shipping of the samples from the field to the laboratory. Samples shall be properly packaged for shipment and dispatched to the laboratory for analysis with a signed custody record enclosed in the shipping container box or cooler. Shipping containers shall be locked or secured with strapping tape in at least two locations. Shipments that are sent to an on-site laboratory or one in close proximity that does not require the use of a common carrier shall be transferred in accordance with local regulations. Table 3-1 below lists sample packaging procedures that will ensure samples arrive at the laboratory with the COC record intact.

The following major issues must be addressed in preparing environmental samples for shipment to the laboratory by common carrier:

- Compliance with EPA regulations, so the samples are not classified as hazardous waste
- Compliance with transportation regulations, including use of the proper shipping containers, use of warning labels, and completion of the required paper work
- Packing, to assure that the samples do not break or leak during shipping. This includes:

- Using approved containers meeting DOT drop test specification
- Lining coolers or containers with plastic bags
- For glass containers, wrapping each in bubble wrap and placing in a clear plastic resealable food bag
- For plastic containers, placing each in a clear plastic resealable food bag
- Never stacking glass containers or laying glass on its side.

3.6.1.1. Samples Classified as Flammable Liquid

Table 3-2 Column 1 lists packaging procedures that apply to those flammable and combustible liquids that do not meet the definitions of another hazard class except DOT Class 9, and for which exceptions under 49 CFR 173.150 are allowed. This includes Flammable Liquids Not Otherwise Specified (NOS), toluene, gasoline, and many of the other flammable liquids that are commonly encountered on hazardous waste sites.

Note: The DOT definition of "liquid" is different from that used by EPA. For purposes of transportation, liquid means a material that has a vertical flow of over 2 inches (50 mm) within a 3-minute period, or a material having 1 gram or more liquid separation, when determined in accordance with the procedures specified in *ASTM D4359-90, Standard Test Procedure for Determining whether a Material is a Liquid or Solid*, (49 CFR 171.8).

3.6.1.2. Samples Classified as Poison — DOT Class 6

Table 3-2 Column 2 lists packaging procedures that apply to those poisonous liquids and solids for which exceptions under 49 CFR 173.153 are allowed. This includes 1,1,1-trichloroethane, trichloroethylene, trichlorobenzene, PCB transformer oil, and many of the other poisonous materials commonly encountered.

3.6.1.3. CERCLA Reportable Quantities — DOT Class 9

Table 3-2 Column 3 lists packaging procedures for substances (liquids and solids) where the waste material is not otherwise classified as a DOT Hazardous Material because of hazardous properties *and* for which the entry in Column 8a of 49 CFR 172.101 Table is 155. For the shipment of larger quantities of EPA hazardous waste and DOT Class 9 hazardous substances where the quantity of material in each container *exceeds* the CERCLA RQ and no other DOT Hazardous Material classification applies, the following packaging requirements apply:

- Label each container with a separate container number
- Seal each drum or pail with a Security Seal
- Prepare one COC record for each group of containers that is being shipped at the same time to the same destination. List the container numbers on the COC record.

These shipments may include EPA Hazardous Waste in 5-gallon cans and 55-gallon drums. Most DOT containers are approved. The list of approved containers for packing Groups II and III Class 9 Hazardous Substances are listed in §173.203 for liquids and §173.213 for solids. These lists include steel, aluminum, plastic and fiber drums (solids only). Quantity limitations are shown in 49 CFR 172.101, Column 9.

Table 3-1. Packaging by Common Carrier

Instructions	By Common Carrier	
	Non-hazardous Samples	Hazardous Samples
Secure sample container lids with strapping tape.	1*	1*
Mark the level of material in each sample container with a grease pencil.	2	2
Place each container in a clear plastic resealable food bag so that the sample container label can be read.		3
Place about ½ inch of inorganic cushioning material such as vermiculite in the bottom of a metal can.		4
Place each container in a separate can and fill the remaining volume of the can with an inorganic cushioning material such as vermiculite (do not use plastic foam cushioning material as it could dissolve if the sample container were to leak).		5
Close the can using three clips to secure the lid.		6
Write the sample number on the can lid. Indicate "This Side Up" by drawing an arrow on the can.		7
Put about 1 inch of cushioning material (e.g., vermiculite or plastic foam) in the bottom of a watertight metal or equivalent strength plastic shipping container. If the container is a cooler, seal the drain plug on the inside of the cooler with tape. Also line the inside of the container with a plastic bag.	3	8
Wrap glass bottles and jars in plastic bubble wrap.	4	
Place cans in the container and fill the remaining volume of the shipping container with packing material. Add ice bags if required.		9
Place the sample containers top-up in the shipping container. Arrange the sample containers so that glass containers are surrounded by plastic containers.	5	
Fill the void space around and on top of the sample containers with plastic bags filled with ice cubes or ice chips.	6	
Seal the COC record in a clear plastic resealable food bag and tape it securely to the inside of the shipping container lid.	7	10
Close and lock or latch the shipping container.	8	11

	By Common Carrier	
Instructions	**Non-hazardous Samples**	**Hazardous Samples**
If the shipping container used is a picnic cooler, use tape to seal the drain plug.	9	12
After acceptance by the shipper, tape the shipping container completely around with strapping tape at two locations. Secure the lid with tape. Do not cover any labels.		13
Place the laboratory address on the top of the shipping container.		14
For all hazardous shipments, complete shipper's hazardous material certification form.		15
Place a "This End Up" label on the lid and on all four sides of the shipping container.	10	16
Affix the signed and dated custody seals on the front right and back left of the shipping container. Cover the seals with wide, clear tape.	11	17

*Numbers indicate the instructions that must be followed.

Table 3-2. Packaging Not by Common Carrier

Instructions	Flammable Liquid	Poison DOT Class 6.1	DOT Class 9
Quantity limitations shipped by cargo aircraft Gross weight of package: Total quantity of flammable liquid: Maximum sample container size:	66 pounds 49 CFR 172.101 Table, Column 6b 49 CFR 172.101 Table, Column 5 *or* The flash point of the liquid	66 pounds *Liquids* – 4 liters (1 gallon) *Solids* – 5 kilograms (11 pounds)	66 pounds *Liquids* – 4 liters (1 gallon) *Solids* – 5 kilograms (11 pounds)
Check the caps of all sample containers to assure that they are secure. Tape caps.	1*	1*	1*
Place each sample container in an individual 6-mL plastic bag and secure with a twist tie. The sample identification tag should be positioned to enable it to be read through the bag.	2	2	2
Place sample containers in paint cans in a manner that will prevent bottle breakage.	3	*Liquids:* 3	
Place vermiculite in the paint can around the samples. The amount of vermiculite used should be sufficient to absorb the sample if a sample container should break.	4		
Secure the lid to the paint can with can clips and label the outside of the can with the sample ID numbers and quantity.	5		
Wrap bubble wrap around each glass sample container and fix with tape.		*Solids:* 4	3
Package the paint cans in DOT boxes or cooler. Use additional packaging to secure cans.	6		
Seal the drain plug with tape on the inside and outside of the cooler and line		5	4

Instructions	Flammable Liquid	Poison DOT Class 6.1	DOT Class 9
the cooler with a plastic bag. Place the canned or bagged sample containers in the cooler. If plastic bottles are being used, alternate them with any glass container.			
Fill any voids in the cooler with additional packing material.	7	6	5
Place ice contained in bags on top of all sample containers within the cooler. Use as much ice as space will allow.	8	7	6
Place the COC record in a clear plastic resealable food bag and tape to the inside of the cooler lid. Label the outside of the cooler as containing the COC record.	9	8	7
Seal the cooler lid with clear tape or strapping tape. Affix security seals.	10	9	8

*Numbers indicate the instructions that must be followed.

3.6.2. Marking and Labeling

All samples *must be labeled* to prevent misidentification and should include the following information:

- Sample # or ID
- Date of collection
- Collector
- Analysis requested
- Preservative
- Sample location.

Sample labels must clearly link the sample to the field sheet or the COC record and must be written legibly and in permanent ink. In addition, all containers must be labeled and listed on the COC record.

Note: If a three-bottle set is used for VOAs, all three bottles must be labeled and listed on the COC record.

EPA TSCA regulations [40 CFR 761.40(e)] require that a PCB label be put on all containers whose surfaces are in direct contact with material that is over 50 parts per million (ppm) PCBs. This requirement applies to sample containers as well as pails, drums, and other containers that are in direct contact with the PCB material. The labeling requirement does not apply to containers in which PCB sample containers are shipped. Although the sample containers must be individually labeled, this requirement is not affected by the quantity of sample or whether the sample is classified as hazardous under RCRA or DOT regulations. For DOT Class 9 and EPA Hazardous Waste the following labeling requirements apply:

- If EPA Hazardous Waste Manifest is required:
  - Hazardous waste
    - liquid, NOS, NA3082
    - solid, NOS, NA3077

- If EPA Hazardous Waste Manifest *is not* required:
  - Environmentally hazardous substances
    - liquid, NOS, UN3082
    - solid, NOS, UN3077

OSHA's Hazard Communication Standard requires all containers of hazardous materials coming in or out of a workplace to be labeled with the contents, appropriate hazard warnings, and the name and address of the manufacturer. OSHA does not specify a standard labeling method, but some commonly used ones are provided by National Fire Protection Association (NFPA), Hazardous Materials Identification System (HMIS), ANSI, and DOT.

3.6.3. Shipping Papers

Ship high hazard samples via overnight courier following the courier's documentation requirements. A special airbill must be completed for each shipment. An EPA manifest must be prepared if the shipping container contains hazardous waste *unless* the samples are exempt. The Hazardous Waste Manifest must bear the handwritten signatures of the generator, transporter, and designated facility. A copy of the manifest must be kept for 3 years by the shipper. The shipping papers must contain the name, address, and handwritten signature of the shipper.

The shipping papers (and Hazardous Waste Manifest if used) must contain a 24-hour emergency response telephone number. This phone number must be monitored at all times while the hazardous material is in transportation, including storage incidental to transportation. The phone must be monitored by a person who is either knowledgeable of the hazards and characteristics of the hazardous material being shipped and has comprehensive emergency response and incident mitigation information for that material, or who has immediate access to a person who possesses such knowledge and information. The emergency response phone number must be entered on the shipping paper immediately following the description of the hazardous material or entered once on a shipping paper if the number applies to all of the hazardous materials and is indicated for emergency response information.

3.7. QA/QC Protocol

QC is a normal part of good field and laboratory practice. QC includes all of the procedures ap-

plied to data collection and generation activities to achieve and maintain the level of pre-established data quality. The desired level of data quality should be based on the intended use of the data. Therefore, the QC protocol should include all technical controls (e.g., sampling and analytical methods, use of field blanks, field duplicate samples, inclusion of performance testing or reference samples, statistical analysis, etc.). The controls start with the regulatory requirements of the data acquisition project and carry through to the ultimate data reporting and completion of all of the documentation of the use of these controls.

QA refers to the procedures used by management to assure that the QC is what is required and that it is being adhered to at any point in the project. QA constitutes the overview and monitoring processes designed to ensure that the quality of the data generated meets the desired levels as established by management. These controls include establishing DQOs based on the intended use of the data, the institution of procedures for formalizing planning documents prior to the initiation of data collection activities, and the use of audits to identify problems in both QC and QA.

The QA/QC protocol is specified in the SAP for each job that involves field sampling. QA/QC requirements are based on the level of data quality required for the project, and may address specific regulatory requirements. The purpose of a QA/QC protocol is to ensure the following:

- The laboratory receives samples that accurately represent the conditions existing at the sample site
- The results of the analysis are traceable to the specific sample location
- Compliance requirements are met.

The methods used to attain this protocol include training of personnel, providing detailed procedures for preparation, collection, marking and handling, packaging, packing, transfer of samples, and validation and verification of the administrative process and sampling techniques.

3.7.1. Decontamination of Sampling Equipment

The SAP should address the extent of decontamination and specify the procedures to prevent sample contamination. Sampling may be performed using separate laboratory cleaned equipment for each sample location. Procedure effectiveness should be checked for each matrix by submitting equipment decontamination blank samples to the laboratory for analysis.

Note: For specific information regarding the decontamination of field equipment, refer to *ASTM D5088-02, Standard Practices for Decontamination of Field Equipment Used at Waste Sites*. This standard describes the decontamination process for field equipment used in the sampling of soils, soil gas, sludges, surface water, and groundwater at waste sites. According to this standard, these practices are applicable only at sites where chemical (organic and inorganic) wastes are a concern, *not* for radiological, mixed (chemical and radiological), or biohazard sites.

3.7.2. Sample Container Cleanliness Requirements

Sample containers are a possible source of sample contamination. The SAP should specify the level of QC for sample containers. Pre-cleaned containers meeting EPA CERCLA cleanliness endurance criteria are available from several suppliers. If these containers are used, the serial number and QA batch number of each one should be recorded in the FLB/FN or on the field form. A review of the cleanliness should be made to ensure all parameters are checked to be below the detection limit of the contaminants to be tested for compliance. Some SDWA and CWA parameters may require laboratory cleaned containers proven to be below the limit of detection for the method.

Note: In no case should an effort be made in the field to decontaminate a sample container. If a container becomes contaminated, it should be replaced, with a note to that effect recorded in the FLB/FN.

3.7.3. Sample Container Type and Size Requirements

The types and sizes of sample containers to be filled for each sample will depend on method requirements and on QC requirements of the SAP. General sample container requirements are shown in Appendix B for different matrices and

analytical parameters. Compliance with specific instructions in the SAP is mandatory. If specified sample containers are not available, permission must be obtained from the Program Manager in writing for the use of other sizes and types of sample containers.

3.7.4. Sample Preservation and Storage Requirements

Special preservation and storage requirements should be specified in the SAP to ensure that samples do not undergo chemical changes from the time they were collected until their analysis by the laboratory. General requirements are specified in Appendix B. The specific requirements of the SAP will govern.

The quality of the reagents, water and materials used for preservation should be verified to ensure these items do not invalidate the reported results. Chemicals used as preservatives may be traced by lot number and quality by maintaining a reagent record keeping system. The water and acid preservatives used for trip and field blanks may be checked prior to use in the field and lot controlled to ensure no contamination is present prior to the material leaving the laboratory.

3.7.5. Sample Holding Time Limits

Even with preservation and special storage procedures, the composition of samples can change over time. The holding time for samples is the time from collection to laboratory preparation or analysis. Holding time limits summarized in Appendix B are method and program requirements. Site-specific holding times specified in the SAP take precedence.

3.7.6. Laboratory and Field Analytical Procedures

Laboratory analytical procedures for each parameter are specified based on the compliance limits, permit limits and data needs stated in the SAP. The SAP or COC record indicates to the laboratory which sample containers are to be analyzed for what parameters and specifies the analytical methods. Based on the DQOs, field testing may require the same level of QC as laboratory testing, and the procedures specified in the field sampling or test plan must be followed exactly. Any deviations from established test procedures must be entered in the FLB/FN or on the field form and the Program Manager must be informed immediately of sample numbers affected.

3.7.7. QC Samples

Field QC samples are prepared and analyzed to determine whether test samples have become accidentally contaminated, check on the repeatability of the method, and ensure the samples are representative of the site or matrix sampled. A number of different QC samples may be specified. Each of the QC samples checks for a potential problem that can affect data reliability. The recommended frequency for each type of QC sample is summarized in Appendix C.

3.7.7.1. Test Sample

The test sample consists of one or more sample containers filled with material collected at one sampling point within a stated time. Several sampling containers may be required if material collected for analysis for different parameters must be preserved differently or sent to different laboratories. For a specific test sample, all containers are designated by the same sample location number, but may have different sample container numbers or designations to indicate variations made to the samples.

3.7.7.2. Field Duplicates and Split Samples

Field duplicate samples are two separate samples taken from the same source and are used to determine data repeatability based on field sampling and laboratory analysis procedures. Field duplicate samples are as follows:

- Assigned different container numbers
- Specified in the FLB/FN or on the field form
- Distinguished from the test samples on the COC record or field records
- Often submitted blind as to designation so the laboratory data assures objectivity.

Exception: Each test sample collected for a specific organic analysis may consist of two or more containers filled with the same material; these may be given different

container numbers but are designated as the same sample on the COC record. Only one sample container will be analyzed; the other being saved as a backup in case the laboratory must repeat the extraction and/or analysis. Duplicate samples for analysis consist of sets of two containers, with each pair of containers being designated on the COC record.

Field duplicate samples may be submitted to one laboratory for analysis for the same parameters. The comparability of the results provides information on the repeatability of the field sampling and laboratory analysis procedures.

The containers may be submitted to different laboratories for identical analyses to obtain information on inter-laboratory repeatability of field sampling and laboratory analysis procedures. This is a split sample.

Sample heterogeneity may cause major problems with the representativeness of field duplicate or split samples of soil/sediment matrices. Proper sample homogenization in the field will significantly improve the repeatability of the field sampling procedure. (Gy P. 1993, *Sampling for Analytical Purposes*, Wiley, West Sussex. Pitard F. F. 1993, *Pierre Gy's Sampling Theory and Sampling Practice: Heterogeneity, Sample Correctness and Statistical Process Control*, Books Britain, London.)

Typically, both field duplicates and split samples will be collected at a rate of 10% of field samples or at a minimum of one, per analyte, matrix, and sampling technique. More duplicates and split samples may be collected depending on the data quality needs.

3.7.7.3. Equipment Decontamination Blanks

Equipment decontamination blanks, or rinsate blanks, provide information on the levels of cross-contamination resulting from field or laboratory sample preparation actions. These blanks are specified in the SAP and on field sampling forms, and are prepared in the field. An equipment decontamination blank is usually reagent or deionized water that is free of the analyte of interest and is transported to the site, opened in the field, and poured over or through the sample collection device, collected in a sample container, and returned to the laboratory and analyzed. This serves as a check on sampling device cleanliness. For example:

- **Field Groundwater Equipment Decontamination Blank for Metals Analysis.** Handled by the bailer, use ASTM Type II water, or better. Filter, place in a sample container, and preserve using the same procedures as for the test and duplicate samples.
- **Soil Sampling Equipment Decontamination Blank for Semivolatile Organics.** Rinse the field equipment prior to its use and collect the rinsate for analysis.
- **PCB Wipe Sample Equipment Decontamination Blank.** Use a wipe pad to wipe the sampling template in the same way the pad is handled during the actual wipe sampling of a surface.

One equipment decontamination blank is collected for each type of equipment used during the day or sampling event. Equipment decontamination blanks are assigned container numbers from the same sequence as the test samples, and may not be distinguished from the test samples on the COC record. More blanks may be collected depending on the data quality needs.

3.7.7.4. Field Blanks

Field blanks are prepared and analyzed to check cleanliness of sample containers, environmental contamination, and purity of reagents or solvents used in the field. A sample container is filled with laboratory ASTM Type I or II water, preserved, shipped to the field with clean sample containers, opened in the field to exposure to ambient field air for a time compatible to field sampling process, and is closed and submitted for analysis using the same parameters as the test sample. The reported results will indicate the presence of contamination. Field blanks are most often used when measuring for volatile analytes.

3.7.7.5. Trip Blanks

A trip blank is used with VOA analysis of water. A blank may consist of two 40-milliliter VOA vials filled at the laboratory with laboratory ASTM Type I or II water, transported to the

sampling site and returned to the laboratory without being opened. This serves as a check on sample contamination during sample transport and shipping.

Note: The caps used on VOA vials have Teflon®-lined septa. The Teflon® side of the silicone septum should face the sample. Prior to closing a vial, make sure there is no soil particle or dirt on the sealing surface of the VOA vial to prevent leaks. If a high concentration of volatile chemicals is present in the air in a shipping container, these chemicals can pass through the septum and contaminate the sample.

A trip blank is included in each shipping container used to ship VOA water samples. One VOA trip blank (two vials) is submitted to the laboratory in each cooler or per sampling event. The frequency of collection for trip blanks is specified in the SAP and is based on the data quality needs. Trip blanks are assigned container numbers from the same sequence used for the test samples, and are not designated as blanks on the COC record.

3.7.7.6. Matrix Spike (MS)/Matrix Spike Duplicate (MSD)

Project or compliance QC procedures require that the laboratory spike a portion of the matrix with a predetermined quantity of analyte(s) prior to sample extraction/digestion and analysis. The frequency of performing an MS is dependent on the data quality needs and method requirements.

A spiked sample is processed and analyzed in the same manner as the sample. The result of the analysis of the spike compared with the non-spike sample indicates the ability of the test procedures to recover the analyte from the matrix, and provides a measure of the performance of the analytical method executed by the laboratory.

For an MSD, a second portion of the matrix is spiked, and the recovery of the MSD can be compared with the recovery of the MS.

Depending on the matrix and analysis, additional sample containers may be specified to provide enough material for this laboratory procedure. These sample containers are assigned container numbers from the same sequence as the test samples and are designated MS/MSD materials on the COC record.

The MS/MSD samples are commonly used in CERCLA testing, but are not commonly used in CWA or SDWA testing. MSs are routinely performed by the laboratory as part of its internal QC on randomly chosen samples. If MS data is required for SDWA or CWA reporting requirements, a request must be made to the laboratory to ensure the MS is performed and reported on the appropriate sample. The sample selected for MSs should have the same or similar matrix as the field samples' but without high levels of target analytes.

3.7.8. Field Audits

The SAP will specify who will conduct field audits, along with their frequency and procedures. QA/QC procedures of the sample collection effort must identify and determine the magnitude of error associated with the contamination introduced through the sample collection effort. Audits are perhaps the most effective tool to ensure that the sampling is done correctly. The two factors most likely to influence the magnitude of the sample collection error are collection methods and frequency of sampling.

In general, a field sampling audit provides an independent outside check on the following:

- **Field Records**
  - COC records
  - Sample container labels
  - FLBs or field forms
  - Personnel training records
- **Sampling Procedures**
  - Equipment
  - Sample containers
  - Accuracy of sample location descriptions
  - Comparability of field sampling techniques
  - Collection and preparation of QC samples
  - Sample preservation
  - Equipment decontamination
  - Contaminated waste storage and disposal

- Sample packing, storage, security, and transportation
- Shipping containers, including use of custody seals (if applicable).

3.8. Generic Sampling Equipment List

Equipment specific to each type of media is found at the end of the related chapters. The following is a generic sampling equipment list:

- Map of sampling location(s)
- Sampling SOP
- FLB or field form
- Pens
- Containers
- Preservatives
- Labels
- Markers
- Coolers
- Ice
- Packing material
- Packaging tape
- COC form
- Custody seals (if required)
- Decontamination storage containers, equipment, and materials
- Personal safety equipment, safety test equipment
- Field screening or testing equipment, standards, reagents, and SOP
- Testing field forms or logbooks
- Laboratory instructions (if different from custody form).

Standard Operating Procedure (SOP) #6

SVE Treatment System Flow Meter Use

I. Equipment List

- Personal protective equipment including safety vest, sun/wind protection (if necessary), steel-toe boots and nitrile gloves
- Anemometer
- PTFE tape
- Tools
- Field logbook, indelible ink pens, field forms and camera

II. Procedure

1) The SVE System must be running prior to taking anemometer readings.
2) A monitoring port is located at the SVTU influent. The monitoring point will be located at least five pipe diameters away from any bend in the conveyance piping or any valve.
3) PTFE tape is wrapped around the anemometer to ensure a good seal is made when inserted in to the monitoring port.
4) The anemometer is powered on using the “On/Off” button and the probe is inserted into the port with the probe perpendicular to air flow.
5) Use the “Temp/Velocity” button to switch between measuring the temperature and velocity and use the “Range” button to switch ranges in the velocity reading if the reading is out of range. Use the “Units” button to switch between fpm (feet per minute) and mps (meters per second) and F (Fahrenheit) and C (Celsius).
6) Record the readings in the field logbook and field data sheet.
7) Power down the anemometer
8) Replace the cap on the monitoring port.

Fieldwork Documentation

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Approvals

Christopher Ohland — October 10, 2022
Christopher Ohland — Date
SWE Quality Assurance Manager

Bruce Wilcer — October 10, 2022
Bruce Wilcer — Date

Project-Specific Modification[1]

05/22/2023: References to Global Positioning System (FSOP-103) do not apply. Ahtna uses a Trimble Catalyst DA2. Manufacturer's instructions: https://rb.gy/lz13m

[1] Document project-specific modifications in this section. No other modification to the SOP is authorized.

Revision History

Rev 1, 10/10/2022: Revised to include PFAS- friendly supplies and procedures.

Table of Contents

1.0 Introduction

1.1 Purpose

This SOP provides field personnel with the procedures for:

- Recording real-time, chronological logs of field activities and circumstances in field logbooks/notepads, field forms, and digital/electronic media
- Documenting fieldwork and fieldwork variances
- Ensuring documentation is reviewed, organized, and safely stored until the project closed out

Adequate documentation is necessary to describe the work performed and variances to work plans if any. Attention to detail is vital since field documentation protects our client and Ahtna with secure, legally defensible evidence and has been helpful in administrative, legal, and cost-recovery requirements. For example, field documentation may be used as evidence in legal proceedings to defend procedures and techniques employed during site investigations. Therefore, field documentation must be factual, complete, accurate, consistent, and not contain subjective language. These principles also apply when photographic or videography techniques document site activities. The goal of written, digital, and photographic/video graphics documentation is to represent field activities that accurately portray site conditions or procedures.

1.2 Scope

The scope of this SOP includes data entry and format requirements for various field documentation.

When required by the project, use the PFAS-free equipment, materials, and procedures recommended in this SOP which are indicated by [PFAS Project].

Written records

- Field logbooks
- Field notepads
- Field forms

Digital records

- Audio
- Photographic/video
- Data loggers

Digital data entry using field tablets is described in the EQuIS Collect User Guide.

- **Note**: *It is important to review contracts and Performance Work Statements to identify specific documentation and format requirements applicable to your project*.
- **Note**: *Contracts may contain requirements for field records. The typical* language states: "*The Contractor shall maintain field records sufficiently to recreate all field activities. The information shall be recorded in a permanently bound notebook with sequentially numbered pages. At the end of each workday, the Contractor shall complete a daily log.*"

- **Note**: *Contracts issued by the USACE may contain requirements for the project archive, both ongoing and after completion of the contract.*

1.3 Roles and Responsibilities

Field Team. A Field Team is one or more individuals working together. Each Field Team is responsible for maintaining a field log of their activities, as applicable

Field Team Lead (FTL). The FTL provides direction and oversight of the fieldwork. The FTL is responsible for reviewing and confirming the adequacy of the field documentation during fieldwork as soon as possible and before releasing the daily quality control report. The FTL keeps the Project (PL) informed of field variances or problems encountered in the field.

Project Lead (PL). The PL is responsible for providing adequate resources to the field staff and ensuring that field staff has adequate experience and training to comply with this SOP successfully. The PL is responsible for approving and documenting techniques not described in this SOP but are considered the best methods for the current project. The PL documents changes as a variance to the plans and forwards the variance to the Program Manager (PgM) for approval. The PL is also responsible for confirming the adequacy of the field documentation after fieldwork. An entry confirming which information was reviewed must be added to the post-event field documentation package (Section 5.0).

Program Manager (PgM). For each SWE Program, the PgM is responsible for providing written instruction to their Field Team, which complies with the requirements of this SOP and the client-contracted specifications.

Site Supervisor.[1] The Site Supervisor is responsible for maintaining a project-specific FLB/notepad and field forms of their activities, as applicable, and providing copies to the PL for review.

Safety Representative. The Safety Representative meets the experience and training requirements of USACE EM-385-1-1 (USACE, 2014). The Safety Representative oversees site-specific health and safety activities and ensures compliance with the project requirements. The Safety Representative notifies the FTL of safety deficiencies and incidents and actions to correct those. If the circumstance warrants, the FTL approves those actions and notifies the PL and Site Safety and Health Officer for their approval.

Quality Control Lead (QC Lead). The QC Lead ensures work inspections are performed using the 3-Phases of Quality Control. Method described in the project work plans. The QC Lead notifies the PL of quality deficiencies and actions to correct those. The PL approves those actions or notifies the SWE Field QC Manager for their approval if the circumstance warrants involvement.

SWE Quality Assurance Manager and SWE Field QC Manager report to the SWE Vice-President. When mentioned in this SOP, The "SWE" prefix is shown to distinguish from the QC Lead assignment shown in the project organization chart.

[1] In this context, a Site Supervisor is a person assigned to oversee long-term operations or construction work; the roles and responsibilities are like that of the Field Team Leader.

1.4 Definitions

Field Documentation – The combination of field logbooks/notepads, field forms, digital/electronic forms, and other documentation in the project file.

Field Logbook (FLB) – A portable, bound, weatherproof notebook with consecutively numbered pages.

> [PFAS Project]: Use field logbook made of standard/loose plain paper (non-weatherproof), held together by an aluminum or Masonite field clipboard. Alternatively, a spiral-bound notebook with non-weatherproof paper and/or cover can be used.

Field Notepad – An unbound, company notepad containing pre-printed heading block and space (straight-lined, grid lined, or open) for recording information. This can be an alternative to the FLB. The notepad can be paper or electronic (Word, Excel, Access, etc.) as long as a hard copy of the individual sheets is sequentially numbered and maintained in a properly labeled binder/file folder.

Field Forms – Any documentation that preserves an accurate historical record of field activities but is recorded on unbound paper. These forms should be referenced in the FLB. A listing of the most commonly used SWE field forms is provided in Section 2, "Relevant Documents." Each data entry field should have an entry or indicate that data for that field is not available or not required.

> [PFAS Project]: Record of field events will be maintained on loose paper (PFAS-free) secured on Masonite or aluminum clipboards. Plastic clipboards, binders, or spiral hard cover notebooks are not acceptable. Field logbooks are permanently assigned to a specific project.
>
> In addition, Field Form FFRM-004.00 "Daily PFAS Sampling Checklist, must be completed each day of fieldwork when activities may compromise environmental media that is sampled.

Data Loggers – Field equipment providing digital/electronic information to supplement field forms. Examples include water-level transducers for aquifer tests, flow sensors and meters in pump and treat systems, and air monitoring equipment (Section 4.1.7).

Digital/Electronic Files – Any documentation that preserves an accurate historical record of field activities but is recorded electronically through field instruments and digital devices. These records should be referenced in the FLB. Digital/electronic information includes global positioning system (GPS) coordinates, photographs, and videos.

2.0 Relevant Documents

SWE file folder m:\\Environmental\Quality Control Procedures\SWE Field Forms\ has the current, approved form templates.

3.0 Equipment List

[PFAS Project]: Products containing waterproof features (e.g., Post-it-notes, waterproof coated paper) cannot be used on per- and polyfluoroalkyl substances (PFAS) projects.

- Applicable field forms

  [PFAS Project]: Work activities will be maintained on loose paper (PFAS-free) secured on Masonite or aluminum clipboards. Plastic clipboards, binders, or spiral hard cover notebooks are not acceptable.

- Bound, waterproof field logbook (FLB; e.g., Rite in the Rain™ or similar) with pre-numbered consecutive pages for field documentation or notepad

  [PFAS Project]: Use field logbook made of standard/loose plain paper (non-weatherproof), held together by an aluminum or Masonite field clipboard. Alternatively, a spiral-bound notebook with non-weatherproof paper and/or cover can be used.

- Waterproof, indelible pens/markers in black or blue ink

  [PFAS Project]: Ball-point pens: do not use markers, felt pens, or pens with water resistant ink

- Digital camera/video, cell phone, or other devices capable of digital imagery
- Electronic device(s) for recording and storing field-related data (e.g., data loggers and GPS units)
- Batteries and charging blocks

4.0 Procedures

This section describes various mechanisms of recording documentation, including requirements and procedures. Before fieldwork, each project should define project instructions that identify the mechanism for documentation. The instruction is intended to promote procedural consistency, defined roles and responsibilities, and common language across project teams, promoting efficient reviews and cross-team utilization and training. Once established, project staff shall follow the project instruction.

4.1 Document Control and Storage

4.1.1 Project File

While in the field, the fieldwork documentation project file is managed by the FTL and consists of:

- Written records: FLB/notepads, field forms
- Digital/electronic records: photos, videos, GPS records
- Downloads from electronic devices such as data loggers

The PL is responsible for providing the location and details for storage. All field documentation is a part of the project file and should be maintained with safe document handling and archiving procedures. Hardcopy documentation and digital files are official records of fieldwork. Scans of official records are helpful for ease of access to project information and generating reports but are not official records.

The PL is responsible for all forms of field documentation, and scans of paperwork, digital records, and downloads from electronic devices are placed in the m:\\ drive project file. All original documents shall be assembled into a data package, submitted to the PL, and archived in the project file. The goal is that all documentation is organized by task/event and stored in a single location.

4.1.2 Problems in the Field and Variances from Project Plans

Variances or problems encountered during the fieldwork that cannot be resolved promptly must be communicated promptly in writing to the FTL /Site Supervisor, who will notify the PL. This may be completed by sending a variance notice by email or other means to promptly communicate the variance or problem and allow for the continuation of the fieldwork. The PL shall provide written approval of recommended solutions or provide an approved alternate solution.

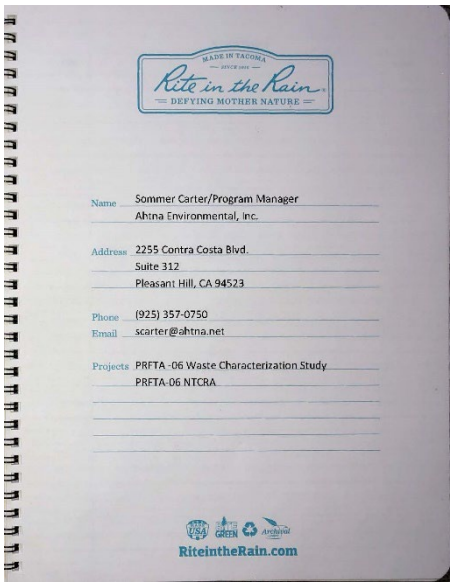
The need for a corrective action addressing variances or problems in the field will be determined by the PL in collaboration with the FTL/Site Supervisor. The PL will notify the PgM and SWE Field QC Manager of any needed corrective action for their concurrence or follow-up.

Documentation of variances to project plans, problems encountered, or corrective actions will be kept in the FLB/notepad or forms.

4.1.3 Field Logbook

Field logbooks can be spiral- or adhesive-bound and are distributed by the PgM or designee. The cover of the FLB is labeled with the project number and name of the Installation/Site(s).

The inside cover of the FLB contains the name, address, phone, and email address of the PgM and a list of projects the FLB is used to record. The information is updated if the project is assigned to another PgM.



The FLB shall be project/task-specific. The Field Team uses the FLB to record details of their responsibility (e.g., sampling, QC, safety, oversight, etc.) and provide them to the FTL/Site Supervisor for their review before submitting daily QC reports (DQCRs).

The FLB records are scanned, and the scan is saved as a PDF file on the Ahtna server in the project folder to create an electronic record for project reports. The PL shall ensure the FLBs are stored safely until project closeout. The field job box could be used for temporary storage.

4.1.4 Field Notepads

Three-ring punched, loose-leaf notepads or individual sheets can be printed on field form SWE-FFRM-001.[2] Each sheet contains a heading block, and block entries must be filled in on the first page of a new date.

Example Heading Block for Long-Term O&M or Construction

Installation/Site	Sharpe Army Depot/Sitewide	Project Number	05206.000.01.0000
Site Supervisor	Paul Marsden	Date	July 27, 2021
Subject	Telephone Record	Recorded By	Izzy Done

Example Heading Block for Environmental Studies

Project Number	05206.000.01.0000	FTL	Who Dunnit
Installation/Site	MOTCO Site 2	Recorded By	Izzy Done
Event Name	1Q 2021 GW Sampling and LF Inspection	Date	July 27, 2021

Notepads (loose-leaf paper) are used by the Field Team to record details of their responsibility (e.g., sampling, plant operations, QC, safety, oversight, etc.) and provided to the FTL/Site Supervisor for their review before submitting DQCRs.

The PL shall ensure the sheets are stored in three-ring binders or another filing system (Section 5.0), labeled with the Installation/Site name, project number, and a descriptive name of the project. If an FLB or field form is also used, a scanned copy of the FLB pages and original copies of the field forms are stored in the binder. The sheets are sequentially numbered and reviewed by the FTL/Site Supervisor. The PL reviews and approves the Site Supervisor's notepad sheets. The PL is responsible for safely storing the binder or other filing system until project closeout.

The notepad binder will be kept in the site office project file or job box. As soon as possible, the unbound records shall be scanned and saved on the Ahtna server in the m:\\ drive project folder to create an electronic record to ensure document preservation and use in project reports.

4.1.5 Field Forms

SWE-approved field form templates are available at M:\Environmental\Quality Control Procedures\SWE Field Forms\. Activity-specific SOPs reference the field forms that should be used. If preferred, individual sheets can be printed on pre-punched three-hole paper (or punched later). If the printer is capable, use a heavy paper stock for a durable form. Field forms supplement the FLB/notepad and provide a way to record detailed information using a structured format. When new forms are available, they will be posted

[2] Project-specific format designs may be used. Computer applications such as Microsoft Word or similar may also be used as long as the header information is shown, and printed copies are stored in three-ring binders.

in the template folder. The SWE Technical Writer oversees version control and will notify SWE staff when the form is posted.

Each sheet contains a heading block to enter the Installation/Site name, descriptive activity name, FTL, project number, and QAPP SOP number for the performed activity-specific fieldwork. Depending on the activity, the names of staff assigned with lead roles, weather conditions, date of recorded information, or other information may appear on the form. The heading block entries must be filled-in for each sheet to bind the field form to the project/activity.

Example Field Form Heading Block

Project Number	05108.001.02	FTL	Jared Wilson
Installation/Site	MOTCO/Site 1	SOP No.	FSOP-002
Activity Name	1Q 2021 GW Sampling and LF Inspection	Date	08/06/2021
Field Team (name/organization)	Jared Wilson/Ahtna, Izzy Done/Forever Waiting		
Weather Forecast	Sunny, 65–80°F, SW winds 5–10 mph		

Field forms are used by the Field Team to record details of their responsibility (e.g., sampling, O&M operations, QC, safety, oversight, etc.) and provided to the FTL/Site Supervisor for their review before submitting DQCRs.

The PL shall ensure the sheets are stored in three-ring binders or another filing system (Section 5.0), labeled with the Installation/Site name, project number, and a descriptive name of the project. If an FLB/notepad is also used, a scanned copy of the FLB/notepad pages and original copies of the field forms are stored in the binder. The sheets are sequentially numbered, reviewed, and approved by the PL. As soon as possible, the unbound forms shall be scanned and saved on the Ahtna server in the m:\\folder to create an electronic record to ensure document preservation and use in project reports.

The PL is responsible for safely storing the binder or other filing system until project closeout.

4.1.6 Electronic Files

Photographs and Video

All original digital field documentation (Section 1.4) shall be downloaded as soon as possible to a designated location for project use. Exclude files that are unnecessary due to unusable image quality or content. As soon as possible, the date/time, location, direction (compass point or radial degree), and purpose of the image should be documented before the information is forgotten. The use of metadata and smartphone applications to gather this information can assist. Files can be edited but maintain the original file and save the edited file with a suffix description. Alternately, use field form SWE-FFRM-002 to log photos. This form is helpful for tasks where few pictures will be taken.

The PL is responsible for providing the location and storage details. Files should be uploaded to the project folders and caption descriptions documented as soon as possible after the fieldwork ends.

Data Loggers

Examples of data loggers include equipment used in combination with:

- Water-level transducers for aquifer tests
- Flow sensors and meters in pump and treat systems
- Air monitoring equipment (e.g., particle counters)

The use of data loggers should be recorded in an FLB/notepad or field form and include the type of logger, make, model, S/N, calibration if required, and any input specifications used.

Document data acquisition activities using data loggers (data logging equipment) and related observations in the FLB.notepad. Written notes provide a permanent record of field activities that support digital data temporarily stored on various data loggers.

Specific steps and guidelines for the data acquisition activity being performed should be reviewed in the respective SOP guiding the activity.

The observations and data will be recorded in the FLB/notepad or field form. Because of the variability of features and operation of various data loggers, each field SOP and manufacturer's instructions should be carefully reviewed before beginning field activities.

The PL is responsible for providing the location and details for storage. Files should be uploaded to the project folders as soon as possible after the fieldwork ends. Files should not be edited. If needed, modifications to the captured data should be noted in the project reports. Hardcopy printouts in comma-delimited format (or similar) are recommended should the source file become corrupt.

Global Positioning Systems

GPS data acquisition activities and related observations will be digitally-recorded and later downloaded, and the file saved as described above.

Alternately, the GPS data can be recorded in field documentation to provide a permanent record of field activities supporting digital data that is temporarily stored on the GPS unit. As applicable, observations and data may be recorded in an FLB/notepad or field forms. The field forms will record the survey location identifier (e.g., well/boring location, structural feature) and corresponding coordinates and elevation.

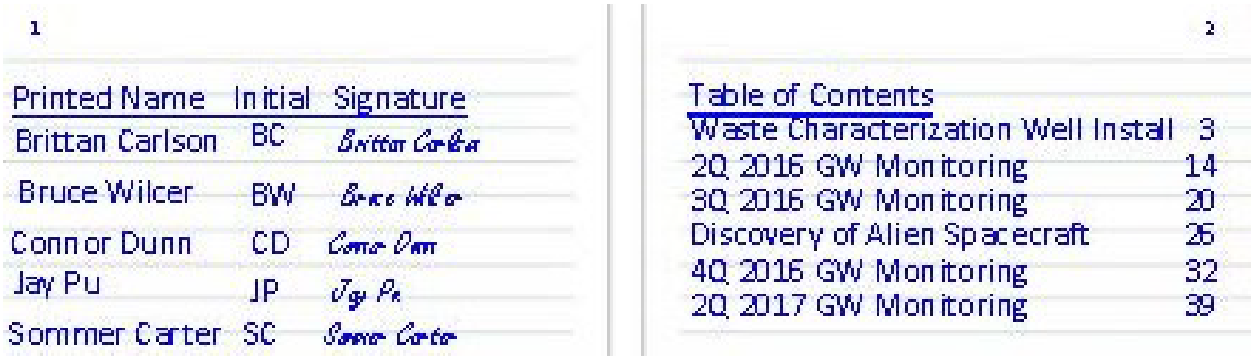
The GPS operator should also be thoroughly familiar with the manufacturer's instructions and SOP for Global Positioning System (FSOP-103) before performing GPS work in the field.

4.2 Field Logbook

The FLB is the written record of all fieldwork elements, such as Ahtna staff, subcontractors, visitors at the site, weather forecast/conditions, field equipment calibrations, construction activities, and sample collection activities. Fieldwork can be recorded on a notepad or forms described in Sections 4.3 and 4.4. When field forms are used, a brief description of the activity is added to the FLB/notepad, and details are added to the form.

4.2.1 Guidelines

Pages 1 and 2 of the FLB should be reserved to provide a signature page and table of contents. The signature page lists the employee's name, initials, and signature. The printed name and signature bind the employee to their written documentation, and the initial is helpful when limited space is available for writing a full name on subsequent pages. Each initial on page 1 must be unique. Page 2 is not required but helpful to quickly locate information in the FLB. If more space is needed, the back cover pages could be used. An entry for a significant event and the page number that initiates the documentation is typical. Open space on pages 1 and 2 does not need to be lined out, as the list will grow during work execution.



1

Printed Name	Initial	Signature
Brittan Carlson	BC	
Bruce Wilcer	BW	
Connor Dunn	CD	
Jay Pu	JP	
Sommer Carter	SC	

2

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Field documentation shall adhere to the following guidelines:

- Write entries in blue or black waterproof ballpoint pen (older copier machines do not recognize other colors). Avoid felt tip pens. *Do not use a pencil*.
- List personnel making entries in the FLB and include initials and signatures on the inside cover page.
- Use a table of contents on page 2 (recommended but not required).
- Start a new page at the beginning of each day.
- Entries should be chronological – a time notation should introduce each entry.
- Language should be objective, factual, and free of personal feelings or inappropriate terminology.
- Do not erase or scratch out errors. Draw a single line through the error, then insert the corrected material. The person who corrected it shall initial and date the correction. If an explanation is needed, add that in the next available blank area in the FLB and cross-reference the error and explanation.
- The FLB shall be signed at the end of each day. Signatures shall be written on a single diagonal line drawn across the blank portion of the page following the day's last entry.
- All FLB shall be returned to the FTL/Site Supervisor for review and safe storage. The FTL/Site Supervisor shall review daily as soon as possible and before the DQCR is released.

4.2.2 Entries to Include

Initial daily entries shall include the following:

- **Date and time**: The time shall be based on military time (i.e., 2100 instead of 9 pm)
- **Field Team Leader**: Name of the Field Team Leader or Site Supervisor
- **Safety Representative**: Name of the task Safety Representative (meets EM 385-1-1 requirements)
- **QC Lead**: Name of the task QC Lead

- **Site Personnel**: Full name, title/role, and affiliation of personnel onsite, including visitors and subcontractors, with arrival and departure time noted
- **Planned Activities**: General description of various work activities for the day
- **Weather**: Weather forecast (temperature, cloud cover, wind speed, and direction). Changing weather that impact site conditions should be recorded throughout the day
- **Notes**: Taken By: Name(s) the FLB/notepad author(s)

The following are examples of ongoing daily entries. Use those and others as applicable:

- When field forms are used, record a brief description of the field activity, then record details on the field form. Do not duplicate information referenced on the field forms in the daily field documentation
- Participation in the Site Safety Tailgate Meeting, details can be added to the Site Safety and Tailgate Meeting form
- Level of personal protective equipment (PPE) and describe upgrade and downgrade of PPE levels
- Type of field instrumentation and calibrations performed, details can be added to the equipment calibration form
- Work start/stop times
- Time and location of activities
- Site physical conditions, changing weather conditions, major task decisions, or other valuable site investigation information and other essential observations
- Level of PPE and describe upgrade and downgrade of PPE levels
- All relevant field observations, major task decisions, or other valuable site investigation information
- Location of work areas if the survey has not been completed
- Survey and location of any sampling points, including swing-tie measurements
- Decontamination times and methods
- All field measurements. If field measurements of this type are being recorded on dedicated field forms, it is not necessary to record in the FLB, but the use of the form should be noted
- Type, amount, method, and location of storing and disposal for investigation-derived waste
- Changes/deviations/variances from the work plan and reason for deviations change/variance.
- Thoroughly document all FTL/Site Supervisor or PL-approved directives, guidance, or potential corrective actions from client and oversite government personnel. Directives that give personnel specific authority to make critical decisions must be documented in the FLB
- Communications with the FTL, Site Supervisor, or PL or client about decisions being made in the field
- Work deficiencies and corrective actions
- Approved work variances
- Persons contacted and topics discussed

4.2.3 Documentation of Project Variances

Thoroughly document all variances from the Performance Work Statements, Work Plans, and QAPP or changes in fieldwork procedures. Problems, delays, or any unusual occurrences such as improper equipment or breakdowns should be included, along with PL-approved resolutions. Summarize the content and conclusions of all relevant meetings, discussions, and telephone conversations that involve you.

4.2.4 References to Locations

This section applies to new locations. Established locations are referred to by the location name or code. Previously established locations are typically shown on site maps/figures.

Whenever an activity (sample collection, field measurement/monitoring, etc.) is performed at a new location (i.e., the location has not been surveyed and shown in a figure), mark the location with a survey stake or similar marker, a detailed description of the location must be recorded in the FLB/notepad or field form and accompanied by a photo, sketch, or point on an attached map as part of the daily field documentation package (sketches with accompanying photographs when appropriate, with north arrow and approximate scale). Record unusual site physical conditions or signs of contamination such as oily discharges, discolored surfaces, unusual odors, dead or distressed vegetation, including types of plants, if possible.

4.3 Notepads

When notepads are used, the requirement and procedures for the FLB (Section 4.2) also apply to the notepad documentation.

4.4 Field Forms

Field forms are used in addition to FLBs/notepads. Field forms are activity-specific and may be completed for each location/sample/well, etc., or one per field event as appropriate. Each form contains a heading block to bind the field form to the FLB/notepad. Field forms augment but do not replace the FLB/notepads. Avoid duplicating information recorded in the FLB/notepad and field form.

The forms include space (check box, table cell, and underlined space) for recording the information necessary for the project to ensure complete and proper information is recorded. Each space must be completed on a field form, and if not needed, then struck out or listing “not applicable.” Blank space can be misunderstood as missing information. Version-controlled template files of the forms are stored in the M:\Environmental\Quality Control Procedures\SWE Field Forms.

Field forms may be modified for project-specific use with the SWE Quality Assurance Manager’s approval.

All unbound data documentation is a part of the field records and should be maintained with safe document handling and archiving procedures. These records should be recorded in the same manner as notes in the FLB/field notpad using black or blue waterproof, indelible ink, and on weatherproof paper as necessary (projects testing for PFAS cannot use products with fluorinated constituents).

4.5 Field Documentation Data Package

After a short-term, specific event (e.g., well installation, sample collection, landfill inspection, and similar), copies of the FLB pages and hardcopies of loose-leaf documentation and relevant correspondence (emails and phone records) should be organized assembled into an event-based data package. The package should include a cover page listing the Installation/Site, project number, and event description.

The PL is responsible for the safe storage of the data package until project closeout. A copy of the package should be scanned and saved in the m:\\ drive project folder. The scan file could replace other scanned files described in the project instructions (Section 4.0).

If the fieldwork is a long-term task such as operating an O&M treatment system, remedial actions (e.g., excavation and disposal), or other qualifying fieldwork, the timeframe for producing the data package should be defined in the PgMs project instructions, but that period should not exceed one per year or end of the contract period.

5.0 Quality Assurance/Quality Control

Conduct the 3-Phases of Quality Control Method described in the project work plans.

Quality Assurance (QA) and QC procedures for field documentation review will be performed by the FTL/Site Supervisor and checked by the PL to ensure the content and level of detail comply with this SOP. The FTL/Site Supervisor can approve variances and fieldwork problems in coordination with the PL. The FTL/Site Supervisor should try to resolve the issue so that work can continue; however, should the variance/incident/problem affect the contracted scope of work or a project decision made from the evaluation of date, the resolution must be coordinated with PgM and SWE Field QC Manager if corrective action is needed. The PgM should notify the SWE Quality Assurance Manager of all corrective actions.

6.0 Documentation Review

The FTL is responsible for the daily review of the fieldwork documentation for compliance with requirements (Section 4.0 “Procedures”) and legibility. Errors and omissions should be explained and revisions to an entry signed and dated by the FTL.

The PL is responsible for reviewing and signing approved documents stored in the project file (Section 4.1).

7.0 References

U.S. Department of Defense, 2013. *DoD Environmental Field Sampling Handbook, Revision 1.0*. April.

Sample Management

Document Number	SWE-FSOP-002
Revision	1
Department	Southwest Operations
Previous Document Number	Original Document
Originally Released	October 10, 2022
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Approvals

Christopher Ohland — October 10, 2022
Christopher Ohland — Date
SWE Quality Assurance Manager

Bruce Wilcer — October 10, 2022
Bruce Wilcer — Date
SWE Field Quality Control Manager

Project-Specific Modification[1]

[1] Document project-specific modifications in this section. No other modification to the SOP is authorized.

Revision History

Rev 1, 10/10/2022: Revised to include PFAS-friendly supplies and procedures.

Table of Contents

1.0 Introduction

1.1 Purpose

The purpose of this standard operating procedure (SOP) is to direct field staff in the proper techniques and documentation requirements to maintain sample custody and the labeling, packaging, and shipping of multimedia samples after they are collected.

Proper sample management from sample collection to laboratory receipt is essential to ensure the legal defensibility of the sample. Sample management is also needed to maintain sample integrity and successfully transport samples to the testing laboratory in an acceptable condition.

1.2 Scope

The scope of this SOP applies to field staff collecting samples. The field staff may be employed by Ahtna or by a subcontractor. Trained environmental professionals will be engaged in or directly supervise the subcontractors' collection and handling of environmental samples.

When required by the project, use the PFAS-free equipment, materials, and procedures recommended in this SOP which are indicated by [PFAS Project].

1.3 Responsibilities

Field Team. A Field Team is one or more individuals working together. The Field Team is responsible for the oversight of and/or collection of groundwater samples as specified in this SOP.

Field Team Lead (FTL). The FTL is responsible for reviewing project work plans to understand the health and safety needs, procedural specifications, and field documentation requirements. The FTL is responsible for reviewing and confirming the adequacy of the fieldwork documentation.

Project Lead (PL). The PL is responsible for providing adequate resources to the field staff and ensuring the Field Team has adequate experience and training to comply with the SOP successfully. The PL is responsible for approving and documenting techniques not described in this SOP but are considered the best methods for the current project.

Safety Representative. The Safety Representative meets the experience and training requirements of USACE EM-385-1-1 (USACE, 2014). The Safety Representative oversees site-specific health and safety activities and ensures compliance with the project requirements. The Safety Representative notifies the FTL of safety deficiencies and incidents and actions to correct those. The FTL approves those actions or, if the circumstance warrants, notifies the PL and Site Safety and Health Officer for their approval.

Quality Control Lead (QC Lead). The QC Lead ensures work inspections are performed using the 3-Phases of the Quality Control method described in the project work plans. The QC Lead notifies the PL of quality deficiencies and actions to correct those. The PL approves those actions or notifies the SWE Field QC Manager for their approval if the circumstance warrants involvement.

1.4 Definitions

Air or Ground Waybill. A shipping document that identifies the sender and addressee, transport carrier, size, and priority of a shipment transported by aircraft.

Chain of Custody. In legal contexts, is the chronological documentation or paper trail that records the sequence of custody, control, transfer, analysis, and disposition of materials, including physical or electronic evidence.

Dangerous Goods. Under the International Air Transport Association (IATA) definition, dangerous goods are articles or substances that can pose a hazard to health, safety, property, or the environment and are shown in the list of dangerous goods in the IATA regulations (IATA 1.0).

Environmental sample. According to the Department of Transportation (DOT) 49 Code of Federal Regulations (CFR) Section 172.101 Appendix A, any sample that has less than reportable quantities of any hazardous constituents.

Excepted Quantity (DOT & IATA Definition). A hazardous substance whose class is permitted on passenger aircraft but in such a small defined amount poses a low risk during transport by aircraft. Hazardous substances that meet the definition of Excepted Quantity may be exempted from documentation, packaging, marking, and labeling requirements typically required when presenting hazardous materials for passenger air transportation. Items shipped as excepted quantities are limited to volumes as specified in IATA Dangerous Goods Regulations, Table 2.6.A and DOT 49 CFR 173.4a.

Hazardous materials. DOT defines a hazardous material as any item or chemical which, when being transported or moved in commerce, is a risk to public safety or the environment and is regulated as such under its Pipeline and Hazardous Materials Safety Administration regulations (49 CFR 100-199), which includes the Hazardous Materials Regulations (49 CFR 171-180).

Sample label. An adhesive paper placed on sample containers or a tag tied to a sample container to designate a sample identification number and other identifying information.

2.0 Relevant Documents

This SOP is intended to be used in conjunction with the following SOPs, and as such, the equipment and materials needed for those activities are not included in this SOP:

Standard Operating Procedures

- SWE-FSOP-001, Field Documentation
- SWE-FSOP-400 Series, various sampling SOPs

Field Forms

- SWE-FFRM-004, Daily PFAS Sampling Checklist
- SWE-FFRM-002, Chain of Custody

3.0 Equipment List

- Gel or bag ice (determine which is appropriate)

  [PFAS Project]: Ice in polyethylene bags

- Bubble wrap and/or foam inserts

  [PFAS Project]: Avoid packing materials that contain PFAS and materials that absorb water, including paper, cardboard, and styrofoam; as they become soggy, they lose cushioning properties.

- Clear, strapping, or duct tape

  [PFAS Project]: Use PFAS-free tape

- Coolers
- Heavy-duty plastic bags

  [PFAS Project]: Use HDPE bags[1]

- Plastic zip-top bags (i.e., quart and gallon)

  [PFAS Project]: Use HDPE bags[1]

- Air or Ground Waybills
- Sample container labels
- Custody seals for coolers

4.0 Procedures

4.1 Sample Custody

Five aspects of sample custody.

- Use appropriate sampling equipment
- Properly handle and document samples, starting from the time of collection
- Keep samples within temperature controls and safely located until offsite transport
- Properly pack and transport samples from the field site to the laboratory
- Verify laboratory receipt of samples
- Ensure laboratory has a custody program (subcontractor responsibility)

4.2 Proper Sampling Equipment

The supplies needed to collect samples must be made of material that will not release contaminants to the sample or hold contaminants to the sampling equipment. Equipment specifications are described in

[1] [PFAS Project]: LDPE bags may be used for bagging samples if special precautions are taken. LDPE bags should be kept separate from other sampling supplies in the staging area and should not come into direct contact with the sample media. Gloves should be changed after handling LDPE bags.

project work plans. Shipping coolers should be inspected for defects and must be decontaminated before use.

> [PFAS Projects]: Surfaces in contact with the sampled media should not contain Teflon® or other PFAS-containing material.

Use new, certified sample containers suitable for the media being analyzed. Containers should be provided by the analytical lab or supplier in the appropriate quantity to accommodate required volumes for the field sample, duplicates, and any amounts required for laboratory QC processes. Certification requirements are specified in the USEPA *Specifications and Guidance for Contaminant Free Sample Containers* (EPA, 1992).

4.3 Sample Collection and Handling

Each person handling the samples must document from whom and when the item was received and to whom and when it was delivered. Documentation of handling samples is part of the custody record, which provides the mechanism for tracking samples from the time of sample collection thru laboratory analysis and disposal.

A sample is considered to be "in custody" for legal proceedings if it is:

- In a person's actual possession
- In view after being in physical possession
- Locked up so that no one can tamper with it after having been in physical custody
- In a secured area, restricted to authorized personnel only.

If any one of these is not in place at all times, sample custody is broken. The FTL should notify the PL of actions taken and document the PL decision. If corrective action is needed, the Program Manager and SWE Field Quality Control Manager should be notified.

Sampling procedures are described in the SWE-FSOP-400 series of SOPs. The Field Team is responsible for logging the sample collection in field logbooks/notepads or field forms as described in SWE-FSOP-001, "Field Documentation."

Sample custody begins at the time of sample collection, and its custody is assigned to the Field Team sample custodian. Custody transfers must be documented. Typical transfers include:

- Transfer of samples from contractors, if used, to Ahtna staff
- Transfer of samples to a transporter
- Transfer of samples to the laboratory
- Transfer of samples within the laboratory

When samples are transferred, the transfer is noted in the field logbook/notepad or field form SWE-FFRM-002, "Chain of Custody," or similar form. The name of the organization/individual and date/time of the transfer and organization/name and date/time of the recipient. For samples shipped by ground or air carrier, the unique airbill number or bill of laden should be recorded.

4.4 Sample Integrity

To reduce the possibility of invalidating the results, all collected samples must be placed in laboratory-supplied containers and labeled (Figure 1).

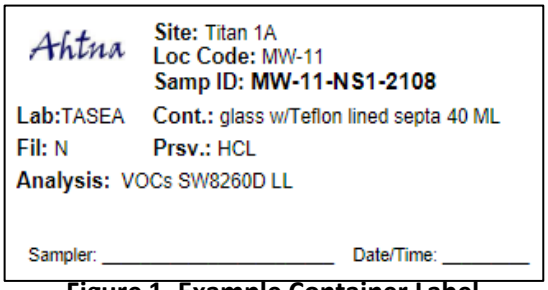

Figure 1. Example Container Label

Sample preservation before laboratory analysis is accomplished by adding the sample into pre-preserved sample containers or adding the preservative after filling the container. Preservation requirements are described in Worksheet# 19/30 of the project Quality Assurance Project Plan (QAPP).

With few exceptions (i.e., metal analyses), samples must be cooled as soon as possible after sample collection, and after that, maintained between 0°C–6°C. Samples must be kept in the custodians' possession or stored safely at all times.

Sample containers should be pre-labeled as much as practical before sample collection. Labels should be affixed to the sample container before or at sampling and must adhere firmly to the container. Labels can be further secured by placing clear packaging tape over the label, but not for volatile organic compounds (VOC) or gasoline range organics (GRO) analyses.

Sample containers that are weighed by the laboratory before use should not have any additional labels placed on the container, affecting the weight. For those containers, use the label already provided on the jar. Only one label should be placed on each sample container.

Use the specifications defined in the project work plans. Unless the QAPP specifies otherwise, sample labels should be written in indelible ink and contain, at a minimum, the following information:

- Project number/Site
- Field sample ID
- Container type and preservative
- Filtered (Y/N)
- Laboratory name
- Analysis requested (abbreviated)
- Sampler's organization and initials
- Collection date and time (24-hour clock)

4.5 Sample Packing

The following steps must be followed when packing sample containers for shipment:

1. Choose a cooler with structural integrity that will withstand shipment. Ensure the cooler is large enough to contain all the samples to be shipped along with the appropriate amount of ice. Use a cooler that has been pre-cooled and not one that has been in a hot vehicle or out in the sun. Secure and tape the cooler drain plug with duct tape.

   [PFAS Project]: Use ice in polyethylene bags.

2. Be sure that the caps on all sample containers are tight and do not leak but do not overtighten.
3. Fill out a chain of custody (COC) form or use the COC form filled out in the field. The COC should only list the samples and bottles (specific to analyses requested) added to the cooler. Check to ensure that the sample labels are intact, completed with the correct information, and that sample identification matches the COC record exactly. An original signed copy of the COC is sealed in a water proof zip-top bag taped to the lid of the cooler.

   [PFAS Project]: The COC record will be placed in a re-sealable plastic zip-lock bag, the bag sealed shut to prevent water intrusion from the bagged wet ice in the cooler, and the bag taped (using PFAS-free tape) to the inside lid of the cooler.

   A copy of the COC is kept with the field logbook/notepad or field form.

4. Wrap and package containers sufficiently to prevent cross-contamination or exposure to melt water and ensure that containers remain intact during shipment.

   [PFAS Project]: Seal each sample container in a HDPE bag to prevent melt water from getting into the sample or degrading the sample label. Taping the end of bags with Duct tape will provide added protection against melt water.[1]

5. Place the containers into the cooler with caps up. No containers should be placed on their sides, as there is significantly less chance of breakage when packed vertically.
6. Use enough ice (double-bagged) to ensure that samples are received by the laboratory at the proper temperature of 0°C–6°C. For temperature-sensitive analyses, it may be necessary to cool the samples in onsite chillers. Refer to the project work plans.

   <u>Recommended ice arrangement:</u>

   - Place a layer of ice on the bottom of the cooler.
   - Place a bag of ice vertically on one end of the cooler, followed by a set of samples. Follow this with another vertical bag of ice and repeat until the cooler is full. Make sure all samples are lined on both sides with ice.
   - Place more bags of ice flat on top of the samples.
   - Cover this with an insulating layer, such as bubble wrap.

     [PFAS Project]: Avoid packing materials that contain PFAS and materials that absorb water, including paper, cardboard, and Styrofoam; as they become soggy, they lose cushioning properties

7. Place a temperature blank in the cooler, and VOC/GRO trip blank is needed.
8. Fill excess space between sample containers and walls of the cooler with additional bubble wrap.
9. Place a signed and dated custody seal on the outside spanning the area where the cooler lid meets the cooler's body.

   [PFAS Project]: Custody seals will be pre-printed on PFAS-free paper.

10. Secure the cooler with packing tape over the Custody Seal.

    [PFAS Project]: PFAS-free tape will be placed over the seals to ensure that seals are not accidentally broken during shipment.

4.6 Offsite Transport

Samples taken over multiple days should be sent to the laboratory with sufficient time to allow the laboratory to meet holding time requirements. If the requested analyses have a short holding time (less than 48 hours), samples should be delivered to the laboratory for analysis as soon as possible following sample collection: preferably same day or overnight for morning delivery. Notify the laboratory Project Manager when short holding times are anticipated.

Samples can be stored onsite if sample custody is maintained and the samples are placed in transport containers (e.g., cooler or shipping box) for protection from breakage, contamination, and loss and in an appropriate controlled-temperature device (e.g., ice-packed cooler or onsite refrigerator)

Sample coolers are typically transported by a laboratory employee or air carrier. Only reliable services that provide a tracking number should be used when using professional services to transport physical samples. A copy of the shipping receipt and tracking number should be logged in the field logbook/notepad. The package should be addressed to the "Sample Custodian."

Transportation regulations followed by air carriers are airline-specific; some use only IATA, and others allow either IATA or DOT. Ground and vessel transportation is guided by DOT regulations. If shipping by highway or rail, no shipping paperwork is required as stated in 49 CFR 173.4a(h)1. These regulations have requirements to identify, document, label, and package samples if the shipment contains dangerous goods.

- **Note**: *United Parcel Service and Federal Express follow IATA for air shipments and DOT for ground shipments*

The shipper is responsible for identifying, documenting, and packaging samples for air shipment that contains dangerous goods or whether the shipment is exempted for limited quantities. Because most multimedia samples collected for environmental projects returned in preserved containers are exempted, specific procedures are not provided in this SOP. Contact the Field QC Manager if dangerous goods shipment is suspected.

Shipments of the following may contain dangerous goods:

- If the hazardous material has a UN code
- Unknown hazardous waste from drums, sludges, or appears suspicious
- Odor, PID measurements, and physical characteristics indicate a hazard

- Explosives or radioactive materials

Keep in mind that IATA requirements and the FAA and TSA "Prohibited Items List" will not allow shippers to check dangerous goods, in any quantity, as baggage on a commercial flight.

Each sample collected will be recorded on a COC form. Each COC form(s) in a cooler or shipping container should be specific to the samples in the cooler and not samples in multiple/other coolers.

4.7 Laboratory Acknowledgment

Once the samples arrive at the laboratory, the laboratory Sample Custodian checks the shipment for:

- Levels of liquid samples to assess whether leaks have occurred
- Shipment contents match the COC form
- Check the cooler temperaure and pH if preserved.

***Note**: VOC/GRO analyses are checked at the sample analysis time.*

The laboratory will provide notification of sample acknowledgment. The notification summarizes the work order, sample login descrepences and resolution, and discussions between the laboratory Project Manager and the Field Team. The FTL is responsible for reviewing the notification for completeness and accuracy.

4.8 Document Control

Sampling field forms should be completed in their entirety. If an entry is not applicable, indicate "n/a" (not applicable) or line out the entry.

After a task or project, all field documentation, including the field logbook, field datasheets, and electronic data, shall be scanned and placed in the appropriate folder on the server. All original documents shall be submitted to the PL and kept in the project file. See FSOP-001 (Field Documentation).

5.0 Quality Assurance/Quality Control

Conduct the 3-Phases of Quality Control method described in the project work plans.

Verify the laboratory notice of sample acknowledgment.

6.0 Documentation Review

The FTL is responsible for daily review of the field sample management and fieldwork documentation for compliance with requirements (Section 4.0) and legibility. Errors and omissions should be explained and revisions to an entry signed and dated by the FTL.

7.0 References

International Air Transport Association (IATA), 2019. Dangerous Goods Regulations.

Code of Federal Regulations, 49 CFR 173.4a. Excepted Quantities

USEPA Specifications and Guidance for Contaminant Free Sample Containers. EPA540/R-93/051. (December 1992)

Investigation Derived Waste Management

Document Number	SWE-FSOP-802
Revision	0
Department	Southwest Operations
Previous Document Number	Original Document
Originally Released	April 1, 2022
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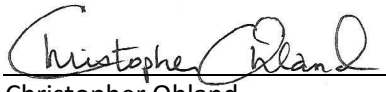
Approvals



Christopher Ohland
SWE Quality Assurance Manager

April 1, 2022
Date

Bruce Wilcer
SWE Field Quality Control Manager

April 1, 2022
Date

Project-Specific Modification[1]

[1] Document project-specific modifications in this section. No other modification to the SOP is authorized.

Revision History

Table of Contents

1.0 Introduction

1.1 Purpose

The purpose of this standard operating procedure (SOP) is to direct field staff in the proper techniques, and documentation for handling, labeling, tracking, and disposing of investigation derived waste (IDW) encountered or generated during environmental field activities. This SOP gives descriptions of equipment, field development procedures, field data collection, and personnel responsibilities.

1.2 Scope

The scope of this SOP is to describe procedures for projects that generate IDW.

Materials that may become IDW include but are not limited to:

- Personal protective equipment (PPE) includes disposable coveralls, gloves, booties, respirator canisters, splash suits, and other non-soil, solid wastes
- Disposable equipment and items include plastic ground and equipment covers, aluminum foil, conduit pipe, disposal samplers (e.g., bailers), tubing, and others
- Soil cuttings/spoils from boreholes/trenches and other soil wastes generated during sampling
- Drilling mud or water used or generated during drilling
- Groundwater obtained through well development or well purging
- Cleaning fluids such as spent solvents and wash water
- Packing and shipping materials
- Sediment from surface water bodies (rivers, lakes, ponds)
- Wash and rinse waste from decontamination activities

These types of IDW may require classification as non-hazardous or hazardous waste and should be containerized, stored, profiled, transported, and disposed of appropriately according to regulatory and client-specific requirements. Review project-specific work plans and waste management plans to confirm appropriate procedures for each site.

1.3 Responsibilities

Field Team. A Field Team is one or more individuals working together. The Field Team is responsible for the oversight of IDW as specified in this SOP.

Field Team Lead (FTL). The FTL is responsible for reviewing project work plans to understand the health and safety needs, procedural specifications, and field documentation requirements. The FTL is responsible for reviewing and confirming the adequacy of the fieldwork documentation.

Project Lead (PL). The PL is responsible for providing adequate resources to the field staff and ensuring the Field Team has adequate experience and training to comply with the SOP successfully. The PL is responsible for approving and documenting techniques not described in this SOP but are considered the best methods for the current project.

Safety Representative. The Safety Representative meets the experience and training requirements of USACE EM-385-1-1 (USACE, 2014). The Safety Representative oversees site-specific health and safety activities and ensures compliance with the project requirements. The Safety Representative notifies the

FTL of safety deficiencies and incidents and actions to correct those. The FTL approves those actions or, if the circumstance warrants, notifies the PL and Site Safety and Health Officer for their approval.

Quality Control Lead (QC Lead). The QC Lead ensures work inspections are performed using the 3-Phases of Quality Control method described in the project work plans. The QC Lead notifies the PL of quality deficiencies and actions to correct those. The PL approves those actions or notifies the SWE Field QC Manager for their approval if the circumstance warrants involvement.

1.4 Definitions

Field Documentation – The combination of field logbooks/notepads, field forms, digital/electronic forms, and other documentation in the project file.

Field Forms – Any documentation that preserves an accurate historical record of field activities but is recorded on unbound paper. These forms should be referenced in the FLB. Each data entry field should have an entry or indicate that data for that field is not available or not required.

Field Logbook (FLB) – A portable, bound, weatherproof notebook with consecutively numbered pages.

Field Notepad – A unbound notepad or loose-leaf paper with consecutively numbered pages.

Investigation Derived Waste (IDW). Waste that is generated in the process of investigating or examining a contaminated site.

Personal Protective Equipment (PPE). Personal health and safety equipment is used to protect the individual from contaminant exposure and physical injury.

2.0 Relevant Documents

This SOP focuses on the IDW management task and applications and should be used in conjunction with other applicable SOPs and forms, including the following:

2.1.1 Standard Operating Procedures

- SWE-FSOP-001, Field Documentation
- SWE-FSOP-801, Equipment Decontamination

3.0 Equipment List

The following materials and equipment may be needed for IDW management:

- Bound field logbook (FLB) with consecutive page numbers and waterproof, indelible pens/markers
- PPE as outlined in site-specific Accident Prevention Plans (APPs)
- Decontamination equipment and supplies (e.g., wash/rinse tubs, brushes, Liquinox™, plastic sheeting, paper towels, sponges, garden-type water sprayers, large plastic bags (minimum 0.85 mil), potable water, distilled water, and deionized water)
- Department of Transportation (DOT)-rated 55-gallon drums or other approved containers for containing soil cuttings, decontamination water, and formation water
- Drum/bung wrench and drum funnel

- Heavy equipment forklift or vehicle with drum grappler (as necessary)
- Photoionization detector (PID)
- Vendor-supplied roll-off bin(s), with liners if applicable
- Laboratory-supplied sample containers
- Wood pallets (as necessary)
- Non-porous (e.g., stainless steel) trowels
- Field notebook/notepad and waterproof permanent marking pens
- Waste manifests
- Secondary containment materials (i.e., spill containment platform/pallet with drain, absorbent pads)

4.0 Procedures

The procedures below are provided for managing non-liquid and liquid IDW generated during field activities.

4.1 IDW Staging Area

Identify an onsite area for staging drums, bins, and other storage containers. The area should be large enough to allow temporary storage and safe access to the drums and bins of IDW. If IDW is left onsite without supervision, then the area must be secured from unauthorized access and containers labeled appropriately. Hazardous IDW may not be accumulated for more than 90 days.

4.2 Soil IDW

Place IDW (soil cuttings/spoils generated during drilling, trenching, soil sampling, or other) into DOT-rated 55-gallon drums, appropriately-sized containers/bins, or stockpiles at the point of generation. In most cases, mixing the cuttings from several borings or sampling locations is permissible to fill the containers or entire stockpiles but must be confirmed in advance by the PL/FTL. Ask the FTL whether potentially hazardous solids should be segregated from non-hazardous.

When drums or containers are full or daily activities are completed, the drum lids and rings will be fastened. Full drums or containers will be transported to the designated IDW accumulation area regularly to avoid the accumulation of drums or containers at investigation sites for extended periods.

Waste profiling analyses will be performed before disposal (Section 4.5). Each project may have unique waste profiling, storage, and disposal—review project-specific work plans and coordinate activities between the PL and client.

Unless approved, hazardous soil cuttings and excavation spoils must not be used to fill boreholes, test pits, or excavations. Place soil cuttings/spoils on plastic sheets or containerize them when generated; dispose of the plastic sheets with the used PPE or soil cuttings.

4.3 Liquid IDW

Contain liquids in DOT-rated drums or appropriately-sized watertight containers at the point of generation. Mixing the water from several sampling locations, decontamination water, process water,

and other IDW sources may be permissible to fill the drums but should be confirmed in advance with the PL or FTL. Ask the FTL whether potentially hazardous liquids should be segregated from non-hazardous.

When drums or containers are full or daily activities are completed, the drum lids and rings will be fastened. Full drums or containers will be transported to the designated IDW accumulation area regularly to avoid accumulating drums or containers at investigation sites for extended periods. All drums or containers will be labeled appropriately at the end of each day's activities. Perform waste profiling before disposal (Section 4.5). Each project may have unique requirements for waste profiling, storage, and disposal—review project-specific plans and coordinate activities with the PL or FTL.

4.4 PPE and Other Consumable Supplies

Inspect equipment and PPE (e.g., plastic sheets, screens, coveralls, boot covers, or other) to determine proper disposal procedures. If there is no evidence of contamination, materials can be disposed of with regular trash.

Decontaminate and discard PPE and other used supplies in plastic bags and sealed in metal barrels for final storage, transport, and disposal. Decontamination procedures consist of brushing off or using small amounts of water to scrub off potential gross contamination (see SWE-FSOP-801, Equipment Decontamination).

4.5 Waste Profiling

Waste profiling requirements will be coordinated by the PL with the client and disposal facility. At a minimum, a representative sample of the solid and aqueous IDW will be collected and analyzed for all chemicals of potential concern. When approved by the PL, generator knowledge is an acceptable alternative to laboratory testing. The PL will also coordinate with the client, disposal facility, and waste transporter to manage the completion of the waste manifest and ensure that an adequate number of manifests are available for the amounts and types of material to be disposed of. An example manifest is provided in Attachment 1.

Waste manifests are signed by the client or client's representative (usually identified on the manifest as the "owner" and/or "generator"). Field personnel are not allowed to sign manifests under any circumstances.

4.6 Labeling

Apply a label immediately after adding soil or groundwater to drums or soil to bins. If the waste generated has not been profiled, apply a "Pending Analysis" label (Figure 1). Add the contents, date(s) of generation, the origin of materials, address of generation, and contact information to the label. Because drum and container labels may be exposed to the elements, it is essential to use waterproof markers to fill in the information on labels and possibly clear packaging tape over the labels to preserve the information.

Once the material has been profiled, remove the "Pending Analysis" label and add the appropriate "Non-Hazardous" (Figure 2) or "Hazardous" label (Figure 3). Add the shipper, address, date(s) of generation, contents, and contact information to the label.

Figure 1 – Label: Pending Analysis

Figure 2– Label: Non-Hazardous

Figure 3– Label: Hazardous

4.7 Disposal of IDW

Soil and groundwater IDW will be placed in drums or appropriately configured bins and stored in a designated hazardous/non-hazardous waste storage area, the location and use of which will be coordinated with the client. Manifesting and disposal of IDW during field activities will be coordinated with the client before the initiation of field activities. As applicable, field activities that generate IDW will be conducted consistent with sustainable practices (e.g., reducing the volume of routine waste or IDW generated by decreasing materials consumption).

4.8 Document Control

The FTL is responsible for documenting or reviewing field team documentation of IDW management, including collection, sampling, labeling (if applicable), staging, and ultimate disposition of IDW. Disposition may include manifesting the waste and transportation offsite or releasing the waste to the client for ultimate disposal. The information entered in field documentation concerning IDW should include the following:

- Project Name
- Names of personnel
- Site location
- Type of activities
- Date waste generated
- Boring, well, or site number(s)
- Matrix
- Type of container(s)
- Estimated volume
- Disposition of contents
- Comments (field evidence of contamination [e.g., PID reading, odors])
- Any variance to procedures described in this SOP

After completing a task or project, all field documentation, including the field logbook, field datasheets, and electronic data, shall be scanned and placed on the server in the appropriate folder. All original documents shall be submitted to the PL and kept in the project file. See FSOP-001 (Field Documentation).

5.0 Quality Assurance/Quality Control

Conduct the 3-Phases of Quality Control method described in the project work plans.

Quality Assurance (QA) and Quality Control (QC) procedures for IDW field documentation review will be performed by the PL and QC Manager to confirm that content and level of detail comply with the applicable planning documents. Identification of errors and corrections made during QA/QC reviews will follow documentation requirements described in SWE-FSOP-001 (Fieldwork Documentation).

6.0 Documentation Review

The FTL is responsible for reviewing hazardous waste characteristics, ensuring the disposal facility is licensed to receive the IDW, and reviewing waste manifests and bills of lading.

The FTL is responsible for the daily review of fieldwork documentation for compliance with requirements (Section 4.0) and legibility. Errors and omissions should be explained and revisions to an entry signed and dated by the FTL.

7.0 References

None cited.

Attachments

Attachment 1.
Uniform Hazardous Waste Manifest

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) **A7 2002939203-001** **SC PPW 12/9/2008** Form Approved. OMB No.2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST	1. Generator ID Number	2. Page 1 of 1	3. Emergency Response Phone	4. Manifest Tracking Number

5. Generator's Name and Mailing Address — Generator's Site Address(if different than mailing address)

Generator's Phone:

6. Transporter 1 Company Name — U.S.EPA ID Number

7. Transporter 2 Company Name — U.S.EPA ID Number

8. Designed Facility Name and Site Address — U.S.EPA ID Number

Facility's Phone:

9a. HM	9b. U.S. DOT Description (Including Proper Shipping Name, Hazard Class, ID Number, and Packing Group(If any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes		

14.Special Handling Instructions and Additional Information

Contract retained by generator confers agency authority on initial transporter to add or substitute additional transporters on generator's behalf for purposes of transportation efficiency, convenience, or safety

15. GENERATION'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I Certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name — Signature — Month Day Year

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit :

Transporter Signature (for exports only): Date leaving U.S. :

17. Transporter Acknowledgement of Receipt of Materials

Transporter 1 Printed/Typed Name — Signature — Month Day Year

Transporter 2 Printer/Typed Name — Signature — Month Day Year

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

18b. Alternate Facility (or Generator) — U.S. EPA ID Number

Facility's Phone:

18c. Signature of Alternate Facility (or Generator) — Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

1.	2.	3.	4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a.

Printed/Typed Name — Signature — Month Day Year

EPA Form 8700-22v (Rev. 3-05) Prevolus editions are obsolete.

Analytical SOPs

SOP No.	SOP Title	Author Organization
#50	Sample Receiving/Login Procedures	Eurofins
#63	Internal Sample Tracking, Transmittal and Custody Procedures	Eurofins
#91	EPA Method TO-14A/TO-15 Volatile Organic Compounds (5&20 ppbv)*	Eurofins
#83	EPA Method TO-14A/TO-15 Volatile Organic Compounds (Low-Level)*	Eurofins

*SOP is available upon request

Eurofins Air Toxics
STANDARD OPERATING PROCEDURE

SOP #50

1.0) SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure is to outline the procedures for receiving samples, entering them into the ATLAS database, and logging them into the proper sample storage area. This SOP establishes specific guidelines for sample acceptance, which are generally accepted practices under EPA, DoD-ELAP, and NELAP protocols. Refer to *Appendix A* for Eurofins Air Toxics Sample Acceptance Policy.

2.0) RECEIVING PACKAGES

2.1 If receiving a group of packages, such as from Fed-Ex or UPS, keep the packages together until the last one is brought in. Count the items, confirm with the driver the number of packages and sign for them. If the count isn't confirmed, have the driver rescan all the packages and verify that all packages are intended for Eurofins Air Toxics. As signing for the packages assumes custody of them, never sign until the count is confirmed.

2.1.1 Sort Packages

2.1.1.1 Line up coolers in area behind receiving counter. Place coolers from the same client (based on company and point of contact) touching, as these samples are probably from the same project.

2.1.1.2 In an appropriate area, line up the boxes. Boxes from the same client (based on company and point of contact) should be touching, as they are probably from the same project.

2.1.2 Triage

2.1.2.1 Open package; locate and fill out COC (Chain of Custody). If there is no COC, notify the PM (Project Manager).
*EATL COCs have a place for the items noted below. If receiving a client COC, the following information still needs to be documented and there are stamps on the front counter to aid in this process.

• In the Received section, place signature followed by "EATL" (to denote receipt by lab) and the date/time (in military time) which the samples arrived at EATL.
•Verify and fill in Custody Seal Info.
ºYes: Custody seals present and intact.
ºNo: Custody seals present, not intact.
ºNone: Custody seals not present.
•If applicable, measure and record the temperature of sample(s). (See section 6.1.) Repack the ice and close the coolers to maintain temperature. If temperature recording is not applicable, write "NA" for the temperature.

•Verify and fill in condition of sample(s).
ºGood: No obvious damage and proper temperature.
ºIf an issue is found, enter SDR (Sample Discrepancy Report) on the COC: Issues include evidence of possible shipping damage, custody seals are not intact, samples were received at an improper temperature or the COC is incomplete (refer to section 5.0).

•Fill in Shipper Name (Ex: Fed-Ex). If shipping documents are loose, then detach them from package to be transferred with the COC into workorder folder. If the shipping documents cannot be detached from the package, write the tracking number on the Air Bill section of the COC (Note: If the airbill can be placed in folder there is no need to fill in the Air Bill#).
•If there is any indication on the COC that the samples are on a TAT of 7 Days or sooner, place a red folder with the sample set and if the indicated TAT is 3 Days or sooner alert other Login Analysts as to the rush status.

2.1.2.2 Do a cursory hold time check, alerting the lab and PM of any samples with sensitive hold time.

2.1.2.3 Samples Designated By Clients To Be Used For Evidentiary Purposes

2.1.2.3.1 Clients may designate that samples will be used for evidentiary purposes either on the COC or in some other documented manner.

2.1.2.3.2 Unless specific instructions are received from the client and are agreed to by Eurofins Air Toxics, samples that are designated for evidentiary purposes will be logged in and maintained identically to samples not identified for this purpose.

2.1.3 Print Project Profile

2.1.3.1 Canisters or barcoded sorbent tubes (i.e. TO-17 TA, 325B, etc.)

2.1.3.1.1 Open ATLAS. In the CATS/CATS tab, check-mark the box next to the "Print Project Profile" and place cursor in Asset Barcode field.

2.1.3.1.2 For each group of samples, scan the barcode on the canister/tube to print the Project Profile. **NO SAMPLES MAY BE LOGGED IN WITHOUT A PROJECT PROFILE**.

2.1.3.1.3 Verify if the samples will be on a TAT of 7 Days or sooner (check the COC, Profile TAT and Profile Notes to Receiving). If so, place a red folder with the sample(s) and alert other Login Analysts to the rush status if the TAT is 3 Days or sooner.

2.1.3.1.4 Based on the expiration date, TAT and if the samples need to be refrigerated, determine the priority for logging in the samples. Communicate with the lab and PM to let them know of any rush analyses (2 Days or sooner) or expiring samples. Communicate priorities to other Login Analysts.

2.1.3.2 Client Canisters or non-barcoded media

2.1.3.2.1 For Tedlar Bags, Client Canisters or media without barcode scanning information, use the information on the COC to locate the correct project profile. See WI 50 for detailed instruction to find project profiles. If unable to positively determine the project profile due to missing client information or project information, it will require project manager's confirmation; if the PM is not available to confirm, the workorder will be placed on hold. When the correct project profile has been identified, the Project Manager will send an email confirmation and notify sample receiving to proceed with the log-in. **Do not send SRC** until profile is confirmed.

Note: To ensure a correct profile is selected, the company name on CoC must match the profile, unless otherwise noted in profile or confirmed by PM. The project name or number should match with profile or previous workorders. If any doubt, confirm with project managers. The SRC should not be sent until profile is confirmed.

2.2 If receiving packages directly from a client or client's courier:

2.2.1 Ensure proper documentation on the COC in regard to custody transfer.

2.2.2 Fill out the COC as in 2.1.2.1 above, writing "HD" as the Shipper Name, this shall indicate the media was Hand Delivered (An Airbill is not necessary for Hand Delivered items).

2.2.3 Do a cursory check to make sure that the COC is filled in properly, the TAT is apparent and the type of analysis requested is consistent with the media that has been submitted. Ask questions, if needed. Give the client a copy of the COC.

2.2.4 If there is any indication on the COC that the samples are on a rush TAT, put a red folder with the documentation and alert other Login Analysts as to the rush status.

2.2.5 Do a cursory hold time check, alerting the lab and PM of any samples with sensitive hold times or turnaround times of 2 Days or sooner.

2.3 If receiving packages directly from an EATL Courier:

2.3.1 Should the EATL Courier have the COC in hand, they shall sign and date with time the 'Relinquished by' area to ensure proper documentation on the COC in regard to custody transfer.

2.3.2 Fill out the COC as in 2.1.2.1 above, writing "Courier" as the Shipper Name. An Airbill is not necessary for EATL Courier delivered items.

2.3.3 Do a cursory check to make sure that the COC is filled in properly, the TAT is apparent and the type of analysis requested is consistent with the media that has been submitted. Contact the PM with any questions, if needed.

2.3.4 If there is any indication on the COC that the samples are on a rush TAT, put a red folder with the documentation and alert other Login Analysts as to the rush status.

2.3.5 Do a cursory hold time check, alerting the lab and PM of any samples with sensitive hold time or turnaround times of 2 Days or sooner.

2.3.6 If the EATL Courier delivered packages while Login Analysts were away from receiving, the EATL Courier shall sign and date with time the "Relinquished by" area, while EATL Lab personnel will

sign and date with time the "Received by" area.

3.0) LOGGING IN WORKORDERS (WOs)

3.1 Find the WO stamp on the front counter, the stamp will automatically increase the number by 1. This will be the WO Number for this set of samples. Stamp the COC(s). See section 6.2 for more details on assigning the WO number.

3.2 Set out samples in order, as shown on the COC, verifying the sample tags against the COC. Document discrepancies on a SDR (see Section 5.0).

3.2.1 Collection times not present on the COC or consistent with sample tags are not considered to be a discrepancy.

3.3 As clients may have more than one project in progress and may pull cans related to a different profile, to ensure the correct profile is used: Compare the project profile against the COC for project name/number, the requested analysis, etc.

3.3.1 If a matching profile cannot be found, contact the PM for confirmation of which Profile to use.

3.3.2 If it appears that the correct Project Profile does not have the appropriate information, (such as the profile is limited to TO-15 analysis, but the COC requests TO-3), contact the appropriate PM for clarification.

Note: Follow-up with the PM within 24-hours if a response is not provided.

3.4 Click New WO Button in ATLAS

3.4.1 Enter the Project ID from the profile into the Project ID section and hit enter or click Search.

3.4.2 This will populate the project info into the results section, but does not automatically highlight the first record in the results section. Manually highlight the record.

3.4.3 Click Create New Workorder button.

3.4.4 Type in WO number.

3.5 In the Receiving tab in ATLAS

3.5.1 Wait for the computer to update the screen.

3.5.2 Fill in Receiving Status (check completed which will automatically update the "By" initials to the person logged into ATLAS).

3.5.3 If there are any issues found, such as expired samples or improperly filled out COCs, fill out a SDR (see section 5.0). The sections of the SDR will guide whether the samples continue through the process or are held until the Project Manager (PM) contacts the client.

3.5.4 Analysis Box

3.5.4.1 Reporting List: Click on List Filter or click F5 to refresh the Reporting Lists in the Project Profile and choose correct list. Before choosing a list, ALWAYS make sure that Current Project is clicked, as the WO should only report options from the Project Profile. IF THE LIST NEEDED IS NOT ASSOCIATED WITH THE PROJECT, NOTIFY THE PM TO MAKE APPROPRIATE CHANGES TO THE PROFILE BEOFORE CONTINUING.

3.5.4.2 Method Type: The system will autofill the Method Type based on the Reporting List. It is typically accurate, but the dropdown can be used to fill in the correct laboratory work list. This field is used to place the WO on the appropriate laboratory worklist. (If ATL Applications do not fill correctly, manually choose Other MS or Other GC as appropriate for the type of analysis. The lab can direct you to the correct entry, if you are not sure for that particular analysis.)

3.5.4.3 Type of Analysis: The system will autofill based on the Reporting List. This field is used to populate the Method on the Login Summary page.

3.5.4.3.1 For 5&20, make appropriate change so that only the correct analysis (TO-14A or TO-15) is present, such as Modified TO-15 (5&20 ppbv).

3.5.4.4 Sample Tracking Type of Analysis: The system will autofill based on the Reporting List. It should always be the Reporting list without the word "Modified" and then any add-ons needed. This is the list that shows for the lab in Sample Tracking. "Modified" is removed for easier viewing in the lab.

3.5.4.4.1 If the Project Profile indicates that this is an AFCEE project, add "/AFCEE" to the end.

3.5.4.4.2 If the samples have multiple lists indicate such as "/2Lists" at the end.

3.5.5 Project Information box:

3.5.5.1 Fill in Project Number/Project Name from COC. These items will be typed exactly as they are shown on the COC, including capital letters, spacing, hyphens, etc. If the COC is blank, these fields will be blank, regardless of whether or not they are populated in the Project Profile.

3.5.5.2 Verify dates, turnaround and checkboxes.

3.5.5.3 Verify that the Financial Status is set to "Good". If the Financial Status is not "Good" (the field is red), then note for later action. (See section 6.11.)

3.6 Receive returned items into CATS

3.6.1 Go to CATS, the Reception Editor Tab

3.6.2 For tracked items (those with barcodes such as canisters and flow controllers):

3.6.2.1 Place the cursor in the Asset Barcode field. Scan samples in order then scan all other bar-coded items. Verify by the number of lines that all items were recorded.

3.6.2.2 For samples, in the Items Received box tab to the Fraction ID field. Type in the correct Fraction ID's (01A, 02A…). Verify the canister numbers on the COC against those in the system.

3.6.2.3 For extra media not listed as sample, verify if they are from the same PID or same client.

3.6.2.4 Save.

3.6.3 To return items shipped by quantity (such as gauges, tubes, filters and etc.):

3.6.3.1 After tracked items have been scanned, in the Items Received section highlight the Shipment ID, then click the Find Other button.

3.6.3.2 The Shipment ID will appear in the Search Criteria box of the Find Other tab. (Alternatively, in the Find Other tab, type in the Shipment ID preceded by the PMs initials, such as "KV76741".)

3.6.3.3 Click the Find button. This will populate the Open Shipments portion of the results.

3.6.3.4 Double click on the Open Shipments to pull up the Items.

3.6.3.5 Click on each item received, put in the correct Qty and then click Receive Item(s).

3.6.3.6 This will receive the item with your WO

3.6.3.7 Repeat until all items have been received and then click back into the Reception Editor. The items you received by quantity will now be part of the Items Received list.

3.6.3.8 Save.

3.6.4 Click the "Print Receiving Report" button.

3.7 Check the shipment for additional charges:

3.7.1 Right-mouse click on the shipment ID and choose "Open Selected Shipment" to open the associated shipment.

3.7.2 Check to see if the Shipment has already been pulled (Bidship Pulled shows as "Y"). If the shipment has already been pulled, skip to Section 3.7.6.

3.7.3 Check if shipping needs to be charged or if any items such as fittings, unions or tubing need to be charged for.

3.7.4 If not, click the box to Y for the Bidship Pulled and save.

3.7.5 If charges apply:

3.7.5.1 Note the items, quantity and shipping charges so that they can be charged for in section 3.9.

3.7.5.2 Write comments in the Conditions for Charges section of the bidship showing which WO will be charged and what items (such as shipping or fittings), set the Bidship Pulled Box to Y and save.

3.7.6 Repeat, checking all associated shipments

3.8 Return to the Receiving tab

3.8.1 If the media was scannable (had bar codes), click the auto-fill from CATS button, which will auto-fill the fraction numbers and container info. If the media was not scannable, enter the fraction numbers and container types manually.

3.8.2 Type in the Client Sample ID, exactly as shown on the COC including capital letters, spacing, hyphens, etc.

3.8.2.1 Type in the Date of Collection. (Other countries sometimes write dates as day/month/year instead of the US standard of month/day/year - when in doubt, check with the PM.)

3.8.2.2 Check for expired or soon to expire samples. Notify the lab of quickly expiring samples and fill out an SDR (see Section 6.0) for samples which were received expired.

3.8.2.3 Click Save WO.

3.8.2.4 Check the Sample Tracking Info box. Samples associated this Project Profile ID are tracked and summed. Total Samples therefore reflects the total number of all samples ever received under a given Project profile ID. If the number of samples is the same as the number of samples in this WO, check CSR Review to give the PM the opportunity to review the first WO from the Project Profile.

3.8.2.5 If the Project Profile states 100% duplicates or 1/ANB (1 per analytical batch), set the number of duplicates appropriately.

3.8.2.6 If samples require extraction (PUF/XAD media e.g.), make sure the "Requires Extraction" box is checked.

3.9 In the Login module go to the Login tab

3.9.1 Fill in the Login Status (check completed which will automatically update the “By” initials to the person logged into ATLAS).

3.9.2 Enter the PO Number from the COC, exactly as shown including capital letters, spacing, hyphens, etc. If the PO Number is not on the COC, use the PO Number from the Project Profile. If there is no PO Number on the Project Profile either, leave the field blank.

3.9.3 Verify the Report To and Bill To info versus the Project Profile.

3.9.4 In the Sample Info section:

3.9.4.1 If the samples are canisters, click “Auto-Fill From Rcvg” which fills in the Final Press. Verify the Final Press is correct. If not, manually type in the final pressure associated with the canister type. If samples are not canisters, leave blank.

3.9.4.2 Enter the times of collection from the COC (if times are not present on the COC, keep blank which will fill as “NA” on the report). Only samples are required to have sample times.)

3.9.5 Click the Misc. Charge Auto-Fill from Project button.

3.9.5.1 Using the Shipment and Project Profile, verify that all charges pulled in are correct and that all applicable charges are included(examples include canisters, shipping, fittings, tubing, unions, eCVP and EDD charges).

3.9.5.2 The auto-fill will pull in charges based on Shipment and will put in a comment as to which Shipment the charges are from. Keep this information as it comes over, for billing purposes.

3.9.5.3 If shipping is charged, a 20% handling fee is added for domestic shipping. International shipping is always charged and has a 30% handling fee. The price in "Client Charges" field includes the handling fee.

3.9.6 Save the WO and Print Labels (unless there are multiple fractions).

3.10 Go to the Lab Narrative Tab. (See SOP #45 for further information.)

3.10.1 Choose the correct Narrative template. (See Work Instructions WI50 for a list of common used Lab narratives.)
3.10.2 Click "Refresh samples recvd, header line" button.
3.10.3 Verify the first sentence in the first narrative box, including the number of samples, type of media and date Received.
3.10.4 If there were receiving issues (as narrated in the SDR, see section 6.0), use the Insert Narratives button to choose the correct narrative statement. The wizard can help to insert sample IDs appropriate for the issue. QA is responsible for maintaining these templates. The Receiving analyst is allowed to change the tense and add in the correct sample IDs, but any other changes to the template must be approved by QA.

3.11 Go to the Login FAX Cover tab

3.11.1 If the client is on Financial Hold, choose the appropriate narrative to include in the Login Fax. See Section 7.11 for additional information regarding Financial Status.
3.11.2 If there were receiving issues, click on discrepancies to help create text. This is NOT the same wording as the Lab Narrative, although the issues are narrated in both places. Be sure to include the statement "The following discrepancy has been observed" using the correct vernacular.

3.12 Go to the Remarks tab

3.12.1 Use the list of Remarks to help create the text for any remarks. These will print on the WO Summary Page (Ex: A 100% surcharge was applied for the 24-hour turnaround time). There is sometimes a note in the Project Profile giving a specific remark that needs to be added to all WOs for that project.
3.12.2 In WO comments narrate anything internal to EATL. The client will not see these comments (Ex: 3 cans received unused.). Anything out of the ordinary, which required verification, or might be questioned, should be notated in this section.

3.13 Email/Scan COC

3.13.1 Scan the COC as a TIFF file and attach using the Load and Save COC button. **NOTE:** If the project is a DOD Level IV (eCVP), the shipping documents must be scanned into ATLAS as well. Scan the COC and shipping document(s) as a TIFF file and attach using the Load and Save COC button.
3.13.2 Verify that the WO number on the COC matches the WO number in ATLAS and that all COC pages and shipping documents (if applicable) are present.

3.14 Print the Login Review Report from the Report tab.

3.14.1 Verify each item on the report referencing the COC, Project Profile, Receiving Report and SDR.
3.14.2 Check mark next to each item to show that it was verified.
•For the checkbox section, a check-mark or "NA" must be used for each item (NA is appropriate when an item does not exist. For instance, if there is no SDR then the box for "All SDR items have been narrated." should be "NA"). A line-through all the boxes does not prove that each item was verified and is not appropriate.
3.14.3 If needed, make notes on the report to clarify any unusual circumstances.
3.14.4 For minor changes that need to be made, show the change on the report and date and initial to show that the change was made in the system. For major changes, make the change then reprint the report.
3.14.5 Date and initial the Login Reviewed By line at the end of the report to show that you have approved the information on the report. This report serves as a checklist for items that need to be verified. If you are signed off and will not be sending the WO through Login Review, also sign the Second Reviewed by line and mark the Reviewed Status as complete with your initials in the Login/Login Screen. See *Appendix B* for Login Review Report example.
3.14.6 All DoD workorders require Login Review to be completed by a different person that logged in the samples.

3.15 If the sample does not need to be pressurized, print the Login Summary page.

3.16 Print the Reporting List and verify that it is correct.

3.17 Put folder together.

3.17.1 Staple the Project Profile to the inside of the front of the folder.

3.17.2 Put Stamps on folder, as needed.

- •QA Review (See Section 7.8.)
- •Login Review (100% for Analyst in training)

3.17.3 Put dates on folder, using "NA" where not applicable. The folder should be pre-stamped with the following Due Dates:

- •Promise Date
- •CVP Date
- •EDD Date

3.17.4 The documents should be put in this order.

- •Login Summary Page (may be added after pressurization)
- •COC
- •Project Requirement Table - PRT (If applicable). *The location of the PRT can be found in the Special Field of the QA/QC section of the Project Profile (i.e., O: \Project Requirement Table 20xx\010x-00xQC.doc). The path listed indicates the location of the file on the network.*
- •*Reporting List*
- •*Sample Receiving Report*
- •*Any contacts, emails or other info*
- •*Login Review Report*
- •*Air Bill(s)*

3.18 Additional fractions of a WO

3.18.1 If the same samples are used in an additional fraction, use the "Duplicate Current Workorder" button in the New Workorder tab to create a fraction with the next letter. (For example you are in the "A" fraction, clicking this button will create a "B" fraction.)

Please Note:
**If multiple fractions are created, canisters must be scanned and charged in the same fractions, usually the A fraction. Exceptions are when different media were received (i.e. TO17 tube vs canister).
**Creating a Duplicate Workorder will not automatically move the cursor to the Receiving tab; the user must click to the Receiving/Receiving screen to access the new fraction.

3.18.1.1 Update the Method Type, Reporting List, Type of Analysis and Sample Tracking Type of Analysis as shown in 3.5.4.

3.18.1.2 If this fraction uses only some of the samples from the previous fraction, in the Login/Login screen, right-mouse-click on the sample(s) that do not apply and choose the "Delete Row" feature. This will delete the sample from this fraction.

3.18.1.3 Follow steps 3.10-3.17 Note: The COC from the parent fraction will auto-fill. Verify that this is the correct COC. If not, attach the correct COC.

3.18.1.4 When all fractions have been created, click Print Labels. This button will print labels for all fractions in a WO.

3.18.3 If the additional fraction of the WO does not include the same samples and has different media type, login from scratch using steps 3.4-3.15.

3.19 Label Samples

3.19.1 The print label feature will print all labels for all fractions of a WO or you may choose to print only specified fractions of the WO.

3.19.2 Affix label to the back of the sample tag underneath the pressurization section, and assure that the label is consistent with the sample. Verify barcode (if applicable).

3.20 Send the Sample Confirmation Email

Verify that all fractions of a WO have been logged in and reviewed. After finishing the last fraction, click on the Email Notification button under the Email/Scan COC tab. This will prompt the system to create the Sample Receipt Confirmation. Once created, click on the Send Email button, which will pop-up the email to be sent to the client from the appropriate PM's email address. Verify with the Project Profile that you are emailing the correct person(s), do a sanity check of the pdf to ensure that it created correctly and send the email. Note: During the training process, this step will be performed by an experienced analyst after Login Review.

3.21 If the samples are not canisters, the folders may be transferred directly into the appropriate Lab Pickup Bin in receiving or to Login Review. The samples will be logged into the appropriate Sample Tracking Logbook and placed in the appropriate storage area (See Section 8.0). The update the WO status in ATLAS as appropriate.

3.22 If the samples are canisters, place folder and canisters on a cart for pressurization.

3.22.1 After pressurization the folder will be moved to Receiving for entry of pressures into the ATLAS workorder. (Note: For high pressure cylinders, DO NOT ENTER a pressure into the initial and final pressure columns on the Login Page. Instead, write a remark stating what pressure the cylinders were received at.)

3.22.1.1 Enter the initial pressure into the login screen.

3.22.1.2 Verify the final pressure on the login screen.

3.22.1.3 If there is an SDR for pressure issues, add the QA approved narrative to the Sample Receipt Section of the Lab Narrative tab.

3.22.1.4 Print the Login Summary Page and confirm the pressures on the hardcopy.

3.22.1.5 Put the documents in order as shown in Step 3.17.4.

3.22.1.6 Put the folder into the appropriate Lab Pickup Bin in receiving or Login Review. Be sure to update the WO status in ATLAS.

4.0) LOGIN REVIEW (100% FOR THOSE NOT SIGNED OFF AND DoD WORKORDERS)

The person completing the Login Review reviews the WO for accuracy. If the Login Analyst is not approved to send the Sample Receipt Confirmation email, the Login Reviewer will do so once the login has been approved. All DoD workorders require Login Review to be completed by a different person that logged in the samples.

4.1 Verify the items on the Login Review Report:

4.1.1 Any changes are indicated and given back to the Login person to correct, giving them the opportunity to learn. (Unless that person is out of the office and will not be able to make the corrections in a timely manner).

4.1.2 By dating and initialing the report at the "Second Review By" line at the end of the report, the reviewer indicates approval of the WO or that they approve the WO with minor changes as notated. For major changes, the Login Reviewer may request the folder to be returned for a second review.

4.2 Verify the Reporting List and pressures (if applicable).

4.3 Once all changes have been made and verified, in the Login/Login screen, check the Review Status box as completed, which will autofill the initials of the person logged into ATLAS.

4.4 Send the Sample Confirmation Email (See Section 3.20).

4.5 Put the folder into the appropriate Lab Pickup Bin in receiving or with the canisters for pressurization, being sure to update the WO status appropriately.

5.0) SAMPLE DISCREPANCY REPORT (SDR)

During the course of receiving, logging in and pressurizing the samples, sample discrepancies may be observed and are listed on a Sample Discrepancy Report (see *Appendix C)*. Most discrepancies are then noted in the Receiving Notes portion of the Lab Narrative using QA approved templates and/or on the Sample Receipt Confirmation email. Issues requiring immediate notification to the client are given to the PM to contact the client. This client interaction is also narrated on the SDR.

5.1 Possible General Sample Receipt Discrepancies include:

- Absence of a COC
- COC Incomplete
- COC not filled out in ink
- COC relinquished improperly
- Shipping Damage
- Number of samples on COC does not match the number of samples received
- Name of sample on COC does not match Sample Tag (See Work Instructions WI50 for exceptions)
- Sample collection date on COC does not match Sample Tag
- Not properly preserved
- Container type inappropriate for analysis
- Unlabeled samples
- Mislabeled samples
- Expired samples
- Custody Seals broken or improperly placed
- PM10 sample filters received wet

5.2 Possible Canister Sample Receipt Discrepancies include:

- Leaked to ambient at time of pressurization.
- Canister received emitting a strong odor; sample can/cannot be analyzed
- No brass cap or quick connect on canister and canister valve received open
- Flow controller used and canister sample received at ambient or under pressure
- Canister sample received with a vacuum difference >5.0”Hg between the receipt vacuum and the final vacuum reported on the COC, indicating potential valve leakage.
- Canister sample received at >15”Hg (not identified as a Trip/Field Blank).

5.3 Sorbent and liquid media

- Samples received outside of required temperature range; coolant was/was not present.
- Sample container was received broken; sample was/was not intact.
- Coolant was not properly dispersed throughout the cooler.

5.4 Tedlar Bags

- Tedlar bag appears to be leaking.
- Tedlar bag received flat.
- Tedlar bag received emitting a strong odor sample; can/cannot be analyzed (see Section 8.0).
- Tedlar Bag received with a significant volume of water.

5.5 EPA 325B

- Temperature not recorded on the COC.
- Loose end caps.
- No custody seal present on black pelican case.

6.0) TECHNICAL PROCEDURES

6.1 Measuring Sample Temperatures

The receipt temperature is recorded on the COC for samples that are required to be received chilled per method requirement.

6.1.1 EATL ships a temperature blank (VOA vial filled with water) with every shipment of media that has this requirement. The vial is opened and the temperature is measured upon receipt using a calibrated infrared temperature gun or liquid-filled thermometer. The required temperature should be 4 ± 2 ^{o}C.

*Client notification is required for samples received >6^{o}C using Sample Discrepancy Report(Type 2 SDR).

*Client notification is NOT required for sample received between 0-2^{o}C (Type 1 SDR). No narrative needed.

6.1.2 Temperatures for samples received without a temperature blank will be measured using an NIST-certified infrared (non-contact) thermometer. The thermometer is aimed at the representative sample, with the front of the thermometer approximately one inch away from the sample surface.

6.2 Assigning Workorder Numbers and Fractions

6.2.1 A unique seven-digit number is assigned as an identifier for each workorder, in the format of YYMMSSS where YY is year, MM is month and SSS a number that increments sequentially for each WO in that month. For example, the first batch of samples received in January 2007 would be identified as 0701001. This workorder number is stamped on the COC. The ATLAS system is programmed to allow a unique workorder number to be assigned only once.

6.2.2 Ending letters assigned to the WO to denote either an additional analysis for the sample set or to break a large sample set into 20 or less samples for each WO. For example, if 2 analyses are requested for the first sample set received in January 2007, the WOs assigned would be 0701001A and 0701001B.

6.2.3 The following guidelines are used when assigning workorder numbers:

- Multiple analyses/same COC(s): Assign an ending letter for each analysis (i.e.: 0701001A, 0701001B, and 0701001C).
- Multiple COCs/same analysis, client, and project and the COCs are labeled as 1 of 2 and 2 of 2: Set up one workorder if there are less than 25 samples. If there are more than 25 samples, either assign a new WO# for each set of 25 or an ending letter for each subsequent set of 25 (i.e. 0701001A, 0701001B...) Some exceptions can be made, and will need to be approved by the PM.
- NOTE: When working with Hi/Lo or VPH WOs, the duplicated fractions will also need to be take into account, and the total per order/fraction shall be 13 each (with Hi/Lo and Dups making a total of 26 reported).
- Multiple COCs/different projects or COCs labeled as 1 of 1: Assign a different workorder number for each COC.

6.2.4 After the workorder number is established, each sample is given a unique fraction number (i.e.: 0701001**-01A**, 0701001**-02A**, ...). The fraction number is written next to the sample on the COC in the left hand column, if there is no room to legibly write this by the analyst it is possible to use the right hand margin. At this time, check the client sample identifications on the COC. Client sample IDs must be unique. If client sample IDs are not unique, it is an SDR.

NOTE: The same fraction number should never be re-used, even if there are multiple media types, unless it's requried per project. Thus, each sample fraction should relate to a specific sample.

Up to 25 samples can be assigned per WO number or work order fraction. If more than 25 samples are received for one project, assign a WO number and fraction the first twenty samples as 01A-25A. Subsequent samples from the same project will generally be assigned a new WO number every twenty-five samples (i.e. 0701001, 0701002, ... or 0701001A, 0701001B, ...) Some exceptions can be made if approved by the PM (i.e. an order with 27 samples). Sample fractions will begin with 01A for each new WO number that is created, sample fractions shall continue for each subsequent work order fraction.

Example:

A workorder of 45 samples:

1) Samples 1 through 25 are assigned as **1108001A-01A** through **1108001A-25A** (TO-15) and

1108001B-01A through **1108001B-25A** (ASTM D-1945);

2) The next 20 samples will be assigned the next sequential workorder number with the associated letter at the end and the sample numbering starting at 1 again as
1108002A-01A through **1108002A-20A** (TO-15) and
1108002B-01A through **1108002B-20A** (ASTM D-1945)

OR

A workorder of 45 samples:

1) Samples 1 through 25 are assigned as
1108001A-01A through **1108001A-25A** (TO-15) and
1108001C-01A through **1108001C-25A** (ASTM D-1945);

2) The next 20 samples will be assigned the next sequential workorder number with the associated letter at the end and the sample numbering continuing as
1108001B-26A through **1108001B-45A** (TO-15) and
1108001D-26A through **1108001D-45A** (ASTM D-1945)

6.3 Receiving Client Media

It is possible to receive media that is the property of the client. Refer to other ATLAS modules such as: Project Profiles, Contacts, Sample Tracking and previous workorders to verify the proper project information and verify with the PM if there is any doubt. See SOP 95 for the procedure relating to client canisters.

6.4 Receiving EATL Media Into ATLAS.

6.4.1 EATL media or equipment will be entered into ATLAS either by scanning its barcode or by quantity. Media without a barcode (i.e.:TO-17 VI tubes, TO-13A cartridges, Passive samplers, filters, etc.) must be matched with the shipment number manually. Refer to other ATLAS modules such as: Project Profiles, Contacts, Sample Tracking and previous workorders to verify the proper project information. A Receiving Report, which lists all media received, is printed and included in the workorder folder. Tracked media(barcoded media) is charged as it is returned. Non-Barcoded media and related equipment will be auto-invoiced at the time the shipment is released. Canister related items which are not expected to be returned, such as fittings or tubing, will be charged on the first WO related to the shipment and notated in the Shipment. Applicable shipping charges are also charged on the first related WO and notated in the Shipment, so that the client is not charged twice.

6.4.2 Clients will often indicate that media is not a sample by writing notes such as 'VOID', 'low vac', 'unused', 'do not analyze' or 'not a sample' on the sample tag or COC.

6.4.2.1 If the notation indicates an issue with the media, a c.Support incident will be created and a pink "Check Equipment" tag filled out and attached to the media. The media is then placed in the Check Equipment area for pick-up by Support Services. (See SOP #89 section 3.1 and Work Instructions WI50). The media is tagged with an Equipment Check tag which indicates PM & project ID, the client indicated issue and the EATL finding upon evaluation

6.4.2.2 If the notation does not indicate an issue with the media, it can be placed on the returns cart for pick-up by Support Services.

6.4.3 For samples not listed on the COC, samples received unmarked and/or not specifically labeled as returns (such as "Bad can", Do not analyze, VOID, etc) the PM will need to determine if they are samples. It is the responsibility of the Receiving Team to email the PM regarding questionable canister and provide the project name/number, bidship number, type of media **and label information (i.e. sample IDs)**. **Only when the PM confirms via written communication with the client that they are returns can the sample tags be marked with**

the word "VOID" in red marker and safely placed in the Returns area. If they are determined to be samples, the PM will request a COC and they will be logged in as samples.

6.4.4 For samples received with documented sample IDs without a COC, the PM will need to determine if they are samples to be analyzed. The sample receiving staff sends an email to the appropriate PM with the sample IDs, project information (if available), bidship and type of media. Only when the PM confirms via written communication with the client that they are returns can the sample tags be marked with the word "VOID" in red marker and safely placed in the Returns area. If they are determined to be samples, the PM will request a COC and they will be logged in as samples.

6.5 Entering Project Information into the Workorder

6.5.1 Most of the project information is auto-filled from the Project Profile into the newly created workorder. It is imperative to check the Project Profile against the COC to ensure they are consistent. If not, consult the PM regarding the correct Project Profile for the sample set.

6.5.2 Hold times are programmed into ATLAS but should be verified (see Work Instructions WI50).

6.5.3 Due Customer Dates are programmed into ATLAS assuming PST or PDT (as appropriate) but should be verified. Samples that arrive after 3 pm are considered to be received the following day and the due dates must be manually entered into ATLAS.

6.5.3.1 The standard guidelines for due dates are as follows (see Work Instructions WI50 for detail):

- Date Due Customer: Date the client expects the data
- EDD Due Date: Date client expects EDD
- CVP Due Date: Date client expects CVP/eCVP Package
- Standard TAT: Date Promised and Date Due Customer is 9 business days by 11:59 pm.
- Rush TAT: Date Promised is the same as the Date Due Customer by continental US time (i.e. EST/CST/MST or PST, all international and non-continental US times are PST).

6.5.3.2 "Due Dates" stamp is placed on the outside of all folders indicating the Promised Date, CVP and EDD due dates. The Login Analyst records the appropriate due dates or 'NA' if a due date is not applicable.

6.5.3.3 Samples with a rush TAT (7 business days or less) will have a sticker which indicates the TAT and time due placed on the outside of the folder. Rush TAT workworders are due by 5PM but is adjusted to accommodate the difference in time zones. These WOs are placed in red folders.

6.6 Different colored folders are used to help define the sample set:

- Normal TAT - Yellow
- Quick TAT - Red
- Single Report Delivery - Orange (If a quick TAT is requested, a orange folder is used to alert the lab that special reporting requirements are needed.)
- Special Pressurization requirements – Green (If a quick TAT is requested, a green folder is used to alert the pressurization team that unusual pressurization requirements are needed.)

6.7 QA Review

QA Review is assigned on workorders requesting 100% QA review. A stamp will need to be placed on the outside cover of the workorder folder as well as a checkbox on the Receiving/Receiving screen.

6.8 External Proficiency Testing (PT) or Performance Evaluation (PE) Sample

External audit PT and PE samples are received periodically from either government agencies or consulting firms. Upon receipt, the Login Analyst notifies the QA Department. The QA Department works with a PM to set-up a Project Profile. The Login Analyst logs-in the samples using the Project Profile and under the direction of QA. The turn around time is set up one week earlier than is requested to allow the QA Department to review the data. All the documentation that is received is placed in the folder.

6.9 Labeling Samples

6.9.1 Canisters

6.9.1.1 Each sample is labeled with a unique, indelible identification. This label is printed out from ATLAS.

6.9.1.2 *Never* affix a label directly on a canister. Attach the sample label to the blue tag which is attached to each canister, being careful not to obstruct existing information.

6.9.1.2 The Sample Login Analyst will double-check lab sample IDs and canister barcode numbers when affixing the labels.

6.9.1.3 If the sample canister must be pressurized with Helium, attach a purple 'Pressurize with Helium' tag to the canister and ensure a green folder is used for the workorder, indicating special pressurization requirements.

6.9.1.4 If the client specifically requests that a sample be held for a period of time, check "Not Release can until:" box in Receiving page, select the date to be released and click save. This will print a date on the label to alert the lab staff before releasing samples. *This action must occur before printing the labels* A small orange tag must be stapled to the blue sample tag for these samples.

6.9.1.5 For samples which are marked either on the sample tag or COC as having high concentrations of a known compound, the Sample Login Analyst will place a red 'Danger' tag on the canister. Sometimes the client will provide this information ahead of time so that the Project Profile can reflect this in the 'Receiving Notes' section. Samples that arrive with an obvious odor are handled following Section 9.0 of this SOP.

6.9.1.6 If canisters or any EATL equipments are labeled as faulty, they are tagged with pink Equipment Check tag that are filled with appropriate information then follow the c.Support procedure as outlined in Work Instructions WI50

6.9.2 Tedlar Bags.

•Labels should be affixed directly onto the bag, making sure not to obstruct the bag valve or existing sample information.

6.9.3 Labeling Other Media.

6.9.3.1 Labels should never be affixed to the samples themselves unless they are in a container which will not come in contact with the extraction or analysis equipment.

6.9.3.2 **Cartridges should not be touched by hand**; therefore the label is attached to the bubble wrap or plastic bag.

6.10 Financial Status

The Financial Status shows on the Receiving and Login screens. A Financial Status of "Good" shows as green and all others are red. If the Financial Status is not "Good" the WO shows on the finance department worklist. The samples will then proceed into the laboratory for analysis. The procedure varies depending on the status of the clients' account. Samples remain 'On Financial Hold' until there is resolution. Categories are as follows (See Table 1):

Table 1

Financial Status	PM Action	Receiving Action	Lab Action
Blacklisted	**No media, no report, no**	If work comes in, notify the	If work gets through, **DO**

	service. Notify client they have been black-listed and Air Toxics will not do business with them.	PM and manager immediately. **DO NOT PROCESS SAMPLES!!**	**NOT ANALYZE!!!** Notify PM and manager of the issue.
Prepayment	Notify client when they call for media that payment must be received in full before they will receive results.	Work order will automatically be placed on financial hold. "Cash in Advacne " narrative is added to the sample receipt confirmation	
Collections	Same as blacklisted	Same as blacklisted	Same as blacklisted
Competitor	Obtain approval from senior manager; if approved, proceed as for any other client.	No action required.	No action.
Credit Card OK	Ask client if they have a current credit card on file that we may use. If not, refer to Client Credit Card Procedure. If client does not wish to use a credit card, inform Angela and client status will be changed to New Client. Send client appropriate T&C forms.	No action required.	Do not send report until there is a signature from Finance and the WO Financial Status field is set to "Good" in ATLAS
Good	No action required.	No action required.	No action required.
Hold	Notify client they will not receive any reports or media until the hold is lifted. Ask them to work with their A/P department to clear up the issue.	Work order will automatically be placed on financial hold. "Finanical Hold" narrative is added to the sample receipt confirmation	Do not send report until there is a signature from Finance and the WO Financial Status field is set to "Good" in ATLAS.
New Client	Notify client they will not receive any reports until their credit application is fully executed (both parties have signed agreement).	Work order will automatically be placed on financial hold. "New client status" narrative is added to the sample receipt confirmation	Do not send report until there is a signature from Finance and the WO Financial Status field is set to "Good" in ATLAS.
PO Required	Ask for PO information and notify client that data will not be sent until the PO is confirmed and validated.	Work order will automatically be placed on financial hold. "PO required" narrative is added to the sample receipt confirmation if no PO# present on CoC or in profile.	Do not send report until there is a signature from Finance and the WO Financial Status field is set to "Good" in ATLAS.

6.11 Sample Receipt Confirmation

6.11.1 When a workorder is completed, a Sample Receipt Confirmation (SRC) email is sent to the client to confirm receipt of samples. The SRC consists of 5 sections:

- Section 1: Cover page with discrepancies noted.
- Section 2: Sample Receipt Summary (sample names, collection dates, etc.)
- Section 3: Chain of Custody
- Section 4: Reporting list showing referenced method, target compound list and reporting limits.
- Section 5: Outstanding media (if applicable)

6.11.2 The date that the SRC email was sent is automatically documented by ATLAS in Login Tracking in the "Date Login Fax Sent" field.

6.11.3 If EATL is notified of an error with respect to information on the COC (i.e.: sampling date/time incorrect, sample IDs incorrect or switched, etc.), the client will be asked to provide a revised COC. If they are unable to do so, the Project Manager will request written documentation (such as an email or FAX) from the client and document in Contacts. A copy of the written documentation will be given to Sample Receiving to place in the workorder folder or attach to the WO in ATLAS. EATL cannot deviate from the information on the COC without this written documentation from the client. ***EATL will not make corrections to client information on the original COC, as this is a legal document.***

6.11.4 If EATL made an error in transcribing an entry from the COC into the workorder (i.e.: a misspelling, entering a "5" instead of an "S", etc.), a Client Contact from ATLAS is sufficient to document a change in our system.

7.0) SAMPLE STORAGE

Samples that do not need to be refrigerated are stored in the Sample Cage in the main laboratory**.** Samples that must remain chilled are placed in the appropriate refrigerator/freezer. See Table 2 below.

Table 2

Location in Sample Cage		**Suggested Contents**
Section A-01		Tedlar Bags, Misc Media Types, typically for ATL Applications
Section A-02 to E-04		1L and 6L Summa canisters
Section G to J		Tedlar Bags, 1L Summa cansiter and PAC250s
Section X to Y		Media being held after analysis or ready to release
Location	**Refrigerators**	**Suggested Contents**
TO-17 Room	4	TO-17 Samples, WMS TD, Rad145 and all other TD samples
Extraction	12 or 5	TO-13A, Radiell 130, WMS OVM.
Location		**Suggested Contents**
Extraction - Dessicator		TSP/PM10 filters
EPA 325 Room		EPA 325 samples

7.1 Sample Tracking

7.1.1 It is the Login Analyst's responsibility to record samples into the Sample Tracking logbook in the appropriate area of the laboratory, depending on the type of sample received. Canister, bag and EPA325B samples will be tracked electronically using Sample tracking module in ATLAS; all others will be using logbooks. When entering the samples, the workorder number and specific fractions, number of samples, analysis, location where samples will be stored, analyst name, and date/time (military format) sample custody is being transferred must be included into the first "IN" box of the Sample Tracking Logbook.

7.2 Procedure for samples received and not logged in by the end of the day:

7.2.1 Canisters
Samples are assigned a workorder number and they remain in the Sample Receiving area overnight.

7.2.2 Coolers
Samples are assigned a workorder number and placed in the appropriate refrigerator, along with a note indicating they have not yet been received into ATLAS. The appropriate Sample Tracking logbook must be filled out. The folder with the COC is placed

in Receiving with a note as to where the samples are located, so that they may be logged in the next morning.

7.2.3 The goal is to login all samples within 1 business day of receipt. Exceptions are:

- Samples without a COC
- Samples associated with a Project Profile that has a 'STOP' on it
- Samples where the Project Profile is unknown or non-existent. In these cases, if a project profile exists, samples are entered into ATLAS and the Work Order is placed on hold. If the Project Profile does not exist, a note with the issue and the PM who was asked to resolve it is placed with the samples. The Sample Login Analyst then follows up with the PM until the issue is resolved and the samples can be taken off hold or logged in.

8.0) HANDLING OF HAZARDOUS SAMPLES

Samples may be hazardous to handle. In the following situations, use the procedure listed. Members of the Safety Committee are available to assist with any samples of concern and should be notified of unusual issues. Always err on the side of caution.

8.1 Canisters and Tedlar Bags:

Due to potential health hazards, samples which emit a strong odor are handled in the following manner:

- Samples are immediately placed in a fume hood.
- Samples that do not fit in the fume hood are stored in the Hazardous Waste Shed, to ensure appropriate security of samples.
- The Safety Committee and/or the Lab Manager are contacted to assess the level of hazard associated with the sample(s) and to ensure proper handling.
- The Login Analyst logs the samples into the proper logbook/Sample Tracking module, noting the location where they are temporarily being stored.

8.2 Liquid and Sorbent Media Samples:

- The Sample Login Analyst should always wears protective gloves while unpacking these types of samples.
- If a liquid sample is received in a leaking or broken container, a Safety Committee Member is notified for proper cleanup and handling of the Sample. Note: Clearly marked Temperature Blanks (which are filled with water) can be safely disposed of by the Login Analyst without notifying the Safety Committee.
- A member of the Lab Team or the Safety Committee is consulted if a sorbent sample is received broken, to determine if the sample can be analyzed and ensure proper handling.

9.0) SUBCONTRACTING SAMPLES

When samples arrive which need to be subcontracted to another laboratory (this will be noted in the Project Profile), a workorder is set up with a Method Type of 'Subcontract'. This prevents the workorder from showing up on any of EATL's laboratory work lists. The sample is labeled, a Chain of Custody is filled out and the PM is notified. The PM will work with the Shipping Dept. to send off the samples to the subcontract laboratory. The workorder folder is placed in the Subcontract bin in the Project Management area until the data is returned (See EATL SOP #90).

10.0) ON-HOLD SAMPLES AND CANCELLATION OF WORKORDERS AND SAMPLES

10.1 When a subset of samples from the same sampling event are requested (either on the COC or from the PM) to be placed on hold, they will need to be logged in under a different workorder fraction than the active samples. Both workorder status and samples status should be set as "On Hold". The PM will receive a daily report of all the workorders that are on hold. They will then evaluate and update the status of the samples as active or canceled. If the status becomes active, the workorder is placed on the active work list for analysis and the TAT gets updated in ATLAS. The TAT for the samples and workorders on hold starts from the day they become active.

If the PM decides to cancel the samples that were on hold, they will then update the status in ATLAS accordingly. The production team can then release the samples from the Canister Module Tracking.

The exception to this procedure is when a client sends duplicate sample (back-up) and requests the duplicate sample to be placed on hold and analyzed if there are any discrepancies with the original sample. In this case, all the active and duplicate "on-hold" samples are logged in under the same workorder fraction. The production team is responsible for updating the "back-up" sample status to "cancelled" or "active" depending on the circumstances. In order to release the duplicate or back-up sample from the canister module tracking, the status needs to be either active and analyzed or canceled.

10.2 Clients will sometimes cancel analyses after the samples have been received. If they have been given a workorder number, then the cancellation must be requested by the PM. See Work Instructions WI50 for the Cancellation Procedure (Please note that the PMs will typically be the ones to cancel samples or WOs in the system).

11.0) INTERNAL COMMUNICATIONS

11.1 Sample Discrepancy Reports (SDR) requiring PM action:

11.1.1 Login Issue: The SDR will be sent electronically to the PM. The PM will contact the client on the same day or as soon as is reasonably possible. The PM will document clear instructions on how to proceed in the SDR. The Login Analyst will then continue the login process.

11.1.2 Pressurization Issue: The SDR will be sent electronically to the PM. The PM will contact the client on the same day or as soon as reasonably possible. Once the PM establishes how to proceed, they will document the action on the SDR. The updated SDR will be sent to the Login Analyst if immediate action, such as canceling a sample is necessary and the WO will be updated with the necessary adjustments.

11.1.3 The Login Analysts will check for SDR e-mail updates throughout the day, taking the action required.

11.2 Profile Clarifications

11.2.1 Major Issues (These are issues for which the samples cannot be logged in, such as it is not clear what analysis the samples are for or the list requested does not exist)

•The COC (with assigned WO#) and Project Profile (when available) are given to the PM, (either physically or through email) and a note placed on the sample set.

•If client involvement is necessary, the PM will contact the client the same day. The PM will get back to the Login Analyst as quickly as possible with clear instructions on how to proceed. Any documentation such as contacts or emails will be included in the folder or attached to the WO.

•The Login Analyst will proceed with the login process being sure to include the resolution in the internal "Comments" section of the Remarks tab.

11.2.2 Minor Issues (These are issues for which the samples can continue through the process, such as media pricing or full vs. short lists.):

•An email will be sent to the PM regarding the issue and the issue notated in the internal "Comments" section of the Remarks tab. The PM will research the issue. The PM will make appropriate changes to the WO, provide clear instructions for the Login Analyst to make appropriate changes or decide that no action will be taken. The course of action will be documented in the "Comments" section of the Remarks tab.

NOTE: All notification or confirmation to PM or lab need to have workorder number and/or PID included in the email subject line.

11.2.3 Lab Issues: The Login Analyst will inform the laboratory of any quickly expiring or quick TAT samples. This is done through email. If there is an extreme time-sensitive issue, the Login Analyst will also verbally alert the manager of the department or a team member who works on the analysis.

11.3 PM/Lab Requests

11.3.1 Requests involving additional analyses, or list changes must be provided in writing (i.e. email) to the receving team and should be addressed immediately. Once the changes have been made the lab/PM is notified via email.

11.3.2 Requests that are not time sensitive or relating to analyses that can't be addressed immediately should be addressed before end of the day.

12.0) THE FLOW OF FOLDERS

12.1 Folders are created during the login process.

12.2 If the samples are canister samples:

12.2.1 The folder is sent to pressurization with the samples.

12.2.2 Once the pressures are entered into the system, updated with the pressurization date and Login Summary page printed. The folder then goes to:

- Login Review (if necessary)
- Lab Pickup Bins (if Login Review is not necessary)

12.3 If the samples are not canister samples the folders will go to:

- Login Review (if necessary)
- Lab Pickup Bins (if Login Review is not necessary)

12.4 After Login Review (if necessary) folders will go to:

12.4.1 Lab Pickup Bins.

13.0) THE TRACKING OF FOLDERS

The Status field in the ATLAS Sample Tracking module will be utilized to track folders.

13.1 When a WO is created, the Status is automatically set to "Log-In".

13.2 After Pressurization, when a WO is placed back into Receiving area, the Status will be updated to "Login Rev".

13.3 When a folder is ready for the lab and is put into the hanging bins in Receiving, the status will be changed to "Lab Pickup Bins".

13.4 If for any reason an analyst needs to hold on to a folder, the status will be updated with their initials.

14.0) SPECIALIZED WO CREATION

For the naming of specialized work orders, see the naming key below. Work Instructions WI50 include the procedure for Setting up Deliverables for a Filed Workorder, Unreturned Media Charges and Unused Media Charges. For instructions on how to Re-issue a workorder, please refer to SOP#68 and see Work Instructions WI50 for detailed instructions.
Specialized WO Naming Key:

*Returned Media Work Orders:	R(6 digits number consist of yymm and two digits sequential number) (ex. R170901, first return shipment arrived in September 2017)
Unreturned Media Work Orders:	U(bidship for unreturned media) (ex. U98765, media from bidship 98765 not returned)
Invoiced Non-Returnable Media:	I(outgoing bidship number) (ex. I98765, media being shipped to client as bidship 98765)
*Miscellaneous Charges:	M(6 digit number consist of yymm and two digits sequential number that request was received to add charges) (ex.

	M170901, first request to add misc. charges received in September 2017)
*Client Media Certification:	N(6 digit number that consists yymm and two digits sequential number) (ex. N170901, first request for client media certification in september)
*Subcontract Charges	S(6 digit number consist of yymm and two digit sequential number) (ex. S170901, first request for subcontract charges in September 2017)

* Subsequent WO numbering will continue in sequence for all "R" "M" "N" and "S" designated WOs and starts from 01 for the next month (ex. R170901, M170902, N170903. S170904 etc).

15.0) REFERENCES/DEFINITIONS

Refer to the Eurofins Air Toxics Laboratory Quality Assurance Manual (LQAM)
Defintions and Terms, Appendix A.

16.0) APPENDICES

List of Appendices
Appendix A - Eurofins Air Toxics Sample Acceptance Policy
Appendix B - Login Review Report Example
Appendix C - Sample Discrepancy Report Example

Appendix A

Eurofins Air Toxics Sample Acceptance Policy

EUROFINS AIR TOXICS SAMPLE ACCEPTANCE POLICY

Samples received by Eurofins Air Toxics need to be relinquished following standard EPA/NELAP approved guidelines. These include full and complete Chain-of-Custody documentation indicating:

Unique sample name
Location, date, and time of collection
Canister Number/Tube Number (where applicable)
Collector's name
Sample Type (verified by matching the requested analysis to the sample(s) submitted by the client)
Analysis Requested
Preservation type (where applicable)
Any special remarks

The Chain-of-Custody form must be filled out in ink and indicate proper use of sample container specified by the method. Each sample should be labeled with unique, durable, and indelible identification and should contain adequate volume for the tests requested. Never affix a label directly on a Summa™ canister. A special tag is attached to each canister for this purpose.

Proper, full, and complete inspection and documentation will be performed during the Receiving/Login process including the following areas:

Evidence of container's physical damage
Status of the container's custody seal
Presence or absence of a chain-of-custody form
Incomplete or incorrect chain-of-custody form
Number of samples
Name of each sample
Sample collection date/time
Sample type (canister, XAD, DNPH, etc., verified by matching the requested analysis to the sample(s) submitted by the client)
Sample tag information complete and matching COC information
Temperature (when applicable)
Delivery Method and tracking number information (when applicable)
Pressure (canisters)
Presence of unlabeled samples
Presence of mislabeled samples
Presence of unused media
Method required trip blanks, field blanks, equipment blanks, field duplicates, or field spikes

Any sample discrepancies against the above criteria are documented on the Sample Discrepancy Form and communicated to the client via Electronic Sample Receipt Confirmation. The client is contacted by the Project Manager for discrepancies of a more serious nature, e.g,

Chain of custody was not received with samples
Analysis method(s) is (are) not specified
Sample(s) received out of holding time
Incorrect media for requested analysis
Sample container (Tube/VOA vial) was received broken, damaged or not enough sample present for the analysis
Canister sample received at > 15" Hg (not identified as a Trip/Field Blank)

Flow controller used in the field but canister sample received at ambient pressure
Tedlar bag/canister received emitting a strong odor (sample cannot be analyzed)
Canister sample received at ambient pressure and canister failed leak check or received with valve open.

Appendix B

Login Review Report Example

Login Review for Workorder # AnneSDRTest

Company Name: AAA Bogus
Project ID: 8101
Project Name:
Project Number:
PO Number:
Method Type: NA
Reporting List: Zarch 03/05/2009 Modified TO-15-LL (Before 9/13/06 Changes
Analysis Type: Test
Smp. Trk. Anal. Type: test
Date Received: 12/11/2008
Date Promised: 12/24/2008 11:59:00P
ate Due Customer: 12/29/2008
Rush: None
Time Due: 11:59 pm
CVP Pkg Due: 01/01/1990 N
EDD Due: 01/01/1990 N
CSR Review: N Screen N 24 Hr. Clock Y Late Penalty: N QA Review: N
Of Duplicates: 0 Total Samples: 0 Total Duplicates: 0
Financial Status: New Client ☐ Proper 'Financial Hold' statement narrated (purple folder).
Certs Expected: 0 Certs Found: 0
Smp. Conf. Sent: 1/1/1990 12:00:00AM
Profile Done: Y

Report To
First Name: Jane Last Name: Doe
Company: AAA Bogus

Bill To
First Name: Jane Last Name: Doe
Company: AAA Bogus

Sample Info

Frac ID	Client ID	Date of Coll	Time Of Coll	Price	Status	Smp Hold	Ext Hold	Container Type

Misc Charges

Item	Qty	Price	Media ID	Comments

Lab Narrative:

Narrative Template: Passive SE by Mod EPA TO-17

Receiving Notes:

There were no receiving discrepancies.

Workorder Comments:

Workorder Remarks:

Login Fax Cover Sheet Comments:

- ☐ COC Filled out properly (Relinquished/Received, Collection Date, Method, etd.).
- ☐ Client requests on COC have been followed.
- ☐ 'Notes to Receiving' in the Project Profile read and followed.
- ☐ All necessary tags have been attached to samples (DO NOT CLEAN, etc.)
- ☐ Bidship verified for additional charges.
- ☐ All SDR items have been narrated.
- ☐ The COC paperwork has been scanned and properly attached to WO.
- ☐ Sample Confirmation email sent.
- ☐ SDR, Receiving Report and COC are included in all fractions of the Workorder
- ☐ Verify Sample ID's vs COC
- ☐ Verify Sample lables against Canister Barcodes
- ☐ Notified Lab of Expiring or Quick TAT Samples
- ☐ Samples scanned into Canister Tracking

Login Reviewed By: _____

Second Review By: _____

Appendix C

Sample Discrepancy Report Example

Eurofins Air Toxics	Title: **Sample Discrepancy Report (SDR)**			Release Date: 11/01/18
	Form #: F1.3	Revision #: 7	Revision Date: 11/01/18	Page #: 1 of 2

Sample Discrepancy Report

Identification

Initiated By: _____ **Project ID:**_____ **PM:** _____ **Date:** _____ **Discrepancy Type:** ☐ **1.** ☐ **2.** ☐ **3.**

Workorder(s) affected: **Sample(s) affected:** _____

1. Sample Receipt Discrepancies

Narration Not Required:

1.1. ☐ Sample container (cartridge/tube) was received broken, however sample was intact.
1.2. ☐ No brass cap on canister.
1.3. ☐ Date of Collection noted on first sample, but no arrow down to indicate all samples.
1.4. ☐ Sampling year not documented on COC but noted on sample tag.
1.5. ☐ Sorbent Sample received outside method required temperature of 2°C to 6°C but less than 6°C.

Notify Lab for further determination:

1.6. ☐ Tedlar bag received with minimal volume.

Narration Required in Lab Narrative and Sample Confirmation:

1.7. ☐ COC was not filled out in ink.
1.8. ☐ COC improperly relinquished / received.
☐Signature missing ☐date missing ☐time missing.
1.9. ☐ Sample ID on tags do not match the COC.
1.10. ☐ Can numbers do not match the COC.
1.11. ☐ Sampling date discrepancy.
1.12. ☐ Custody Seal on the outside of the container was ☐ broken / ☐ improperly placed (check one).
1.13. ☐ ID-none on the sample Tag/Blank.
1.14. ☐ Other (describe below).

Initials: _____Date:_____

Describe the Discrepancy: _____

2. Sample Receipt/Screening Discrepancies requiring PM notification

Document on Cover Page of Sample Receipt Confirmation and in Receiving Notes of Lab Narrative

If Section II. is filled out PM must be notified within 24 hrs of initiation

2.1. ☐ COC was not received with samples.
2.2. ☐ Analysis method(s) is ☐ not specified / ☐ incorrectly specified (check one) on the COC.
2.3. ☐ Incorrect sampling media / container for analysis requested.
2.4. ☐ Number of samples on the COC does not match the number of samples that were received.
2.5. ☐ Samples were received expired.
2.6. ☐ Sampling date is not documented for ☐ *some* / ☐ *any* samples (check one).
2.7. ☐ Sample received with amount of H_2O in the Tedlar Bag.
2.8. ☐ Sample cannot be analyzed. Container was ☐ received broken / ☐ leaking / ☐ flat / ☐ defective.
2.9. ☐ Tedlar bag / canister received emitting a strong odor; Sample ☐ can / ☐ cannot (check one) be analyzed.
2.10. ☐ Sorbent samples -sampling volume was not provided.
2.11. ☐ Flow controller used – canister samples received at ambient or under pressure.
2.12. ☐ Canister was at ambient pressure at time of pressurization and (check all that apply):
☐ Canister valve was open.
☐ Brass nut was loose/not present.
☐ Sample can be analyzed.
☐ Sample cannot be analyzed.
2.13. ☐ Canister sample received with a vacuum difference >5.0"Hg between the receipt vac. and the final recorded vac. on the COC.
☐ Canister passed leak check in lab <2psi, no evidence sample was compromised.
☐ Canister failed lab leak check, canister found to be leaking. Canister sample compromised.
2.14. ☐ Canister sample received at >15"Hg (*not* identified as a Trip/Field Blank).
2.15. ☐ Canister Trip Blank received at low vacuum (<25"Hg).
2.16. ☐ Sorbent Sample received outside method required temperature of 2°C to 6°C; ☐ ice / ☐ blue ice (check one) was present. A temp. Blank ☐ was / ☐ was not present (check one).
2.17. ☐ Other (describe below).

Initials: _____ **Date:** _____ **Notify Receiving:** ☐ **Notify PM:** ☐

Describe the Discrepancy: _____

3. **Lab Discrepancies requiring Team Leader/PM notification**

Document in Analytical Notes of Lab Narrative

If Section III. is filled out PM must be notified within 24 hrs of initiation

3.1. ☐ Tedlar Bag found to be leaking at the time of analysis; sample ☐ can / ☐ cannot (check one) be analyzed.

3.2. ☐ Tedlar Bag found to be flat/low volume; sample cannot be analyzed.

3.3. ☐ Samples received with insufficient time to analyze prior to expiration.

3.4. ☐ Canister found to be leaking at the time of analysis.

3.5. ☐ Sample loss due to instrument malfunction / broken glassware.

3.6. ☐ Low/high surrogate recoveries noted in QC/sample(s) for extractable samples.

3.7. ☐ Reporting Limit was raised.

3.8. ☐ Post weight > Pre weight in field/lab Blank for PM10/TSP samples.

3.9. ☐ Sample Trip Blank has a reportable level(s) of target compound(s) present. Re-analysis confirmed the initial result.

3.10. ☐ Other (describe below).

Initials: _____ **Date:** _____ **Notify Receiving:** ☐ **Notify PM:** ☐ _____

Team Lead Initials: _____ **Date:** _____

Describe the Discrepancy: _____

_____

_____

How Does this Affect Client: _____

_____

_____

Project Manager Use Only

Project Manager Notification ☐ **Section 2 Complete** ☐ **Section 3 Complete**

Action:

☐ It is not necessary to notify the client. Narrate the discrepancy in Receiving Notes/Analytical Notes of Lab Narrative.

PM Initials:_____ Date: _____

☐ Client notification required. See attached client contact / email, or comments below:

Client Notification:

PM Initials:_____ Person notified: _____ Date: _____

☐ Waiting for Client Reply

Comments: _____

_____

☐ Notify Lab Name: _____ Date: _____ **Notify Receiving:** ☐

☐ **Additional notifications attached.**

Additional Comments:

____

17.0) SOP REVISION HISTORY

Revision Date	Revision #	Changes	Reviewer(s)
05/05/20	26		Joel Tillman

		Sections 2.0, 6.0, 7.0 - Clarified procedures; Section 3.13 - Added procedure for scanning shipping documents and attach to the workorder for DoD CVP projects; Corrected typos throughout.	
12/18/20	27	Updated Table 1- Receiving Action to reflect current procedure for WO with PO Required status. Updated Table 2 to reflect updated locations for different media type Updated Section 6.4 to clarify media charge procedures.	Jenny Wu
04/13/22	28	Section 3.3 - Added a 24-hour follow-up with the PM if a response has not been provided; Sections 3.14.6 and 4.0 - Added procedure for DoD workorders; Updated company name (removed LLC) in the cover page; Revised Section 15.0 title to include DEFINITIONS.	Melanie Levesque Joel Tillman

End of document

Version history

Version	Approval	Revision information	
26	10.JUN.2020	Sections 2.0, 6.0, 7.0 - Clarified procedures; Section 3.13 - Added procedure for scanning shipping documents and attach to the workorder for DoD CVP projects; Corrected typos throughout.	
27	25.JAN.2021	Updated Table 1- Receiving Action to reflect current procedure for WO with PO Required status. Updated Table 2 to reflect updated locations for different media type Updated Section 6.4 to clarify media charge procedures.	
28	19.APR.2022	Section 3.3 - Added a 24-hour follow-up with the PM if a response has not been provided; Sections 3.14.6 and 4.0 - Added procedure for DoD workorders; Updated company name (removed LLC) in the cover page; Revised Section 15.0 title to include DEFINITIONS.	

Eurofins Air Toxics
STANDARD OPERATING PROCEDURE

INTERNAL SAMPLE TRACKING, TRANSMITTAL AND CUSTODY PROCEDURES

SOP #63

1.0 SCOPE AND APPLICATION

The procedures in this SOP describe the manner in which the laboratory tracks samples from the time after they are logged in and pressurized (if required) until analysis is completed and disposal occurs. The purpose of tracking is to maintain chain-of -custody from the time of sample receipt until final disposal.

2.0 PROCEDURE SUMMARY

2.1 Description

The Sample Receiver or Sample Pressurization and Screening personnel log the entire component of the workorder into a sample storage area* following assignment of a workorder number, laboratory identification numbers, and pressurization (if required). To ensure traceability of results, the unique sample number and workorder number assigned is used to identify the sample in all laboratory data documentation, including logbooks, instrument printouts, and final reports.

Please note that the entire building is considered a "secure area" (see Eurofins Air Toxics SOP #30 *Laboratory Security*).

All bar-coded canister and bags must be scanned by the analyst/scientist taking custody of the samples to a designated location. Sample tubes for EPA 325 are also scanned using the tube barcodes to their designated area. All other samples must be logged into the appropriate sample tracking logbook prior to analysis by the lab. Removal of the samples for any reason requires either scanning of the bar-code of the sample to a specific location or documenting the movement in the appropriate logbook. This procedure continues to track all samples' transfer and locations throughout the laboratory up until disposal.

*Sample storage area consists of the sample custody cage, designated EPA 325 sample tube storage area and designated 325 shelves, designated refrigerators and designated freezers.

2.2 When a canister, 325 tube or a bag sample is scheduled for analysis, the analyst obtains custody of the sample by scanning the canister/sticker/tube bar code as well as the bar coded location destination of each individual sample. The scanned information is electronically transmitted to ATLAS systems to reflect the custody of canister and bag samples at all times. The historical information is maintained in this database from the time of sample receipt until the disposal stage. All other media samples are logged into the Internal Extractable Sample Tracking Logbook and the pertinent storage area.

2.3 Movement of samples from one instrument to another for the purpose of screening or multiple analyses requires canister/bag scanning or logbook entry as applicable. All laboratory staff must use their own secure ATLAS connection login and password prior to using the ATLAS scanning module to record identification of the custodian. Users must also log-out of the ATLAS Tracking Module when not in use to prevent unauthorized access.

3.0 HEALTH AND SAFETY

The 6L Summa™ canisters are somewhat heavy and could cause injury if they are dropped. To reduce the possibility of dropping canisters during transport using a cart, canisters must be placed on the cart shelf in a single layer. Canisters must never be stacked on top of each other on a cart. In addition to bruising, a valve could be damaged, which could allow potentially toxic sample constituents to escape. Multiple canisters should be moved individually, or moved on a cart to prevent any incident. Tedlar bags can be punctured, which could cause sample loss and result in potential exposure.

4.0 EQUIPMENT/APPARATUS

List of Equipment

- Computer with ATLAS connection available
- Wireless barcode scanners
- Large RED permanent marker

For samples without bar codes:

- Black ballpoint pen
- Sample tracking logbooks (Internal Sample Tracking)
- "Released Samples" stamp
- Large RED permanent marker
- Clock

5.0 PROCEDURE

5.1 Client samples are received by the Sample Receiver in the Sample Receiving Department. At this time, a workorder number is created for the samples as a group, and individual laboratory identification numbers are assigned to each field sample (see Eurofins Air Toxics SOP #50). Note: All samples must be associated with a workorder number prior to allocation throughout the laboratory.

5.2 Requests for multiple analyses will result in fractionation of the workorder into as many separate portions as are needed. Fractionated portions are

labeled A, B, C, etc. The workorder is then entered into the laboratory database.

5.3 Pressurization of the canister media, if required, may take place, and then the Sample Pressurization and Screening personnel move the samples into the sample custody cage. At this time, samples are placed in an assigned and identified storage location until needed for analysis.

If samples are taken directly from the pressurization analyst for analysis prior to being logged into the sample custody cage, it is the responsibility of the laboratory analyst/scientist to ensure proper custody is maintained by either scanning the samples or logging them into the appropriate logbooks.

5.4 If pressurization and screening are not required, Sample Receiving personnel log/scan the samples into the appropriate sample storage area. Pre-labeled shelves in the sample storage area or refrigerators are assigned to each sample.

5.5 All digital or manual logbooks must include the following tracking information:

a) Workorder number
b) Number of samples
c) Analysis(es) requested
d) Location
e) Date
f) Time (military)
g) Initials of the person holding custody of the samples currently or previously
h) Samples on hold

5.6 Unanalyzed canister and Tedlar bag samples are stored in the sample custody cage on shelves A – J. Samples for which analysis has been completed are either disposed immediately (see Section 6), or stored on shelves X and Y (if the project requires sample hold until reporting or has "Do Not Clean" tags). Note: Samples logged back into the cage where analysis is completed must also be recorded into Form F3.21 "Do Not Release Canister Tracking" which is located in the cage area.

5.7 Unanalyzed non-barcoded samples stored in the sample custody refrigerators/freezers are placed on shelves labeled as "Not Analyzed".

5.8 Each individual barcoded samples must be scanned into ATLAS tracking system before any further movemnet of the sample/s through the laboratory.

5.9 For non-barcoded samples each entry in manual logbooks must be accompanied by the date, time (military), and initials of the person who took or relinquished custody, the instrument and the analysis/es which is/are scheduled to be conducted. Entry errors must be corrected by drawing a single line through the incorrect information accompanied by date and initials.

5.10 In order to prevent accidental disposal, a work order that are signed out but has not been analyzed due to unforeseen delays (e.g. instrument failure) must be returned to the assigned location in the sample storage area, and this action must be documented in the sample tracking logbook or scanned into the storage area.

Verified samples from completed workorders must not be stored on the lab floor or the sample storage area and must properly be released for disposal if no further analysis is required.

5.11 A workorder that is partially analyzed by the end of a shift may be left in the immediate vicinity of the analytical instrumentation only if they are being handed off to another analyst/scientist.

5.12 A workorder that is partially analyzed on one instrument and need to be moved to another instrument must properly be logged back (or scanned) into the cage/ATLAS and back out to the appropriate instrument.

5.13 Barcoded samples for which one analysis has been completed and need further analysis, must be scanned back in to the sample storage area and properly log/scan back out to the appropriate instrument/method for further analysis.

6.0 SAMPLE DISPOSAL PROCEDURE

A sample may be released for disposal only when the following criteria are met:

6.1 The analyses have been completed and are verified as meeting quality criteria documented in the relevant SOPs in addition to verifying client project requirements have been met.

6.2 Runlog(s) are verified for completion of all samples associated with each workorder fraction to ensure all requested methods have been analyzed before final release.

6.3 A qualified analyst or scientist has reviewed the sample run as acceptable. (Demonstration of sample loading proficiency and approval by a

Laboratory Management are required qualifications for an analyst or scientist to release samples.)

6.4 If the sample requires multiple analyses and all fractions have been completed as indicated by the date of analysis and the instrument utilized in the Sample Tracking Module. The date of analysis information is manually entered into the system by the qualified laboratory staff. Verification of this information entry into ATLAS prior to sample disposal is confirmed by the ATLAS Tracking Module.

6.5 If the sample canister does not have a "Do Not Clean" tag. If this tag is attached to the canister, the canister can be released five days after sample analysis, per specific project requirement, or sooner, but must be approved by the Project Manager prior to release. Additionally, Form F3.21 "Do Not Release Canister Tracking" must be verified and completed by initialing and dating the sample release date.

6.6 Review of the QC and analytical runs is documented by a check mark and initials in the instrument logbook. Once the review is completed, samples can be released. The ATLAS Tracking System will validate that a date of analysis for all samples associated with each fractions of a workorder has been entered and the sample is checked as "Done" in the "show sample" module in sample tracking prior to their release. Before any sample can be checked off as "Done" in ATLAS, the appropriate runlog(s) must be verified. Additionally, second runlog verification must be performed prior to entering the date in the "Date Analyzed" column of the ATLAS Tracking System for each workorder fraction. This step is critical to ensure each sample in the workorder fraction has individually been verified as analyzed.

6.7 Before entering a date in the 'Date Analyzed' column, verify that all samples are documented as completed in section 2 of the Data Review Checklist (F1.27).

Note 1: New employees in training refer to instruction I 2.17 "New Employee Canister Release Instructions"

6.8 Only the designated color-coded carts can be used for canister transfer between methods, instruments, and for sample release (see appendix A for the code key.) When releasing samples, it's the chemist responsibility to account for all the canisters on the cart. Each canister must individually be scanned and verified in sample tracking prior to moving the samples to Support services.

6.9 Before canister samples are transferred to the Support Services

Department, an X is marked on the sample tag using a large RED permanent marker along with date and initials of the chemist to indicate to Support Services the canister has been verified and ready for cleaning (see Section 5.1.16). These samples must not be placed back onto the shelves. Released canisters or bags that require additional analysis prior to the disposal step can only be re-activated by designated manager with over-ride privileges. To re-activate a sample, a reason is required to be entered in the correct field for complete documentation.

6.10 In the event that storage space in the sample's original location within the sample storage area is limited, the samples for which analysis requirements are not yet complete may be located on another shelf. The sample and the new location must be scanned to maintain the chain of custody.

6.11 Various samples are categorized as "single use" (PUF/XAD cartridges, charcoal cartridges, etc.). Disposal of the used up media must be documented in the appropriate sample tracking logbook to specifically indicate that the sample will not be returned to secure custody because it no longer exists. The term "Used Up", analyzed, "Extracted", or "Consumed" with a date and initials will be used to document this fact.

6.12 In the case of TO-17 tubes, samples are generally re-collected to allow for re-analysis or dilution if needed. Re-collected sample tubes are re-capped with long-term storage fittings and placed in their original storage tins in the assigned sample refrigerator and designated shelf (e.g. Refrigerator 4, Shelf 2). Archived samples can be released when Atlas shows that the workorder has been reported, generally with a status of "Filed". Entries in the sample custody logbook reflect the date/time and initials of the analyst logging re-collecting sample tubes into the refrigerator as well as final release.

6.13 Similar to TO-17, EPA 325 samples are re-collected to allow for re-analysis or dilution and are re-capped with long-term storage caps as soon as practical after the completion of the analytical sequence. Samples are stored at ambient temperature and scanned to their assigned shelf labeled "325" in the designated EPA 325 sample tube storage area. Unless otherwise documented in the project requirements, samples are released when the workorder has been reported. If the customer delays delivering required field parameters to the lab beyond a week after receipt, samples may be released after verifying that all sample runs and QC meet requirements and applicable trigger exceedance evaluation is completed. Release is documented by scanning the barcodes into Atlas and updating the status accordingly.

7.0 LOGBOOK MAINTENANCE FOR NON-BARCODED SCANNING SAMPLES

It is the responsibility of the laboratory staff to ensure that proper sample chain-of-custody is maintained. This includes correction of any errors found in the sample storage area logbook, confirming complete documentation, and an unbroken chain of custody. A sample should not be logged out of any sample storage area which was never properly logged in, and a sample should not be logged back into a sample storage area which was never properly logged out.

8.0 DEFINITIONS

Refer to the Eurofins Air Toxics Laboratory Quality Assurance Manual (LQAM) Definitions and Terms, Appendix A.

Cart Color Code Key

Color	Department	Qty.
Orange Cart	Transfer	3
Brown Cart	To Be Analyzed	18
White Cart	Receiving	Varies
Purple Cart	Returned Media	1
Yellow Cart	Screening [**To be Screened**]	Varies
Green Cart	Screening [**Ready for Cage**]	Varies

SOP Revision History

Revision Date	Revision #	Changes	Reviewer(s)
09/26/12	14	Update entire content based on the new ATL Media Tracking System for canisters and bags with barcodes.	Bahar Amiri Sepideh Saeed Heidi Hayes
10/23/13	Cart color code	Removed the screening color code key	Sepideh Saeed
10/08/14	17	Removed Section 2.4 and Appendix A which referenced Color Coded Sample Carts. Switched sections 5.1.16 and 5.1.17 to improve clarity. Removed reference to VOST and TO-17 from section 5.1.16. Added section 5.1.18 to describe TO-17 sample storage and release.	Mike Skidmore Heidi Hayes
09/21/15	18	No changes needed.	Mike Skidmore
09/09/16	19	Update Section 5.1.12 to add checking runlog before updating samples analyzed in ATLAS Include specific information regarding EPA 325 sample tracking in sections 2.1 and 2.2 adding section 5.1.1.8.	Ed Jakab Heidi Hayes
10/17/17	20	Update Section 2.1 and 5.1.18 to update storage location for 325 samples. Updated section 2.2 to include reference to 325 tube. Update section 5.1.17 to reflect current practices Update section 5.1.18 to cover release of samples due to client-delayed reports	Ed Jakab Heidi Hayes
5/22/18	21	5.1.13 updated to add reference for New Employee Instruction (I 2.17); Update company name throughout.	Samantha Black Melanie Levesque
6/27/19	21.1	No changes needed.	Gretchen Hehir
7/29/19	22	Updated 5.1.12 and 5.1.13 to include runlog(s) review verification.	Ed Jakab
01/03/20	23	Updated sections 5.0, 6.0 and reformatted	Sepideh Saeed
12/15/20	23.1	No changes.	Steven Nguyen
1/24/22	24	Updated section 5.6 and 6.5 to include Form F3.21. Removed redundant information from 5.10 and 5.14, Updated cart quantity under Cart Color Code Key; Updated company name (removed LLC); Renamed Section 8.0 as DEFINITIONS.	Mike Skidmore Melanie Levesque

Document Owner/Laboratory Director:

Date: 02/18/22

Quality Assurance:

Date: 02/18/22

ATTACHMENT B

Field Documentation Forms

1. Chain of Custody Form
2. SUMMA® Sample Train Shut-In Test Log
3. Soil Gas Probe Integrity Testing Log
4. Soil Gas Sample Collection Log

Ahtna

Chain of Custody Record

COC Number _____
COC Form _____ of _____

Project Number		Lab Work Order	
Installation/Site		Lab Turnaround Time	◉ 2 w ○ 1 w ○ 3 d ○ 2 d ○ 24 h ○ _____
Activity		Transporter Name	
Purchase Order#		Waybill Number	
Field Team Leader *(name, phone, email)*		Ahtna POC *(name, phone, email)*	

Laboratory Sequence No.	Field Sample ID	Date	Time	Matrix[2]	#.Bottles/Canisters	Preservation Used[1]											Use for Matrix Spike/Dup	Laboratory Point of Contact / Sample Specific Comments
																		(Laboratory Organization)
																		(Laboratory Project Manager)
																		(Telephone)
																		(Email address)
																		Sample Specific Comments

(Comments)

(Relinquished by Field Team/Company)	*(Date/Time)*	*(Received By Field or Laboratory Sample Custodian/Organization)*	*(Date/Time)*	*(Relinquished by/Organization)*	*(Date/Time)*
(Received by/Organization)	*(Date/Time)*	*(Relinquished By/Organization)*	*(Date/Time)*	*(Received by/Organization)*	*(Date/Time)*

[1] Preservation Used: HCl (1), HNO3 (2), H2SO4 (3), NaOH (4), H3PO4, Other _____ (6), Other _____ (7), Other _____ (8), Other _____ (9)

[2] Ambient air (AA), indoor air (AI), soil gas (GS), sediment (SE), soil (SO), ground water (WG), surface water (WS), process water (WT)

SUMMA Sample Train Shut-In Test Log

Soil Gas Monitoring

Site 12, Former Fort Ord, California

Canister ID	Sample ID	Date	Start:	End:	Pass/Fail*
			Time/Inch, Hg	Time/Inch, Hg	

Notes:

Hg = mercury

The vacuum at the start and the end of the shut-in test shall be read by the same field person from the same perspective to assure comparibility.

*Passing of the shut-in test is a maximum drop in vacuum of 1 inch Hg after 15 minutes of observation with Summa canister connected to the sample train (with inlet closed).

Page _____ of _____

Field Personnel Signature _____ Date _____

Ahtna

Soil Gas Probe Integrity Testing Log

Soil Gas Monitoring

Site 12, Former Fort Ord, California

	Time (min):	0*		5		10		15			
	Detector:	Shroud	Inline	Shroud	Inline	Shroud	Inline	Shroud	Inline		
Probe ID[1]	Date	Start Time	% He	% He	% He	% He	% He	% He	% He	% He	End Time	Pass/Fail[2]

Notes:

% = percent (by volume) min = minutes

He = helium ID = identification

[1] All probe depths in a nested soil gas probe cluster shall be integrity (leak) tested.

[2] DTSC's *Advisory, Active Soil Gas Investigations* provides the opinion that a 5% ambient air dilution is inconsequential to sample integrity. When sampling under a 20% helium in air atmosphere, 1% helium detected in the purge gas represents a 5% ambient air sample dilution. If the concentration of helium in the purge sample is greater than or equal to 5% of the helium concentration in the shroud, corrective action is necessary to remedy the leak.

* Inline detector reading at time =0 is baseline reading with the detector disconnected from sampling assembly.

Field Personnel Signature: _____ Date _____

Ahtna

Ahtna

Soil Gas Sample Collection Log

Soil Gas and Soil Vapor Extraction Treatment System Monitoring

Site 12, Former Fort Ord, California

Date:_____ **Sampler:** _____ **Weather:** _____

Probe ID: _____ **Location Description:** _____

Probe Leak Test (Pass/Fail):_____

ORIGINAL SAMPLE INFORMATION:

Sample Container: _____ 1.0-L SUMMA Canister ____ 100% Certified _____ Other: _____

Canister ID:_____ Sample Manifold ID: _____

Equipment (Shut-In) Test (Pass/Fail): _____ Sample ID: _____

Collection start time: _____ Collection end time: _____

Initial Canister Pressure/Vacuum (inches Hg): _____ (vacuum of at least – 25" Hg)

Final Canister Pressure/Vacuum (inches Hg): _____ (vacuum between – 4" to – 8" Hg)

DUPLICATE SAMPLE INFORMATION: _____ Not applicable

Sample Container:____ 1.0-L SUMMA Canister ____ 100% Certified ___ Other: _____ Canister ID:_____

Duplicate Manifold ID: _____ Equipment (Shut-In) Test (Pass/Fail): _____

Sample ID: _____ Collection start time: _____ Collection end time: _____

Initial Canister Pressure/Vacuum (inches Hg): _____ (vacuum of at least –25" Hg)

Final Canister Pressure/Vacuum (inches Hg):_____ (vacuum between – 4" to – 8" Hg)

ANALYSES AND REVIEW:

Analytes Requested: _____TCE and PCE _____Other (list):_____

By method:_____ EPA TO-15 (5&20) _____ EPA TO-15 (Low-Level) Laboratory: Eurofins Air Toxics, Inc.

Comments: _____

Sampler Signature: _____ Date**:** _____

Reviewer Signature: _____ Date: _____

Notes:

"Hg = inches mercury L = liter ID = identification

ATTACHMENT C

Three Phase Quality Control Process and Documentation

Preparatory Inspections

Project Number		Field Team Leader	
Installation/Site		QC Lead	
Event Name		Project Lead	
Date		Safety Representative	

Meeting Attendees *(list additional attendees on second page)*

Name and Initials	Event Role/Position	Organization

Preparatory Steps

Planning Documents/Submittals Completed with Approvals	
Item	Comments
Planning Documents/Submittals Reviewed by Field Team (Ahtna and Subcontractors)	
Item	Comments
Preliminary Work Completed in Accordance with Plans	
Item	Comments

Ahtna

Preparatory Inspections

DFOW/Tasks Discussed, and Field Team to Implement Work According to Plans	
Item	Comments
Equipment/Supplies/Materials Procured, Available, in Working Order, and Conforming to Standards (list)	
Item	Comments

Action Items

Additional Meeting Attendees

Name and Initials	Event Role/Position	Organization

Approved By

Initial _____ Signature _____ Date _____

Initial/Follow-Up QC Inspections

Project Number		Field Team Leader	
Installation/Site		QC Lead	
Event Name		Project Lead	

List of Applicable Inspection Items

Item	Inspection	Spec. Document and/or Section	QC Category & Frequency[1]
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

[1] (W) Workmanship; (S) Safety; (M/E) Materials and Equipment; (P) Plan Compliance. Depending on the item, list one or more categories (W, S, M/E, or P) and specify the frequency of follow-up inspections.

Project Lead Approval

Initial _____ Signature _____ Date _____

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Initial/Follow-Up QC Inspections

Project Number			
Installation/Site		QC Representative	
Event Name		Date of Inspection(s)	

Item Number and Inspection	Phase (I/F)[1]	Inspect. Type[2] W	S	M/E	P	Basis[3] E/N/P/O	Variance (Y/N)[4]	Deficient (Y/N)[5]	Inspector Initial/Time
Details:									
Details:									
Details:									
Details:									
Details:									
Details:									

Notes:

[1] **Phase:** Initial (I); Follow-up (F)

[2] **Inspection Type:** (W) Workmanship; (S) Safety; (M/E) Materials/Equipment; (P) Plan Compliance

[3] **Basis:** (E) Existing DFOW or task; (N) New DFOW or task; (P) New personnel; (O) Other (specify) _____

[4] **Variance:** Contact FTL/PL for variance approval, document resolution. Complete field form SWE-FFRM-004, "Work Variance" as directed by FTL..

[5] **Deficiency:** Contact FTL/PL before proceeding with work, note resolution. Complete field form SWE-FFRM-102, "Corrective Action" as directed.

Approved By

Initial _____ Signature _____ Date _____

ATTACHMENT D

Analytical Laboratory Certifications

CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

Eurofins Air Toxics
180 Blue Ravine Road, Suite B
Folsom, CA 95630

Fulfills the requirements of

ISO/IEC 17025:2017

and

U.S. Department of Defense (DoD) Quality Systems Manual for Environmental Laboratories (DoD QSM V5.4)

In the field of

TESTING

This certificate is valid only when accompanied by a current scope of accreditation document.
The current scope of accreditation can be verified at www.anab.org.

R. Douglas Leonard Jr., VP, PILR SBU

Expiry Date: 27 April 2024
Certificate Number: ADE-1451

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

and

U.S. Department of Defense (DoD) Quality Systems Manual for Environmental Laboratories (DoD QSM V5.4)

Eurofins Air Toxics
180 Blue Ravine Road, Suite B
Folsom, CA 95630
Melanie Levesque
(916) 605-3396

TESTING

Valid to: **April 27, 2024** Certificate Number: **ADE-1451**

Environmental

Air and Emissions		
Technology	**Method**	**Analyte**
GC/FID/dual TCD	ASTM D1945 Mod	Acetylene
GC/FID/dual TCD	ASTM D1945 Mod	Carbon Dioxide
GC/FID/dual TCD	ASTM D1945 Mod	Carbon Monoxide
GC/FID/dual TCD	ASTM D1945 Mod	Ethane
GC/FID/dual TCD	ASTM D1945 Mod	Ethylene
GC/FID/dual TCD	ASTM D1945 Mod	Helium
GC/FID/dual TCD	ASTM D1945 Mod	Hydrogen
GC/FID/dual TCD	ASTM D1945 Mod	Isobutane
GC/FID/dual TCD	ASTM D1945 Mod	Isopentane
GC/FID/dual TCD	ASTM D1945 Mod	Methane

Air and Emissions		
Technology	**Method**	**Analyte**
GC/FID/dual TCD	ASTM D1945 Mod	n-Butane
GC/FID/dual TCD	ASTM D1945 Mod	Neopentane
GC/FID/dual TCD	ASTM D1945 Mod	Nitrogen
GC/FID/dual TCD	ASTM D1945 Mod	n-Pentane
GC/FID/dual TCD	ASTM D1945 Mod	Oxygen
GC/FID/dual TCD	ASTM D1945 Mod	Propane
GC/FID/dual TCD	ASTM D1946 Mod	Carbon Dioxide
GC/FID/dual TCD	ASTM D1946 Mod	Carbon Monoxide
GC/FID/dual TCD	ASTM D1946 Mod	Ethane
GC/FID/dual TCD	ASTM D1946 Mod	Ethylene
GC/FID/dual TCD	ASTM D1946 Mod	Helium
GC/FID/dual TCD	ASTM D1946 Mod	Hydrogen
GC/FID/dual TCD	ASTM D1946 Mod	Methane
GC/FID/dual TCD	ASTM D1946 Mod	Nitrogen
GC/FID/dual TCD	ASTM D1946 Mod	Oxygen
GC/FID/PID	TO-3 Mod	TPH(GRO)
GC/FID/PID	TO-3 Mod	TPH(JP4)
GC/MS	TO-15 (Full Scan/SIM)	1,1,1-Trichloroethane
GC/MS	TO-15 (Full Scan/SIM)	1,1,2,2-Tetrachloroethane
GC/MS	TO-15 (Full Scan/SIM)	1,1,2-Trichloroethane
GC/MS	TO-15 (Full Scan/SIM)	1,1-Dichloroethane
GC/MS	TO-15 (Full Scan/SIM)	1,1-Dichloroethene
GC/MS	TO-15 (Full Scan)	1,2,4-Trichlorobenzene

Air and Emissions		
Technology	**Method**	**Analyte**
GC/MS	TO-15 (Full Scan)	1,2,4-Trimethylbenzene
GC/MS	TO-15 (Full Scan/SIM)	1,2-Dibromoethane (EDB)
GC/MS	TO-15 (Full Scan/SIM)	1,2-Dichlorobenzene
GC/MS	TO-15 (Full Scan/SIM)	1,2-Dichloroethane
GC/MS	TO-15 (Full Scan)	1,2-Dichloropropane
GC/MS	TO-15 (Full Scan/SIM)	1,2-Dichlorotetrafluoroethane (Freon 114)
GC/MS	TO-15 (Full Scan)	1,3,5-Trimethylbenzene
GC/MS	TO-15 (Full Scan)	1,3-Butadiene
GC/MS	TO-15 (Full Scan/SIM)	1,3-Dichlorobenzene
GC/MS	TO-15 (Full Scan/SIM)	1,4-Dichlorobenzene
GC/MS	TO-15 (Full Scan)	1,4-Dioxane
GC/MS	TO-15 (Full Scan)	2,2,4-Trimethylpentane
GC/MS	TO-15 (Full Scan)	2-Butanone (MEK)
GC/MS	TO-15 (Full Scan)	2-Chlorotoluene
GC/MS	TO-15 (Full Scan)	2-Hexanone
GC/MS	TO-15 (Full Scan)	2-Propanol
GC/MS	TO-15 (Full Scan)	3-Chloropropene
GC/MS	TO-15 (Full Scan)	4-Methyl-2-pentanone (MIBK)
GC/MS	TO-15 (Full Scan)	Acetone
GC/MS	TO-15 (Full Scan)	alpha-Chlorotoluene
GC/MS	TO-15 (Full Scan/SIM)	Benzene
GC/MS	TO-15 (Full Scan)	Bromodichloromethane
GC/MS	TO-15 (Full Scan)	Bromoform

Air and Emissions		
Technology	**Method**	**Analyte**
GC/MS	TO-15 (Full Scan)	Bromomethane
GC/MS	TO-15 (Full Scan)	Butane
GC/MS	TO-15 (Full Scan)	Butyl Benzene
GC/MS	TO-15 (Full Scan)	Carbon disulfide
GC/MS	TO-15 (Full Scan/SIM)	Carbon tetrachloride
GC/MS	TO-15 (Full Scan/SIM)	Chlorobenzene
GC/MS	TO-15 (Full Scan)	Chlorodibromomethane
GC/MS	TO-15 (Full Scan/SIM)	Chloroethane
GC/MS	TO-15 (Full Scan/SIM)	Chloroform
GC/MS	TO-15 (Full Scan/SIM)	Chloromethane
GC/MS	TO-15 (Full Scan/SIM)	cis-1,2-Dichloroethene
GC/MS	TO-15 (Full Scan)	cis-1,3-Dichloropropene
GC/MS	TO-15 (Full Scan)	Cyclohexane
GC/MS	TO-15 (Full Scan)	Cumene
GC/MS	TO-15 (Full Scan/SIM)	Dichlorodifluoromethane (Freon 12)
GC/MS	TO-15 (Full Scan)	Ethanol
GC/MS	TO-15 (Full Scan/SIM)	Ethylbenzene
GC/MS	TO-15 (Full Scan)	Hexachlorobutadiene
GC/MS	TO-15 (Full Scan)	Methylene Chloride
GC/MS	TO-15 (Full Scan/SIM)	m,p-Xylene
GC/MS	TO-15 (Full Scan/SIM)	Naphthalene
GC/MS	TO-15 (Full Scan)	n-Butanol (1-Butanol)
GC/MS	TO-15 (Full Scan)	n-Heptane

Air and Emissions		
Technology	**Method**	**Analyte**
GC/MS	TO-15 (Full Scan)	n-Hexane
GC/MS	TO-15 (Full Scan)	Nonane
GC/MS	TO-15 (Full Scan)	n-Pentane
GC/MS	TO-15 (Full Scan)	n-Propylbenzene
GC/MS	TO-15 (Full Scan)	Octane
GC/MS	TO-15 (Full Scan/SIM)	o-Xylene
GC/MS	TO-15 (Full Scan)	p-Ethyltoluene
GC/MS	TO-15 (Full Scan)	Propylene
GC/MS	TO-15 (Full Scan)	sec-Butylbenzene
GC/MS	TO-15 (Full Scan)	Styrene
GC/MS	TO-15 (Full Scan)	tert-Butyl Alcohol
GC/MS	TO-15 (Full Scan)	tert-Butyl Benzene
GC/MS	TO-15 (Full Scan/SIM)	tert-Butyl methyl ether (MTBE)
GC/MS	TO-15 (Full Scan/SIM)	Tetrachloroethylene
GC/MS	TO-15 (Full Scan)	Tetrahydrofuran
GC/MS	TO-15 (Full Scan/SIM)	Toluene
GC/MS	TO-15 (Full Scan/SIM)	trans-1,2-Dichloroethene
GC/MS	TO-15 (Full Scan/SIM)	trans-1,3-Dichloropropene
GC/MS	TO-15 (Full Scan/SIM)	Trichloroethene
GC/MS	TO-15 (Full Scan/SIM)	Trichlorofluoromethane (Freon 11)
GC/MS	TO-15 (Full Scan/SIM)	Trichlorotrifluoroethane (Freon 113)
GC/MS	TO-15 (Full Scan)	Tetrahydrofuran
GC/MS	TO-15 (Full Scan/SIM)	Vinyl chloride

Air and Emissions		
Technology	**Method**	**Analyte**
GC/MS	TO-17 (WMS/RAD130) Mod	1,1,1-Trichloroethane
GC/MS	TO-17 (WMS/RAD130) Mod	1,1,2,2-Tetrachloroethane
GC/MS	TO-17 (WMS/RAD130) Mod	1,1,2-Trichloroethane
GC/MS	TO-17 (WMS/RAD130) Mod	1,1-Dichloroethane
GC/MS	TO-17 (WMS/RAD130) Mod	1,1-Dichloroethene
GC/MS	TO-17 (WMS/RAD130) Mod	1,2,4-Trimethylbenzene
GC/MS	TO-17 (WMS/RAD130) Mod	1,2-Dichlorobenzene
GC/MS	TO-17 (WMS/RAD130) Mod	1,2-Dichloroethane
GC/MS	TO-17 (WMS/RAD130) Mod	1,3,5-Trimethylbenzene
GC/MS	TO-17 (WMS/RAD130) Mod	1,3-Dichlorobenzene
GC/MS	TO-17 (WMS/RAD130) Mod	1,4-Dichlorobenzene
GC/MS	TO-17 (WMS/RAD130) Mod	2-Butanone (MEK)
GC/MS	TO-17 (WMS/RAD130) Mod	4-Methyl-2-pentanone (MIBK)
GC/MS	TO-17 (WMS/RAD130) Mod	Benzene
GC/MS	TO-17 (WMS/RAD130) Mod	Carbon tetrachloride
GC/MS	TO-17 (WMS/RAD130) Mod	Chlorobenzene
GC/MS	TO-17 (WMS/RAD130) Mod	Chloroform
GC/MS	TO-17 (WMS/RAD130) Mod	cis-1,2-Dichloroethene
GC/MS	TO-17 (WMS/RAD130) Mod	Cyclohexane
GC/MS	TO-17 (WMS/RAD130) Mod	Ethanol
GC/MS	TO-17 (WMS/RAD130) Mod	Ethyl Acetate
GC/MS	TO-17 (WMS/RAD130) Mod	Ethylbenzene
GC/MS	TO-17 (WMS/RAD130) Mod	m,p-Xylene
GC/MS	TO-17 (WMS/RAD130) Mod	n-Heptane

Air and Emissions		
Technology	**Method**	**Analyte**
GC/MS	TO-17 (WMS/RAD130) Mod	n-Hexane
GC/MS	TO-17 (WMS/RAD130) Mod	o-Xylene
GC/MS	TO-17 (WMS/RAD130) Mod	Propylbenzene
GC/MS	TO-17 (WMS/RAD130) Mod	tert-Butyl methyl ether (MTBE)
GC/MS	TO-17 (WMS/RAD130) Mod	Tetrachloroethylene
GC/MS	TO-17 (WMS/RAD130) Mod	Toluene
GC/MS	TO-17 (WMS/RAD130) Mod	trans-1,2-Dichloroethene
GC/MS	TO-17 (WMS/RAD130) Mod	Trichloroethene
GC/MS	TO-17 (WMS) Mod	Vinyl chloride
Preparation	**Method**	**Type**
Extraction of sorbent media	Eurofins Air Toxics SOP # 100	Solvent Extraction

Note:

1. This scope is formatted as part of a single document including Certificate of Accreditation No. ADE-1451.

R. Douglas Leonard Jr., VP, PILR SBU

Oregon
Environmental Laboratory
Accreditation Program

NELAP Recognized

Eurofins Air Toxics

CA300005

180 Blue Ravine Road, Ste. B

Folsom, CA 95630

IS GRANTED APPROVAL BY ORELAP UNDER THE 2016 TNI STANDARDS, TO PERFORM ANALYSES ON ENVIRONMENTAL SAMPLES IN MATRICES AS LISTED BELOW :

Air	Drinking Water	Non-Potable Water	Solids and Chemical Waste	Tissue
Chemistry				

AND AS RECORDED IN THE LIST OF APPROVED ANALYTES, METHODS, ANALYTICAL TECHNIQUES, AND FIELDS OF TESTING ISSUED CONCURRENTLY WITH THIS CERTIFICATE AND REVISED AS NECESSARY.

ACCREDITED STATUS DEPENDS ON SUCCESSFUL ONGOING PARTICIPATION IN THE PROGRAM AND CONTINUED COMPLIANCE WITH THE STANDARDS.

CUSTOMERS ARE URGED TO VERIFY THE LABORATORY'S CURRENT ACCREDITATION STATUS IN OREGON.

Travis Bartholomew
Oregon State Public Health Laboratory
ORELAP Program Manager
7202 NE Evergreen Parkway, Suite 100
Hillsboro, OR 97124

EFFECTIVE DATE : **10/18/2022**
EXPIRATION DATE : **10/17/2023**
Certificate No : **CA300005 - 017**

OREGON

Environmental Laboratory Accreditation Program

ORELAP Fields of Accreditation

Eurofins Air Toxics
180 Blue Ravine Road, Ste. B
Folsom, CA 95630

ORELAP ID: CA300005
EPA CODE: CA00933
Certificate: CA300005 - 017

Issue Date: 10/18/2022 Expiration Date: 10/17/2023

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Matrix	Reference	Analyte Code	Analyte	Method Code	Description
Air					
	40 CFR Part 50 Appendix J			10000507	Reference Method for the Determination of Particulate Matter as PM10 in the Atmosphere
		3950	Particulates <10 um		
	ASTM D1945 03			30024443	Natural Gas by Gas Chromatography
		4938	2-Methylbutane (Isopentane)		
		4942	2-methylpropane (Isobutane)		
		4323	Acetylene		
		3755	Carbon dioxide		
		3780	Carbon monoxide		
		4747	Ethane		
		4752	Ethene		
		1767	Helium		
		1772	Hydrogen		
		4926	Methane		
		3853	Natural Gas		
		5007	n-Butane		
		9511	Neopentane		
		1843	Nitrogen		
		5028	n-Pentane		
		5029	n-Propane		
		3895	Oxygen		
	ASTM D1946-90			30024465	Reformed Gas by Gas Chromatography
		3755	Carbon dioxide		
		3780	Carbon monoxide		
		4747	Ethane		
		4752	Ethene		
		1767	Helium		
		1772	Hydrogen		

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Matrix	Reference	Analyte Code	Analyte	Method Code	Description
		4926	Methane		
		1843	Nitrogen		
		3895	Oxygen		
	EPA 325B 2013			10277437	Sorbent Tubes Coupled with Thermal Desorption and GC/MS
		9318	1,3-Butadiene		
		4375	Benzene		
		4765	Ethylbenzene		
		5240	m+p-xylene		
		5005	Naphthalene		
		4855	n-Hexane		
		5250	o-Xylene		
		5100	Styrene		
		5140	Toluene		
		5170	Trichloroethene (Trichloroethylene)		
	EPA TO-12			10248201	Non-Methane Organic Compounds by GC/FID
		3860	Non-methane organics		
	EPA TO-13A			10248405	Polycyclic Aromatic Hydrocarbons in Ambient Air by GC/MS
		5795	2-Chloronaphthalene		
		6385	2-Methylnaphthalene		
		5500	Acenaphthene		
		5505	Acenaphthylene		
		5555	Anthracene		
		5575	Benzo(a)anthracene		
		5580	Benzo(a)pyrene		
		5590	Benzo(g,h,i)perylene		
		5600	Benzo(k)fluoranthene		
		5585	Benzo[b]fluoranthene		
		5855	Chrysene		
		5895	Dibenz(a,h) anthracene		
		6265	Fluoranthene		
		6270	Fluorene		

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Matrix	Reference	Analyte Code	Analyte	Method Code	Description
		6315	Indeno(1,2,3-cd) pyrene		
		5005	Naphthalene		
		6615	Phenanthrene		
		6665	Pyrene		
	EPA TO-13A SIM			10248449	Polycyclic Aromatic Hydrocarbons in Ambient Air by GC/MS SIM
		5795	2-Chloronaphthalene		
		6385	2-Methylnaphthalene		
		5500	Acenaphthene		
		5505	Acenaphthylene		
		5555	Anthracene		
		5575	Benzo(a)anthracene		
		5580	Benzo(a)pyrene		
		5590	Benzo(g,h,i)perylene		
		5600	Benzo(k)fluoranthene		
		5585	Benzo[b]fluoranthene		
		5855	Chrysene		
		5895	Dibenz(a,h) anthracene		
		6265	Fluoranthene		
		6270	Fluorene		
		6315	Indeno(1,2,3-cd) pyrene		
		5005	Naphthalene		
		6615	Phenanthrene		
		6665	Pyrene		
	EPA TO-14A			10248609	Volatile Organic Compounds with SUMMA canister and GC/MS
		5160	1,1,1-Trichloroethane		
		5110	1,1,2,2-Tetrachloroethane		
		5195	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)		
		5165	1,1,2-Trichloroethane		
		4630	1,1-Dichloroethane		
		4640	1,1-Dichloroethylene		

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Matrix	Reference	Analyte Code	Analyte	Method Code	Description
		5155	1,2,4-Trichlorobenzene		
		5210	1,2,4-Trimethylbenzene		
		4585	1,2-Dibromoethane (EDB, Ethylene dibromide)		
		4695	1,2-Dichloro-1,1,2,2-tetrafluoroethane (Freon-114)		
		4610	1,2-Dichlorobenzene		
		4635	1,2-Dichloroethane (Ethylene dichloride)		
		4655	1,2-Dichloropropane		
		5215	1,3,5-Trimethylbenzene		
		9318	1,3-Butadiene		
		4615	1,3-Dichlorobenzene		
		4620	1,4-Dichlorobenzene		
		4735	1,4-Dioxane (1,4-Diethyleneoxide)		
		4836	1-Propene (Propylene)		
		4410	2-Butanone (Methyl ethyl ketone, MEK)		
		4860	2-Hexanone (MBK)		
		4542	4-Ethyltoluene		
		4995	4-Methyl-2-pentanone (MIBK)		
		4315	Acetone		
		4375	Benzene		
		5635	Benzyl chloride		
		4395	Bromodichloromethane		
		4400	Bromoform		
		4450	Carbon disulfide		
		4455	Carbon tetrachloride		
		4475	Chlorobenzene		
		4575	Chlorodibromomethane		
		4485	Chloroethane (Ethyl		

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Matrix	Reference	Analyte Code	Analyte	Method Code	Description
			chloride)		
		4505	Chloroform		
		4705	cis & trans-1,2-Dichloroethene		
		4680	cis-1,3-Dichloropropene		
		4555	Cyclohexane		
		4625	Dichlorodifluoromethane (Freon-12)		
		4750	Ethanol		
		4765	Ethylbenzene		
		4835	Hexachlorobutadiene		
		4895	Isopropyl alcohol (2-Propanol, Isopropanol)		
		4900	Isopropylbenzene (Cumene)		
		5240	m+p-xylene		
		4950	Methyl bromide (Bromomethane)		
		4960	Methyl chloride (Chloromethane)		
		5000	Methyl tert-butyl ether (MTBE)		
		4975	Methylene chloride (Dichloromethane)		
		5005	Naphthalene		
		4825	n-Heptane		
		4855	n-Hexane		
		5090	n-Propylbenzene		
		5250	o-Xylene		
		5100	Styrene		
		5115	Tetrachloroethylene (Perchloroethylene)		
		5120	Tetrahydrofuran (THF)		
		5140	Toluene		
		4685	trans-1,3-		

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Matrix	Reference	Analyte Code	Analyte	Method Code	Description
			Dichloropropylene		
		5170	Trichloroethene (Trichloroethylene)		
		5175	Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)		
		5235	Vinyl chloride		
		5260	Xylene (total)		
	EPA TO-15			10248803	VOCs collected in Canisters by GC/MS
		5160	1,1,1-Trichloroethane		
		5110	1,1,2,2-Tetrachloroethane		
		5195	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)		
		5165	1,1,2-Trichloroethane		
		4630	1,1-Dichloroethane		
		4640	1,1-Dichloroethylene		
		5180	1,2,3-Trichloropropane		
		5182	1,2,3-Trimethylbenzene		
		5155	1,2,4-Trichlorobenzene		
		5210	1,2,4-Trimethylbenzene		
		4585	1,2-Dibromoethane (EDB, Ethylene dibromide)		
		4695	1,2-Dichloro-1,1,2,2-tetrafluoroethane (Freon-114)		
		4610	1,2-Dichlorobenzene		
		4635	1,2-Dichloroethane (Ethylene dichloride)		
		4655	1,2-Dichloropropane		
		5215	1,3,5-Trimethylbenzene		
		9318	1,3-Butadiene		
		4615	1,3-Dichlorobenzene		
		4676	1,3-Diethylbenzene		

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Matrix	Reference	Analyte Code	Analyte	Method Code	Description
		4620	1,4-Dichlorobenzene		
		4735	1,4-Dioxane (1,4-Diethyleneoxide)		
		4917	1-Butene		
		4833	1-Pentene		
		4836	1-Propene (Propylene)		
		5220	2,2,4-Trimethylpentane		
		4666	2,2-Dimethylbutane		
		4667	2,3,4-Trimethylpentane		
		4669	2,3-Dimethylbutane		
		4671	2,3-Dimethylpentane		
		4672	2,4-Dimethylpentane		
		4410	2-Butanone (Methyl ethyl ketone, MEK)		
		4535	2-Chlorotoluene		
		4538	2-Ethyltoluene		
		4860	2-Hexanone (MBK)		
		4934	2-Methyl-2-Butene		
		4937	2-Methylbutadiene (Isoprene)		
		4938	2-Methylbutane (Isopentane)		
		4939	2-Methylheptane		
		4946	2-Methylhexane		
		4941	2-Methylpentane (Isohexane)		
		4942	2-methylpropane (Isobutane)		
		4531	3-Ethyltoluene (1-Methyl-3-ethylbenzene)		
		4529	3-Methyl-1-Butene		
		4532	3-Methylheptane		
		4533	3-Methylhexane		
		4534	3-Methylpentane		

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Matrix	Reference	Analyte Code	Analyte	Method Code	Description
		4542	4-Ethyltoluene		
		4910	4-Isopropyltoluene (p-Cymene)		
		4913	4-Methyl-1-Pentene		
		4995	4-Methyl-2-pentanone (MIBK)		
		4300	Acetaldehyde		
		4315	Acetone		
		4320	Acetonitrile		
		4323	Acetylene		
		4325	Acrolein (Propenal)		
		4340	Acrylonitrile		
		4355	Allyl chloride (3-Chloropropene)		
		4357	alpha-Methylstyrene		
		4375	Benzene		
		5635	Benzyl chloride		
		4390	Bromochloromethane		
		4395	Bromodichloromethane		
		4400	Bromoform		
		4450	Carbon disulfide		
		4455	Carbon tetrachloride		
		4475	Chlorobenzene		
		4575	Chlorodibromomethane		
		4577	Chlorodifluoromethane (Freon-22)		
		4485	Chloroethane (Ethyl chloride)		
		4505	Chloroform		
		4525	Chloroprene (2-Chloro-1,3-butadiene)		
		4705	cis & trans-1,2-Dichloroethene		
		4680	cis-1,3-Dichloropropene		

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Matrix	Reference	Analyte Code	Analyte	Method Code	Description
		4602	cis-2-Butene		
		4604	cis-2-Hexene		
		4603	cis-2-pentene		
		4555	Cyclohexane		
		4562	Cyclopentane		
		4563	Cyclopentene		
		4595	Dibromomethane (Methylene bromide)		
		4625	Dichlorodifluoromethane (Freon-12)		
		4627	Dichlorofluoromethane (Freon 21)		
		4725	Diethyl ether		
		4747	Ethane		
		4750	Ethanol		
		4752	Ethene		
		4755	Ethyl acetate		
		4765	Ethylbenzene		
		4835	Hexachlorobutadiene		
		4895	Isopropyl alcohol (2-Propanol, Isopropanol)		
		4900	Isopropylbenzene (Cumene)		
		5240	m+p-xylene		
		4950	Methyl bromide (Bromomethane)		
		4960	Methyl chloride (Chloromethane)		
		4990	Methyl methacrylate		
		5000	Methyl tert-butyl ether (MTBE)		
		4965	Methylcyclohexane		
		4966	Methylcyclopentane		
		4975	Methylene chloride (Dichloromethane)		

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Matrix	Reference	Analyte Code	Analyte	Method Code	Description
		5005	Naphthalene		
		5007	n-Butane		
		4435	n-Butylbenzene		
		5875	n-Decane		
		4825	n-Heptane		
		4855	n-Hexane		
		5026	n-Nonane		
		5027	n-Octane		
		5028	n-Pentane		
		5029	n-Propane		
		5090	n-Propylbenzene		
		6747	n-Undecane		
		5250	o-Xylene		
		5253	p-Diethylbenzene		
		4440	sec-Butylbenzene		
		5100	Styrene		
		4420	tert-Butyl alcohol		
		4445	tert-Butylbenzene		
		5115	Tetrachloroethylene (Perchloroethylene)		
		5120	Tetrahydrofuran (THF)		
		5140	Toluene		
		4685	trans-1,3-Dichloropropylene		
		4607	trans-2-Butene		
		4606	trans-2-Hexene		
		4608	trans-2-pentene		
		5170	Trichloroethene (Trichloroethylene)		
		5175	Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)		
		5225	Vinyl acetate		
		5230	Vinyl bromide		

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Matrix	Reference	Analyte Code	Analyte	Method Code	Description
			(Bromoethane)		
		5235	Vinyl chloride		
		5260	Xylene (total)		
	EPA TO-15 GC/MS SIM			10248858	VOCs collected in Canisters by GC/MS SIM
		5160	1,1,1-Trichloroethane		
		5110	1,1,2,2-Tetrachloroethane		
		5185	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)		
		5165	1,1,2-Trichloroethane		
		4630	1,1-Dichloroethane		
		4640	1,1-Dichloroethylene		
		4585	1,2-Dibromoethane (EDB, Ethylene dibromide)		
		4695	1,2-Dichloro-1,1,2,2-tetrafluoroethane (Freon-114)		
		4610	1,2-Dichlorobenzene		
		4635	1,2-Dichloroethane (Ethylene dichloride)		
		4615	1,3-Dichlorobenzene		
		4620	1,4-Dichlorobenzene		
		4375	Benzene		
		4455	Carbon tetrachloride		
		4475	Chlorobenzene		
		4485	Chloroethane (Ethyl chloride)		
		4505	Chloroform		
		4645	cis-1,2-Dichloroethylene		
		4625	Dichlorodifluoromethane (Freon-12)		
		4765	Ethylbenzene		
		4795	Ethylene oxide		

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Matrix	Reference	Analyte Code	Analyte	Method Code	Description
		5240	m+p-xylene		
		4960	Methyl chloride (Chloromethane)		
		5000	Methyl tert-butyl ether (MTBE)		
		5005	Naphthalene		
		5250	o-Xylene		
		5115	Tetrachloroethylene (Perchloroethylene)		
		5140	Toluene		
		4700	trans-1,2-Dichloroethylene		
		4685	trans-1,3-Dichloropropylene		
		5170	Trichloroethene (Trichloroethylene)		
		5175	Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)		
		5235	Vinyl chloride		
	EPA TO-17			10312206	Determination of Volatile Organic Compounds in Ambient Air Using Active Sampling Onto Sorbent Tubes
		4640	1,1-Dichloroethylene		
		4735	1,4-Dioxane (1,4-Diethyleneoxide)		
		6380	1-Methylnaphthalene		
		6385	2-Methylnaphthalene		
		5500	Acenaphthene		
		5505	Acenaphthylene		
		5555	Anthracene		
		4375	Benzene		
		4505	Chloroform		
		4645	cis-1,2-Dichloroethylene		
		4765	Ethylbenzene		
		6265	Fluoranthene		

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Matrix	Reference	Analyte Code	Analyte	Method Code	Description
		6270	Fluorene		
		4895	Isopropyl alcohol (2-Propanol, Isopropanol)		
		5240	m+p-xylene		
		5005	Naphthalene		
		5250	o-Xylene		
		6615	Phenanthrene		
		6665	Pyrene		
		5115	Tetrachloroethylene (Perchloroethylene)		
		5140	Toluene		
		4700	trans-1,2-Dichloroethylene		
		5170	Trichloroethene (Trichloroethylene)		
		5235	Vinyl chloride		
		5260	Xylene (total)		
	EPA TO-17 Modified 2			10312217	Hydrocarbons in Ambient Air Using WMS Passive Sampling Tubes
		5160	1,1,1-Trichloroethane		
		5110	1,1,2,2-Tetrachloroethane		
		5165	1,1,2-Trichloroethane		
		4630	1,1-Dichloroethane		
		4640	1,1-Dichloroethylene		
		5150	1,2,3-Trichlorobenzene		
		5155	1,2,4-Trichlorobenzene		
		5210	1,2,4-Trimethylbenzene		
		4610	1,2-Dichlorobenzene		
		4635	1,2-Dichloroethane (Ethylene dichloride)		
		5215	1,3,5-Trimethylbenzene		
		4615	1,3-Dichlorobenzene		
		4620	1,4-Dichlorobenzene		

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Matrix	Reference	Analyte Code	Analyte	Method Code	Description
		9546	1,4-Dithiane		
		4410	2-Butanone (Methyl ethyl ketone, MEK)		
		4995	4-Methyl-2-pentanone (MIBK)		
		6698	alpha-Pinene		
		4375	Benzene		
		4455	Carbon tetrachloride		
		4475	Chlorobenzene		
		4505	Chloroform		
		4645	cis-1,2-Dichloroethylene		
		4555	Cyclohexane		
		6208	d-Limonene		
		4750	Ethanol		
		4755	Ethyl acetate		
		4765	Ethylbenzene		
		6774	Halothane (2-Bromo-2-chloro-1,1,1-trifluoroethane)		
		5240	m+p-xylene		
		4960	Methyl chloride (Chloromethane)		
		4990	Methyl methacrylate		
		5000	Methyl tert-butyl ether (MTBE)		
		5005	Naphthalene		
		4825	n-Heptane		
		4855	n-Hexane		
		5090	n-Propylbenzene		
		5250	o-Xylene		
		5100	Styrene		
		5115	Tetrachloroethylene (Perchloroethylene)		
		5140	Toluene		

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Matrix	Reference	Analyte Code	Analyte	Method Code	Description
		4700	trans-1,2-Dichloroethylene		
		5170	Trichloroethene (Trichloroethylene)		
		5235	Vinyl chloride		
	EPA TO-3			10312400	Method for the Determination of Volatile Organic Compounds in Ambient Air Using Cryogenic Preconcentration Techniques and Gas Chromatography With Flame Ionization and Electron Capture Detection
		9408	Gasoline range organics (GRO)		
	Modified EPA TO-17 Passive RAD130 Tube 2			60032351	The Determination of Hydrocarbons in Air Via RAD130 RADIELLO Passive Sample Tubes
		5160	1,1,1-Trichloroethane		
		5110	1,1,2,2-Tetrachloroethane		
		5165	1,1,2-Trichloroethane		
		4630	1,1-Dichloroethane		
		4640	1,1-Dichloroethylene		
		5210	1,2,4-Trimethylbenzene		
		4610	1,2-Dichlorobenzene		
		4635	1,2-Dichloroethane (Ethylene dichloride)		
		5215	1,3,5-Trimethylbenzene		
		4615	1,3-Dichlorobenzene		
		4620	1,4-Dichlorobenzene		
		4410	2-Butanone (Methyl ethyl ketone, MEK)		
		4995	4-Methyl-2-pentanone (MIBK)		
		4375	Benzene		
		4455	Carbon tetrachloride		
		4475	Chlorobenzene		
		4505	Chloroform		
		4645	cis-1,2-Dichloroethylene		
		4555	Cyclohexane		

OREGON

Environmental Laboratory Accreditation Program

ORELAP Fields of Accreditation

Eurofins Air Toxics
180 Blue Ravine Road, Ste. B
Folsom, CA 95630

ORELAP ID: CA300005
EPA CODE: CA00933
Certificate: CA300005 - 017

Issue Date: 10/18/2022 Expiration Date: 10/17/2023

As of 10/18/2022 this list supersedes all previous lists for this certificate number.

Matrix	Reference	Analyte Code	Analyte	Method Code	Description
		4750	Ethanol		
		4755	Ethyl acetate		
		4765	Ethylbenzene		
		5240	m+p-xylene		
		5000	Methyl tert-butyl ether (MTBE)		
		5005	Naphthalene		
		4825	n-Heptane		
		4855	n-Hexane		
		5090	n-Propylbenzene		
		5250	o-Xylene		
		5100	Styrene		
		5115	Tetrachloroethylene (Perchloroethylene)		
		5140	Toluene		
		4700	trans-1,2-Dichloroethylene		
		5170	Trichloroethene (Trichloroethylene)		
		5235	Vinyl chloride		

ATTACHMENT E

Electronic Data Deliverable File Specifications

ADR Electronic Data Deliverable (EDD) File Specifications

The ADR EDD consists of three separate, comma-delimited ASCII text files or Excel CSV files (two, if instrument calibration information is not required by the project). Each file corresponds to a table in the ADR application. These tables are identified as the Analytical Results Table (A1), Laboratory Instrument Table (A2), and Sample Analysis Table (A3). Each file follows the naming convention of using the Laboratory Reporting Batch ID (SDG Number or some other identifier for the EDD) followed by the table identifier (A1, A2, or A3), and then a ".txt" or ".csv" extension. For example, the EDD file names for a laboratory reporting batch identified as SDG001 that includes instrument calibration data would be as follows.

SDG001A1.txt or SDG001A1.csv
SDG001A2.txt or SDG001A2.csv (A2 file is optional)
SDG001A3.txt or SDG001A3.csv

Analytical Results Table (A1 File)

The Analytical Results table contains analytical results and related information on an analyte level for field samples and associated laboratory quality control samples (excluding calibrations and tunes). Field QC blanks and laboratory method blanks must report a result record for each analyte reported within a method. The method target analyte list is matrix dependent and specified in the project library. Laboratory control samples (LCS and LCSD) and matrix spike samples (MS and MSD) must report a result record for every analyte specified as a spiked analyte in the project library. The project library is a reference table ADR uses for both EDD error checking and automated data review. The project library is populated with information from the project QAPP. Refer to the User Manual for detailed information on project libraries. Table 1 in this document lists all field names and their descriptions for the Analytical Results Table (A1).

Laboratory Instrument Table (A2 File)

The Laboratory Instrument table contains results and related information on an analyte level for instrument initial calibration standards, initial calibration verification standards, continuing calibration standards, and GC/MS tunes. A record must exist for each target analyte reported in a method (specified in the project library), for every calibration type (the field named QCType) associated to samples reported in the EDD. Initial calibrations, initial calibration verifications, and associated samples are linked to each other using a unique Run Batch ID for every distinct initial calibration within a method. Continuing calibrations and associated samples are linked to each other using a unique Analysis Batch ID for every distinct continuing calibration within a method. GC/MS tunes are linked to initial and continuing calibrations (and hence samples) using the Run Batch and Analysis Batch IDs respectively. The Laboratory Instrument Table (A2) is optional. Depending on the level of validation required by the data user, the Laboratory Instrument table may not be requested in the deliverable. Table 2 in this document lists field names and descriptions for the Laboratory Instrument Table (A2).

Sample Analysis Table (A3 File)

The Sample Analysis table contains information on a sample level for field samples and laboratory quality control analyses (excluding calibrations and tunes). A sample record exists for each sample/method/matrix/analysis type combination. Table 3 in this document lists field names and descriptions for the Sample Analysis Table (A3).

EDD Field Properties

Tables 1, 2, and 3 in this document specify the EDD field properties for each file. These include the field name and sequence, field name description, data type and length for each field, and whether or not a particular field requires a standard field. Field elements in the EDD must be sequenced according to the order they appear in Tables 1, 2, and 3. For example, in the Analytical Result table (the A1 file), the field "ClientSampleID" will always be the first piece of information to start a new line of data (or database record), followed by the fields "LabAnalysisRefMethodID", "AnalysisType", and so on.

Table 4 in this document lists standard values for those fields that hold standard values. Required field constraints depend on the combination of sample, matrix, method, analyte type, and calibration or QC type information reported in a record. Tables 5 through 9 in this document indicate required fields for each EDD file (table) according to the method category, matrix, analyte type, sample, and QC or calibration type reported in a record.

When creating an EDD as a text file, use the ASCII character set in a file of lines terminated by a carriage return and line feed. No characters are allowed after the carriage return and line feed. Enclose each data set in double quotes (") and separate each field by a comma (comma delimited). Data fields with no information (null) may be represented by two consecutive commas. For example, in the Sample Analysis table, since the "Collected", "ShippingBatchID", and "Temperature" fields do not apply to laboratory generated QA/QC samples, the record for a Laboratory Control Sample by Method 8270C would be entered as follows. Note that the first two fields ("ProjectNumber" and "ProjectName") are omitted in this example.

…"LCSW100598",,"AQ","LCSW100598","LCS",,"8270C",… (and so on)

Do not pad fields with leading or trailing spaces if a field is populated with less than the maximum allowed number of characters. In the above example, although the "MatrixID" field can accommodate up to 10 characters, only 2 characters were entered in this field.

The EDD can be constructed within Excel and saved as .csv file for import into the application. Be sure to format all cells as text beforehand, otherwise Excel will reformat entered values in some cases.

Table 1
Field Descriptions for the Analytical Results Table (A1 file)

Contains laboratory test results and related information for field and QC samples (excluding instrument calibrations) on an analyte level for environmental chemistry including radiochemistry

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
ClientSampleID	Client or contractor's identifier for a field sample as reported on the chain-of-custody If a sample is analyzed as a laboratory duplicate, matrix spike, or matrix spike duplicate, append suffixes DUP, MS and MSD respectively to the Client Sample ID with no intervening spaces or hyphens (i.e. MW01DUP, MW01MS, and MW01MSD). For Method Blanks, LCS, and LCSD enter the unique LaboratorySampleID into this field Do not append suffixes to the ClientSampleID for dilutions, reanalyses, or re-extracts (the AnalysisType field is used for this distinction). For example, MW01DL and MW01RE are not allowed Parent sample records must exist for each MS and MSD. If an MS/MSD is shared between two EDDs, records for the MS/MSD and its parent sample must exist in the Analytical Results table for both EDDs.	Text	25	NO
LabAnalysisRefMethodID	Laboratory reference method ID. The method ID may be an EPA Method number or a Lab Identifier for a method such as a SOP Number, however; method ID is specified by the project. The method ID must be entered into the standard list.	Text	25	YES (specified in project plan)
AnalysisType	Defines the analysis type (i.e., Dilution, Reanalysis, etc.). This field provides distinction for sample result records when multiple analyses are submitted for the same sample, method, and matrix; for example dilutions, re-analyses, and re-extracts.	Text	10	YES (See Table 4)
LabSampleID	Laboratory tracking number for field samples and lab generated QC samples such as method blank, LCS, and LCSD. There are no restrictions for the LabSampleID except for field length and that the LabSampleID must be distinct for a given field sample or lab QC sample and method. Suffixes may be applied to the LabSampleID to designate dilutions, reanalysis, etc.	Text	25	NO
LabID	Identification of the laboratory performing the analyses.	Text	7	NO
ClientAnalyteID	CAS Number or unique client identifier for an analyte or isotope. If a CAS Number is not available, use a unique identifier provided by the client or contractor. The ClientAnalyteID for a particular target analyte or isotope should be specified by the project and must exist in the standard value tables for Analytes. For the LCS, LCSD, MS, and MSD, it is only necessary to report the compounds designated as spikes in the library (and surrogates for organic methods.) For TICs from GC/MS analyses, enter the retention time in decimal minutes as the Client Analyte ID.	Text	12	YES (specified by project)

Table 1
Field Descriptions for the Analytical Results Table (A1 file)

Contains laboratory test results and related information for field and QC samples (excluding instrument calibrations) on an analyte level for environmental chemistry including radiochemistry

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
AnalyteName	Chemical name for the analyte or isotope. The project specifies how an analyte or isotope is named. The analyte name must be associated to a ClientAnalyteID in the standard values table for Analytes (excluding compounds designated as TIC's).	Numeric	60	YES (specified by project)
Result	Result value for the analyte or isotope. Entries must be numeric. For non-detects of target analytes or isotopes and spikes, do not enter "ND" or leave this field blank. If an analyte or spike was not detected, enter the reporting limit value corrected for dilution and percent moisture as applicable. Do not enter "0"	Text	10	NO
ResultUnits	The units defining how the values in the Result, DetectionLimit, and ReportingLimit fields are expressed. For radiochemistry this also includes how the value in the Error field is expressed.	Text	10	YES (specified by project in the library)
LabQualifiers	A string of single letter result qualifiers assigned by the lab based on client-defined rules and values. The "U" Lab Qualifier must be entered for all non-detects. Other pertinent lab qualifiers may be entered with the "U" qualifier. Order is insignificant. Lab qualifiers other than those listed in the standard values table may be used. If so, these must be added to the standard value table in the application.	Text	7	YES (See Table 4)
DetectionLimit	For radiochemistry methods, the minimum detectable activity for the isotope being measured. For all other methods: The minimum detection limit value for the analyte being measured. **For DoD QSM enter the Limit of Detection (LOD)**	Numeric	10	NO
DetectionLimitType	Specifies the type of detection limit (i.e., MDA, MDL, IDL, etc.).	Text	10	YES (See Table 4)
RetentionTime or Error	For radiochemistry methods only, enter the 2 Sigma Counting Error. The units for error are entered in the ResultUnits field. For GC/MS methods only, enter the time expressed in decimal minutes between injection and detection for GC/MS TICs only For target analytes in all other methods, leave this field blank. Note: GC retention times are not evaluated at this time.	Text	5	NO
AnalyteType	Defines the type of result, such as tracer, surrogate, spike, or target compound.	Text	7	YES (See Table 4)

Table 1
Field Descriptions for the Analytical Results Table (A1 file)

Contains laboratory test results and related information for field and QC samples (excluding instrument calibrations) on an analyte level for environmental chemistry including radiochemistry

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
PercentRecovery	For radiochemistry methods: The tracer yield, if applicable. For all other analytical methods: The percent recovery value of a spiked compound or surrogate. If the spike or surrogate was not recovered because of dilution, enter "DIL". If a spike or surrogate was not recovered because of matrix interference, enter "INT". If a spike or surrogate was not recovered because it was not added to the sample, enter "NS".	Numeric	5	NO
RelativePercentDifference	The relative percent difference (RPD) of two QC results, such as MS/MSD, LCS/LCSD, and Laboratory Duplicates. Report RPD in Laboratory Duplicate, LCSD, and MSD records only. If the RPD is not calculable, enter "NC".	Numeric	5	NO
ReportingLimit	Reporting limit value for the measured analyte or isotope Factor in the dilution factor and percent moisture correction, if applicable. The Reporting Limit for each analyte and matrix in a given method is specified in the project library or QAPP. **For DoD QSM enter the Limit of Quantitation (LOQ)**	Numeric	10	NO
ReportingLimitType	Specifies the type of reporting limit (i.e., CRQL, PQL, SQL, RDL, etc). The Reporting Limit Type for each method and matrix is specified in the project library or QAPP.	Text	10	YES (specified by the project)

Table 1
Field Descriptions for the Analytical Results Table (A1 file)

Contains laboratory test results and related information for field and QC samples (excluding instrument calibrations) on an analyte level for environmental chemistry including radiochemistry

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
ReportableResult	This field indicates whether or not the laboratory chooses an individual analyte or isotope result as reportable. Enter "YES" if the result is reportable. Enter "NO" if the result is not reportable. This field applies to target analytes only. If only one analysis is submitted for a particular sample and method, enter "YES" for all target compounds (where Analyte Type = TRG). For GC/MS methods enter yes for tentatively identified compounds (where Analyte Type = TIC). If two or more analyses are submitted for a particular sample and method (i.e. initial analysis, reanalysis and/or dilutions), enter "YES" from only <u>one</u> of the analyses for each target compound. For example: a sample was run a second time at dilution because benzene exceeded the calibration range in the initial, undiluted analysis. All target analytes are reported in each analysis. For the initial analysis, (Analysis Type = RES), enter "NO" for benzene and enter "YES" for all other compounds. For the diluted analysis (Analysis Type = DL), enter "YES" for benzene and enter "NO" for all other compounds. For TICs (Analyte Type = TIC), if more than one analysis is submitted for a particular sample and method, choose only one of the analyses where Reportable Result = YES for <u>all</u> TICs. For example, a sample was run a second time because one or more target compounds exceeded the calibration range in the undiluted analysis. Choose a particular analysis and enter "YES" for all TICS. In the other analysis enter "NO" for all TICs. Note that it is not necessary to report the full target analyte list for the initial result, dilution, re-analysis, or re-extraction. However, each target analyte must be reported YES once and once only in the case of multiple analyses for a given sample, method, and matrix. In the case of organics, all surrogates must be reported for all analyses submitted for a given sample, method, and, matrix.	Text	3	YES (See Table 4)
MDL_DoD	This field is not part of the standard ADR EDD format. **For DoD QSM enter the MDL, otherwise leave blank. (ADR does not perform error checks on this field)**	Numeric	10	NO

Table 2
Field Descriptions for the Laboratory Instrument Table (A2 file)

Contains related to laboratory instrument calibration on an analyte level and GC/MS Tune information. This table is optional depending on project requirements. Do not report Table A2 for radiochemistry methods.

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
InstrumentID	Laboratory instrument identification.	Text	15	NO
QCType	Type of instrument QC (i.e., Instrument_Performance_Check or type of calibration standard).	Text	10	YES (See Table 4)
Analyzed	Analysis date/time for BFB, DFTPP, initial calibration verification standards, calibration verification standards, and continuing calibration standards. For the initial calibration, enter date and time of the last standard analyzed. Also, see comments about initial calibrations in the Alternate_Lab_Analysis_ID field name description.	Date/ Time	*	NO
AlternateLab_AnalysisID	Common laboratory identification used for standards (i.e., VOA STD50, CCAL100, BFB50, etc). For initial calibration, enter ICAL. Information from the initial calibration is entered as one record for each analyte that summarizes the results of the initial calibration (i.e. %RSD, correlation coefficient, and avg RF). Records are not entered for each individual standard within the initial calibration.	Text	12	NO
LabAnalysisID	Unique identification of the raw data electronic file associated with the calibration standard or tune (i.e., 9812101MS.DV). Leave this field blank for the initial calibration. See comments about initial calibrations in the Alternate_Lab_Analysis_ID field description. This field is only applicable where an electronic instrument file is created as part of the analysis.	Text	15	NO
LabAnalysisRefMethodID	Laboratory reference method ID (i.e., 8260B, 8270C, 6010B, etc.). The method ID is specified by the project. The LabAnalysisRefMethodID must be in the standard value list for Method IDs.	Text	25	YES (specified by the project)
ClientAnalyteID	CAS number or unique client identifier for an analyte. If a CAS number is not available, use a unique identifier provided by the client. The unique identifier for a particular analyte should be specified by the project and must exist in the standard value list for ClientAnalyteID. Records for each calibration must report the full target analyte list including surrogates as applicable. The target analyte list is specified for each method and matrix in the project	Text	12	YES (specified by the project)
AnalyteName	The chemical name for the analyte. The project specifies how an analyte is named. The AnalyteName must be associated to a ClientAnalyteID in the standard values.	Text	60	YES (specified by the project)

Table 2
Field Descriptions for the Laboratory Instrument Table (A2 file)

Contains related to laboratory instrument calibration on an analyte level and GC/MS Tune information. This table is optional depending on project requirements. Do not report Table A2 for radiochemistry methods.

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
RunBatch	Unique identifier for a batch of analyses performed on one instrument under the control of one initial calibration and initial calibration verification. The Run Batch ID links both the initial calibration and initial calibration verification to subsequently analyzed and associated continuing calibrations, field samples, and QC analyses. For GC/MS methods, the Run_Batch ID also links a BFB or DFTPP tune and the initial calibration and initial calibration verification standards to associated samples and method QC analyses. A new and unique Run Batch ID must be used with every new initial calibration.	Text	12	NO
AnalysisBatch	Unique laboratory identifier for a batch of analyses performed on one instrument and under the control of a continuing calibration or continuing calibration verification. The Analysis Batch ID links the continuing calibration or calibration verification to subsequently analyzed and associated field sample and QC analyses. For GC/MS methods, the Analysis Batch ID also links the BFB or DFTPP tune. A new and unique Analysis Batch ID must be used with every new continuing calibration or continuing calibration verification. For GC methods, only report opening standards, do not include closing standards (unless the closing standard functions as the opening standard for a subsequent set of analyses, in which case a new and unique Analysis Batch ID is assigned). When dual or confirmation columns/detectors are used, enter results from the primary column/detector only (this is similar to CLP Pesticide reporting).	Text	12	NO
LabReportingBatch	Unique laboratory identifier for a batch of samples including associated calibrations and method QC, reported as a group by the lab (i.e., lab work order #, log-in #, or SDG). Links all instrument calibrations, samples, and method QC reported as a group or SDG.	Text	12	NO
PercentRelativeStandard Deviation	The standard deviation relative to the mean used to evaluate initial calibration linearity. Organic methods may use either %RSD or Correlation Coefficient. If applicable, enter the %RSD. Leave this field blank if the Correlation Coefficient is used.	Numeric	5	NO
CorrelationCoefficient	The correlation coefficient resulting from linear regression of the initial calibration. For metals by ICAP, enter '1.0' if a two-point initial calibration was analyzed. Organic methods may use either %RSD or Correlation Coefficient. If applicable, enter the Correlation Coefficient. Leave this field blank if the %RSD is used	Numeric	5	NO
RelativeResponseFactor	This field applies to GC/MS only. For continuing calibration enter the relative response factor. For initial calibration enter the average relative response factor. Refer to comments about initial calibration records in the field description for Alternate_Lab_Analysis_ID.	Numeric	5	NO

Table 2
Field Descriptions for the Laboratory Instrument Table (A2 file)

Contains related to laboratory instrument calibration on an analyte level and GC/MS Tune information. This table is optional depending on project requirements. Do not report Table A2 for radiochemistry methods.

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
Percent_Difference (or Percent Recovery)	For organic methods, this field is the difference between 2 measured values expressed as a percentage. If %RSD is reported, enter the % difference between the average response factor of the initial calibration (IC) and the response factor of the initial calibration verification (ICV) or continuing calibration (CCV). If correlation coefficient is used, enter the % difference between the true value and the measured value. The Percent_Difference is expressed as a negative or positive value. Do not express Percent_Difference as an absolute value. Use a negative value if the CCV or ICV response factor is less than the IC average response factor or, in the case of correlation coefficient, the CCV or ICV measured value is less than the true value. Use a positive value if the CCV or ICV response factor is greater than the IC average response factor, or in the case of correlation coefficient, the CCV or ICV measured value is greater than the true value. For inorganic methods, this field is the recovery of an analyte expressed relative to the true amount (i.e., %R for a metal in the continuing calibration or initial calibration verification by Method 6010B).	Numeric	5	NO
PeakID01	Identifies individual m/z ions for GC/MS tuning compounds. For BFB enter 50, for DFTPP enter 51.	Numeric	10	NO
PercentRatio01	For BFB enter the relative percent abundance of m/z 50 measured relative to the raw abundance of m/z 95. For DFTPP enter the relative percent abundance of m/z 51 measured relative to the raw abundance of m/z 198.	Numeric	10	NO
PeakID02	Identifies individual m/z ions for GC/MS tuning compounds. For BFB enter 75, for DFTPP enter 68.	Numeric	10	NO
PercentRatio02	For BFB enter the relative percent abundance of m/z 75 measured relative to the raw abundance of m/z 95. For DFTPP enter the relative percent abundance of m/z 68 measured relative to the raw abundance of m/z 69.	Numeric	10	NO
PeakID03	Identifies individual m/z ions for GC/MS tuning compounds. For BFB enter 95, for DFTPP enter 69.	Numeric	10	NO
PercentRatio03	For BFB enter the ion abundance of m/z 95 as 100 percent. For DFTPP enter the relative percent abundance of m/z 69 measured relative to the raw abundance of m/z 198.	Numeric	10	NO
PeakID04	Identifies individual m/z ions for GC/MS tuning compounds. For BFB enter 96, for DFTPP enter 70.	Numeric	10	NO

Table 2
Field Descriptions for the Laboratory Instrument Table (A2 file)

Contains related to laboratory instrument calibration on an analyte level and GC/MS Tune information. This table is optional depending on project requirements. Do not report Table A2 for radiochemistry methods.

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
PercentRatio04	For BFB enter the relative percent abundance of m/z 96 measured relative to the raw abundance of m/z 95. For DFTPP enter the relative percent abundance of m/z 70 measured relative to the raw abundance of m/z 69	Numeric	10	NO
PeakID05	Identifies individual m/z ions for GC/MS tuning compounds. For BFB enter 173, for DFTPP enter 127.	Numeric	10	NO
PercentRatio05	For BFB enter the relative percent abundance of m/z 173 measured relative to the raw abundance of m/z 174. For DFTPP enter the relative percent abundance of m/z 127 measured relative to the raw abundance of m/z 198	Numeric	10	NO
PeakID06	Identifies individual m/z ions for GC/MS tuning compounds. For BFB enter 174, for DFTPP enter 197.	Numeric	10	NO
PercentRatio06	For BFB enter the relative percent abundance of m/z 174 measured relative to the raw abundance of m/z 95. For DFTPP enter the relative percent abundance of m/z 197 measured relative to the raw abundance of m/z 198.	Numeric	10	NO
PeakID07	Identifies individual m/z ions for GC/MS tuning compounds. For BFB enter 175, for DFTPP enter 198.	Numeric	10	NO
PercentRatio07	For BFB enter the relative percent abundance of m/z 175 measured relative to the raw abundance of m/z 174. For DFTPP enter the ion abundance of m/z 198 as 100 percent.	Numeric	10	NO
PeakID08	Identifies individual m/z ions for GC/MS tuning compounds. For BFB enter 176, for DFTPP enter 199.	Numeric	10	NO
PercentRatio08	For BFB enter the relative percent abundance of m/z 176 measured relative to the raw abundance of m/z 174. For DFTPP enter the relative percent abundance of m/z 199 measured relative to the raw abundance of m/z 198.	Numeric	10	NO
PeakID09	Identifies individual m/z ions for GC/MS tuning compounds. For BFB enter 177, for DFTPP enter 275.	Numeric	10	NO
PercentRatio09	For BFB enter the relative percent abundance of m/z 177 measured relative to the raw abundance of m/z 176. For DFTPP enter the relative percent abundance of m/z 275 measured relative to the raw abundance of m/z 198.	Numeric	10	NO
PeakID10	Identifies individual m/z ions for GC/MS tuning compounds. For BFB leave blank, for DFTPP enter 365.	Numeric	10	NO

Table 2
Field Descriptions for the Laboratory Instrument Table (A2 file)

Contains related to laboratory instrument calibration on an analyte level and GC/MS Tune information. This table is optional depending on project requirements. Do not report Table A2 for radiochemistry methods.

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
PercentRatio10	For BFB leave blank. For DFTPP enter the relative percent abundance of m/z 365 measured relative to the raw abundance of m/z 198.	Numeric	10	NO
PeakID11	Identifies individual m/z ions for GC/MS tuning compounds. For BFB leave blank, for DFTPP enter 441.	Numeric	10	NO
PercentRatio11	For BFB leave blank. For DFTPP the percent abundance of m/z 441 measured relative to the raw abundance of m/z 443	Numeric	10	NO
PeakID12	Identifies individual m/z ions for GC/MS tuning compounds. For BFB leave blank, for DFTPP enter 442.	Numeric	10	NO
PercentRatio12	For BFB leave blank. For DFTPP enter the relative percent abundance of m/z 442 measured relative to the raw abundance of m/z 198.	Numeric	10	NO
PeakID13	Identifies individual m/z ions for GC/MS tuning compounds. For BFB leave blank, for DFTPP enter 443.	Numeric	10	NO
PercentRatio13	For BFB leave blank. For DFTPP enter the relative percent abundance of m/z 443 measured relative to the raw abundance of m/z 442.	Numeric	10	NO

* Date/time format is: MM/DD/YYYY hh:mm where MM = month, DD = day, YYYY = four digits of the year, hh = hour in 24 hour format, and mm = minutes.

Table 3
Field Description for the Sample Analysis (A3 file)

This table contains information related to analyses of field samples and laboratory QC samples (excluding calibrations and tunes) on a sample level for environmental chemical analyses including radiochemistry

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
ProjectNumber	Project number assigned by the client.	Text	30	YES (specified by project)
ProjectName	Project name assigned by the client.	Text	90	YES (specified by project)
ClientSampleID	Client or contractor's identifier for a field sample If a sample is analyzed as a laboratory duplicate, matrix spike, or matrix spike duplicate, append suffixes DUP, MS and MSD respectively to the Client Sample ID with no intervening spaces or hyphens (i.e. MW01DUP, MW01MS, and MW01MSD). For Method Blanks, LCS, and LCSD enter the unique LaboratorySampleID into this field Do not append suffixes to the ClientSampleID for dilutions, reanalyses, or re-extracts (the Analysis_Type field is used for this distinction). For example, MW01DL and MW01RE are not allowed Parent sample records must exist for each MS and MSD. If an MS/MSD is shared between two EDDs, records for the MS/MSD and its parent sample must exist in the Sample Analysis table for both EDDs.	Text	25	NO
Collected	For radiochemistry methods the Date of sample collection. Refer to the date format for radiochemistry methods at the end of this table. For all other methods the Date and Time of sample collection. Refer to the date/time format at the end of this table. Leave this field blank for Method Blank, LCS, and LCSD	Date/ Time	16*	NO
MatrixID	Sample matrix (i.e., AQ, SO, etc.)	Text	10	YES (See Table 4)
LabSampleID	Laboratory tracking number for field samples and lab generated QC samples such as method blank, LCS, and LCSD. There are no restrictions for the LabSampleID except field length and that the LabSampleID must be unique for a given field sample or lab QC sample and method.	Text	25	NO
QCType	This record identifies the type of quality control sample QC (i.e., Duplicate, LCS, Method Blank, MS, or MSD). For regular samples, leave this field blank.	Text	10	YES (See Table 4)
ShippingBatchID	Unique identifier assigned to a cooler or shipping container used to transport client or field samples. Links all samples to a cooler or shipping container. No entry for method blanks, LCS, and LCSD. This field is optional.	Text	25	NO
Temperature	Temperature (in centigrade degrees) of the sample as received. This field is not required for radiochemistry methods.	Numeric	10	NO

Table 3
Field Description for the Sample Analysis (A3 file)

This table contains information related to analyses of field samples and laboratory QC samples (excluding calibrations and tunes) on a sample level for environmental chemical analyses including radiochemistry

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
LabAnalysisRefMethodID	Laboratory reference method ID. The method ID may be an EPA Method number or laboratory identifier for a method such as a SOP number, however; values used for Laboratory Method IDs are specified by the project and must be contained in the standard value list for method IDs.	Text	25	YES (Specified by the project)
PreparationType	Preparation Method Number (i.e., 3010A, 3510C, 3550C, 5030B, etc.) For analytical procedures that do not have a specific preparation method number, use "Gen Prep".	Text	25	YES (See Table 4)
AnalysisType	Defines the type of analysis such as initial analysis, dilution, re-analysis, etc. This field provides distinction for sample records when multiple analyses are submitted for the same sample, method, and matrix, for example: dilutions, re-analyses, and re-extracts.	Text	10	YES (See Table 4)
Prepared	For radiochemistry leave this field blank. For all other methods enter the date and time of sample preparation or extraction. Refer to the date/time format at the end of this table.	Date/ Time	16*	NO
Analyzed	For radiochemistry methods the date of sample analysis. Refer to the date format for radiochemistry methods at the end of this table. For all other methods the date and time of sample analysis. Refer to the date and time format at the end of this table.	Date/ Time	*	NO
LabID	Identification of the laboratory performing the analysis.	Text	7	NO
QCLevel	The level of laboratory QC associated with the analysis reported in the EDD. If only the Analytical Results Table (A1) and the Sample Analysis Table (A3) information are submitted for the sample, enter "COA". If the Laboratory Instrument Table (A2) information is also submitted for the sample, enter "COCAL"	Text	6	YES (See Table 4)
ResultBasis	Indicates whether results associated with this sample record are reported as wet or percent moisture corrected. This field is only required for soils and sediments. Enter "WET" if results are not corrected for percent moisture. Enter "DRY" if percent moisture correction is applied to results.	Text	3	YES (See Table 4)
TotalOrDissolved	This field indicates if the results related to this sample record are reported as a total or dissolved fraction. This field is only required for metal methods. For all other methods leave this field blank.	Text	3	YES (See Table 4)
Dilution	Dilution of the sample aliquot. Enter "1" for method blanks, LCS, and LCSD, or if the field samples was analyzed without dilution.	Numeric	10	NO
HandlingType	Indicates the type of leaching procedure, if applicable (i.e., SPLP, TCLP, WET). Leave this field blank if the sample analysis was not performed on a leachate.	Text	10	YES (See Table 4)

Table 3
Field Description for the Sample Analysis (A3 file)

This table contains information related to analyses of field samples and laboratory QC samples (excluding calibrations and tunes) on a sample level for environmental chemical analyses including radiochemistry

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
HandlingBatch	Unique laboratory identifier for a batch of samples prepared together in a leaching procedure (i.e., SPLP, TCLP, or WET preparation). The HandlingBatch links samples with leaching blanks. Leave this field blank if the sample analysis was not performed on a leachate	Text	12	NO
LeachateDate	Date and time of leaching procedure (i.e., date for SPLP, TCLP, or WET preparation). Refer to the date and time format at the end of this table. Leave this field blank if the sample analysis was not performed on a leachate	Date /Time	16*	NO
Percent_Moisture	Percent of sample composed of water. Enter for soil and sediment samples only.	Numeric	10	NO
MethodBatch	Unique laboratory identifier for a batch of samples of similar matrices analyzed by one method and treated as a group for matrix spike, matrix spike duplicate, or laboratory duplicate association The method batch links the matrix spike and/or matrix spike duplicate or laboratory duplicates to associated samples. Note, the MethodBatch association may coincide with the PreparationBatch association. The MethodBatch is specifically used to link the MS/MSD and/or DUP to associated samples.	Text	12	NO
PreparationBatch	Unique laboratory identifier for a batch of samples prepared together for analysis by one method and treated as a group for method blank, LCS and LCSD association. The PreparationBatch links method blanks and laboratory control samples (blank spikes) to associated samples. Note, the PreparationBatch association may coincide with the MethodBatch association but the PreparationBatch specifically links the Method Blank and LCS to associated samples.	Text	12	NO
RunBatch	For radiochemistry methods leave this field blank. For all other methods the RunBatch is the unique identifier for a batch of analyses performed on one instrument under the control of one initial calibration and initial calibration verification. The RunBatch links both the initial calibration and initial calibration verification to subsequently analyzed and associated continuing calibrations, field samples, and QC analyses. For GC/MS methods, the RunBatch also links a BFB or DFTPP tune. A distinct RunBatch must used with every new initial calibration within a method The value entered in this field links a particular sample/method/analysis type record to a set of associated initial calibration and initial calibration verification records from Table A2. This field is only required if the A2 table is included with the EDD.	Text	12	NO

Table 3
Field Description for the Sample Analysis (A3 file)

This table contains information related to analyses of field samples and laboratory QC samples (excluding calibrations and tunes) on a sample level for environmental chemical analyses including radiochemistry

Field Name	Field Name Description	Field Type	Field Length	Standard Value List
AnalysisBatch	For radiochemistry methods leave this field blank. For all other methods the AnalysisBatch is the unique identifier for a batch of analyses performed on one instrument and under the control of a continuing calibration or continuing calibration verification. The AnalysisBatch links the continuing calibration or calibration verification to subsequently analyzed and associated field sample and QC analyses. For GC/MS methods, the AnalysisBatch also links the BFB or DFTPP tune. A distinct AnalysisBatch must be used with every new continuing calibration or continuing calibration verification within a method The value entered in this field links a particular sample/method/analysis type record to a set of associated continuing calibration records in the Laboratory Instrument table. This field is only required if the A2 table is included with the EDD.	Text	12	NO
LabReportingBatch	Unique laboratory identifier for the EDD. This is equivalent to the sample delivery group, lab work number, login ID, etc. The LabReportingBatch links all records in the EDD reported as one group. The value entered in this field must be the same in all records.	Text	12	NO
LabReceipt	Date and time the sample was received in the lab. A time value of 00:00 may be entered. Refer to the date/time format at the end of this table.	Date/ Time	16*	
LabReported	Date and time hard copy reported delivered by the lab. A time value of 00:00 may be entered. Refer to the date/time format at the end of this table.	Date/ Time	16*	

* For radiochemistry methods format Date as MM/DD/YYYY (where MM = two digit month, DD = two digit day, and YYYY = four digit year)

For all other methods format Date and Time as MM/DD/YYYY hh:mm YYYY (where MM = two digit month, DD = two digit day, and YYYY = four digit year, hh = hour in 24 hour format, and mm = minutes)

Table 4
Standard Value List

Field Name	Standard Value	Standard Value Description
Analysis_Type	DL	Dilution of the original sample
	DL2	Second dilution of the original sample
	DL3	Third dilution of the original sample
	DL4	Fourth dilution of the original sample
	RE	Reanalysis/re-extraction of sample
	RE2	Second reanalysis/re-extraction of sample
	RE3	Third reanalysis/re-extraction of sample
	RE4	Fourth reanalysis/re-extraction of the original sample
	RES	The initial or original sample.
Analyte_Name	Refer to QAPP and Project Library	Analyte names are specified by the project and entered into the library for each method and matrix. Analyte Names used in project libraries must first exist in the standard value table. The same holds true for the ClientAnalyteID
Analyte_Type	IS	Internal standard as defined per CLP usage
	SPK	Spiked analyte
	SURR	Surrogate as defined as per CLP usage
	TIC	Tentatively identified compound for GC/MS analysis
	TRG	Target compound
Detection_Limit_Type [1]	CRDL	Contract required detection limit
	IDL	Instrument detection limit
	MDA	Minimum detectable activity
	MDL	Method detection limit
Handling_Type [2]	WET	Wet leaching procedure
	SPLP	Synthetic Precipitation Leaching Procedure
	TCLP	Toxicity Characteristic Leaching Procedure
Lab_Analysis_Ref_Method_ID	Refer to QAPP and Project Library	Method IDs are specified by the project and entered into the library. Methods used in project libraries must first exist in the standard value table
Lab_Qualifiers [3]	*	INORG: Duplicate analysis was not within control limits
	*	ORG: Surrogate values outside of contract required QC limits
	+	INORG: Correlation coefficient for the method of standard additions (MSA) was less than 0.995
	A	ORG: Tentatively identified compound (TIC) was a suspected aldol-condensation product
	B	INORG: Value less than contract required detection limit but greater than or equal to instrument detection limit
	B	ORG: Compound is found in the associated blank as well as in the sample
	C	ORG: Analyte presence confirmed by GC/MS
	D	Result from an analysis at a secondary dilution factor
	E	INORG: Reported value was estimated because of the presence of interference
	E	ORG: Concentrations exceed the calibration range of the instrument
	H	Analysis performed outside method or client-specified holding time requirement
	J	Estimated value
	M	INORG: Duplicate injection precision was not met
	N	INORG: Spiked sample recovery was not within control limits
	N	ORG: Presumptive evidence of a compound
	P	ORG: Difference between results from two GC columns unacceptable (>25% Difference)
	S	Reported value was determined by the method of standard additions (MSA)
	U	Compound was analyzed for but not detected. Analyte result was below the Reporting Limit.
	W	INORG: Post digestion spike was out of control limits
	X	Reserved for a lab-defined data qualifier
	Y	Reserved for a lab-defined data qualifier
	Z	Reserved for a lab-defined data qualifier
Matrix_ID	AIR	Air
	AQ	Water
	ASH	Ash

Table 4
Standard Value List

Field Name	Standard Value	Standard Value Description
Matrix_ID (continued)	BIOTA	Biological matter
	FILTER	Filter
	LIQUID	Non-aqueous liquid
	OIL	Oil
	SED	Sediment
	SLUDGE	Sludge
	SO	Soil
	SOLID	Non-soil/sediment solid
	TISSUE	Tissue
	WASTE	Waste
	WIPE	Wipe
Preparation_Type [4]	3005A	Acid Digestion of Waters for Total Recoverable or Dissolved Metals by FLAA or ICP
	3010A	Acid of Aqueous Samples and Extracts for Total Metals by FLAA or ICP
	3015	Microwave Assisted Acid Digestion of Aqueous Samples and Extracts
	3020A	Acid Digestion of Aqueous Samples and Extracts for Total Metals by GFAA
	3031	Acid Digestion of Oils for Metals Analysis by AA or ICP
	3050B	Acid Digestion of Sediments, Sludges, and Soils
	3051	Microwave Assisted Acid Digestion of Sediments, Sludges, Soils and Oils
	3052	Microwave Assisted Acid Digestion of Siliceous and Organically Based Matrices
	3060A	Alkaline Digestion for Hexavalent Chromium
	3510C	Separatory Funnel Liquid-Liquid Extraction
	3520C	Continuous Liquid-Liquid Extraction
	3535	Solid Phase Extraction
	3540C	Soxhlet Extraction
	3541	Automated Soxhlet Extraction
	3545	Pressurized Fluid Extraction
	3550B	Ultrasonic Extraction
	3560	Supercritical Fluid Extraction of Total Recoverable Petroleum Hydrocarbons
	5030B	Purge and Trap for Aqueous Samples
	5035	Closed-System Purge-and-Trap and Extraction for Volatile Organics in Soil and Waste Samples
	7470A	Acid digestion of waters for Mercury analysis
	7471A	Acid digestion of soils and solids for Mercury analysis
	Gen Prep	Generic preparation type when a preparation method ID does not exist (used mostly for general chemistry methods)
QC_Level	COA	Certificate of Analysis (accuracy and precision, no calibration)
	COACAL	Certificate of Analysis (accuracy and precision including calibration)
QC_Type	MB	Analytical control consisting of all reagents and standards that is carried through the entire procedure (Method Blank)
	CV	(Calibration Verification) Analytical standard run at a specified frequency to verify the calibration of the analytical system
	CCV	(Continuing Calibration Verification) Analytical standard run every 12 hours to verify the calibration of the GC/MS system
	DUP	A second aliquot of a sample that is treated the same as the original aliquot to determine the precision of the method
	IC	(Initial Calibration) Analysis of analytical standards for a series of different specified concentrations
	ICV	(Initial Calibration Verification) Analytical standard run at a specified frequency to verify the accuracy of the initial calibration of the analytical system
	IPC	(Instrument Performance Check) Analysis of DFTPP or BFB to evaluate the performance of the GC/MS system
	LCS	(Laboratory Control Sample) A control sample of known composition
	LCSD	(Laboratory Control Sample Duplicate) A duplicate control sample of known composition
	MS	(Matrix Spike) Aliquot of a matrix spiked with known quantities and subjected to the entire analytical procedure to measure recovery
	MSD	(Matrix Spike Duplicate) A second aliquot of the same matrix as the matrix spike that is spiked in order to determine the precision of the method
Reporting_Limit_Type [1]	CRDL	Contract required detection limit
	CRQL	Contract required quantitation limit

Table 4
Standard Value List

Field Name	Standard Value	Standard Value Description
Reporting_Limit_Type (continued)	PQL	Practical quantitation limit
	SQL	Sample quantitation limit
	RDL	Reportable detection limit
Result_Basis	DRY	Result was calculated on a dry weight basis
	WET	Result was calculated on a wet weight basis
Result_Units [5]	ug/L	Micrograms per liter
	mg/L	Milligrams per liter
	ug/Kg	Micrograms per kilogram
	mg/Kg	Milligrams per kilogram
	pg/L	Picograms per liter
	ng/Kg	Nanograms per kilogram
Total_Or_Dissolved	DIS	Dissolved
	TOT	Total

1 **Additional Detection Limit Types and Reporting Limit Types may be used. These must be added to the application standard values.**
2 **Additional Handling Types (leachate procedures) may be used. These must be added to the application standard values**
3 **Additional Lab Qualifiers may be used, or listed Lab Qualifiers may be used in a different manner than described in this table. New lab qualifiers must be added to the application standard value tables. NOTE: The "U" Lab Qualifier must be used for all non-detects.**
4 **Additional Preparation Types may be used. These must be added to the application standard value tables.**
5 **Additional Result Units may be used. The project library specifies the reporting limit used for each method and matrix**

Note: If new standard values are used then these standard values must be entered in the software standard values for both the lab and contractor. The application will automatically update the standard values tables if an importing library contains standard values (method, client analyte ID, and analyte name) that do not exist in the software importing the new library.

Table 5
Required Fields in the Analytical Results Table for GC/MS, GC, and HPLC Methods

	GC/MS Methods			GC and HPLC Methods		
Field	Regular Sample*	MS/MSD	Method Blank, LCS/LCSD	Regular Sample*	MS/MSD	Method Blank, LCS/LCSD
Client_Sample_ID	X	X	X	X	X	X
Lab_Analysis_Ref_Method_ID	X	X	X	X	X	X
Analysis_Type	X	X	X	X	X	X
Lab_Sample_ID	X	X	X	X	X	X
Lab_ID	X	X	X	X	X	X
Client_Analyte_ID	X	X	X	X	X	X
Analyte_Name	X	X	X	X	X	X
Result	X	X	X	X	X	X
Result_Units	X	X	X	X	X	X
Lab_Qualifiers	Q	Q	Q	Q	Q	Q
Detection Limit	X	X	X	X	X	X
Detection_Limit_Type	X	X	X	X	X	X
Retention_Time	T		T			
Analyte_Type	X	X	X	X	X	X
Percent_Recovery	S	R	R	S	R	R
Relative_Percent_Difference		D	D		D	D
Reporting_Limit	X	X	X	X	X	X
Reporting_Limit_Type	X	X	X	X	X	X
Reportable_Result	X	X	X	X	X	X

Key

- X Required Field
- D Required field for spiked compounds in the LCSD and MSD only
- Q Required field if laboratory has qualified result. The “U” qualifier MUST be entered if the result is non-detect.
- R Required field if Analyte_Type = “SPK” or “SURR”
- S Required field for surrogate compounds only
- T Required field for tentatively identified compounds by GC/MS only
- * Also includes Equipment Blanks, Field Blanks, and Trip Blanks

Table 6
Required Fields in the Analytical Results Table for ICAP, AA, and IC Methods

Field	ICAP and AA Methods			IC and Wet Chemistry Methods		
	Regular Sample*	Sample Duplicate, MS/MSD	Method Blank, LCS/LCSD	Regular Sample*	Sample Duplicate MS/MSD	Method Blank, LCS/LCSD
Client_Sample_ID	X	X	X	X	X	X
Lab_Analysis_Ref_Method_ID	X	X	X	X	X	X
Analysis_Type	X	X	X	X	X	X
Lab_Sample_ID	X	X	X	X	X	X
Lab_ID	X	X	X	X	X	X
Client_Analyte_ID	X	X	X	X	X	X
Analyte_Name	X	X	X	X	X	X
Result	X	X	X	X	X	X
Result_Units	X	X	X	X	X	X
Lab_Qualifiers	Q	Q	Q	Q	Q	Q
Detection Limit	X	X	X	X	X	X
Detection_Limit_Type	X	X	X	X	X	X
Retention_Time						
Analyte_Type	X	X	X	X	X	X
Percent_Recovery		S	S		S	S
Relative_Percent_Difference		R	R		R	R
Reporting_Limit	X	X	X	X	X	X
Reporting_Limit_Type	X	X	X	X	X	X
Reportable_Result	X	X	X	X	X	X

Key

X Required field
Q Required field if laboratory has qualified result. The “U” qualifier MUST be entered if the result is non-detect
R Required field for spiked compounds in LCSD or MSD, or target compounds in the Sample Duplicate only
S Required field if Analyte_Type = “SPK”
* Also includes Trip Blanks, Equipment Blanks, and Field Blanks

Table 7
Required Fields in the Laboratory Instrument Table

	GC/MS Tunes		Initial Calibration				Initial Calibration Verification				Calibration Verification, Continuing Calibration
Field	VOA	SVOA	GC/MS	GC HPLC	ICP/AA	IC*	GC/MS	GC HPLC	ICP/AA	IC*	ALL METHODS
Instrument_ID	X	X	X	X	X	X	X	X	X	X	X
QC_Type	X	X	X	X	X	X	X	X	X	X	X
Analyzed	X	X	X	X	X	X	X	X	X	X	X
Alternate_Lab_Analysis_ID	X	X	X	X	X	X	X	X	X	X	X
Lab_Analysis_ID	X	X					X	X	X	X	X
Lab_Analysis_Ref_Method_ID	X	X	X	X	X	X	X	X	X	X	X
Client_Analyte_ID	X	X	X	X	X	X	X	X	X	X	X
Analyte_Name	X	X	X	X	X	X	X	X	X	X	X
Run_Batch	X	X	X	X	X	X	X	X	X	X	X
Analysis_Batch	C	C									X
Lab_Reporting_Batch	X	X	X	X	X	X	X	X	X	X	X
Percent_Relative_Standard_Deviation			X	X							
Correlation_Coefficient			B	B	X	X					
Relative_Response_Factor			X				X				M
Percent_Difference							X	X	X	X	X
Peak_ID_01	X	X									
Percent_Ratio_01	X	X									
Peak_ID_02	X	X									
Percent_Ratio_02	X	X									
Peak_ID_03	X	X									
Percent_Ratio_03	X	X									
Peak_ID_04	X	X									
Percent_Ratio_04	X	X									
Peak_ID_05	X	X									
Percent_Ratio_05	X	X									
Peak_ID_06	X	X									
Percent_Ratio_06	X	X									
Peak_ID_07	X	X									
Percent_Ratio_07	X	X									
Peak_ID_08	X	X									
Percent_Ratio_08	X	X									
Peak_ID_09	X	X									
Percent_Ratio_09	X	X									
Peak_ID_10		X									
Percent_Ratio_10		X									
Peak_ID_11		X									
Percent_Ratio_11		X									
Peak_ID_12		X									
Percent_Ratio_12		X									
Peak_ID_13		X									
Percent_Ratio_13		X									

Key

X Required field (some fields are not applicable to some General (Wet) Chemistry tests)

B Required field if reporting best fit

C Required field if BFB or DFTPP associated with a continuing calibration only

M Required field for GC/MS continuing calibration only

*IC Includes Ion Chromatography and Classical or Wet Chemistry methods. Methods such as pH, Conductivity, and others do not use traditional calibration procedures: therefore some fields marked as a required field under the "IC" column do not apply for these methods.

Table 8
Required Fields in the Sample Analysis Table

Field	GC, GC/MS, HPLC Methods		ICAP and AA Methods		IC and Wet Chemistry Methods	
	Method Blanks, LCS/LCSD	Regular Samples*, Sample Duplicate, MS/MSD	Method Blanks, LCS/LCSD	Regular Samples*, Sample Duplicate, MS/MSD	Method Blanks, LCS/LCSD	Regular Samples*, Sample Duplicate, MS/MSD
Client_Sample_ID	X	X	X	X	X	X
Collected		X		X		X
Matrix_ID	X	X	X	X	X	X
Lab_Sample_ID	X	X	X	X	X	X
QC_Type	X	Q	X	Q	X	X
Shipping_Batch_ID		X		X		X
Temperature		X				X
Lab_Analysis_Ref_Method_ID	X	X	X	X	X	X
Preparation_Type	X	X	X	X	X	X
Analysis_Type	X	X	X	X	X	X
Prepared	A	A	X	X	N	N
Analyzed	X	X	X	X	X	X
Lab_ID	X	X	X	X	X	X
QC_Level	X	X	X	X	X	X
Results_Basis		S		S		S
Total_Or_Dissolved			W	W		
Dilution	X	X	X	X	X	X
Handling_Type	L	L	L	L	L	L
Handling_Batch	L	L	L	L	L	L
Leachate_Date	L	L	L	L	L	L
Percent Moisture		S		S		S
Method_Batch	X	X	X	X	X	X
Preparation_Batch	X	X	X	X	X	X
Run_Batch	C	C	C	C	C	C
Analysis_Batch	C	C	C	C	C	C
Lab_Reporting_Batch	X	X	X	X	X	X
Lab_Receipt		X		X		X
Lab_Reported	X	X	X	X	X	X

Key

X Required field
A Required field for samples prepared by methanol extraction
C Required field if Instrument Calibration Table (A2) is included in EDD
L Required field if analysis performed on SPLP, TCLP, or WET extracts
N Required field only for samples that require preparation before analysis
Q Required field for Sample Duplicate, MS, and MSD only
S Required field if “Matrix_ID” = “SO” or “SED”
W Required field for aqueous samples only
* Includes Trip Blanks, Equipment Blanks, and Field Blanks

Reviewed EDD Export File Specifications - Analytical Results (A1)
Comma Delimited Text File

Order	Field Name*	Field Description
1	RecordID	Record number.
2	ClientSampleID	Client field sample identifier.
3	LabAnalysisRefMethodID	Laboratory reference method (i.e. 8260B, 6010B, etc.).
4	AnalysisType	Defines type of analysis (i.e. dilution, reanalysis, etc.).
5	LabSampleID	Internal laboratory sample tracking number for samples and lab generated QC.
6	LabID	Identifier of laboratory performing the analysis.
7	ClientAnalyteID	CAS number or unique analyte identifier.
8	AnalyteName	Chemical name for analyte.
9	Result	Reportable result for the analyte.
10	ResultUnits	Units of measure for the result (i.e. mg/Kg, ug/L, etc.).
11	LabQualifiers	A string of letter or symbol qualifiers assigned by the lab based on contractor defined rules and values.
12	DetectionLimit	Detection limit for the analyte being measured.
13	DetectionLimitType	Specifies the type of detection limit (i.e. MDL, IDL, etc.).
14	RetentionTime	The time expressed in decimal minutes between injection and detection for GC/MS TICs only.
15	AnalyteType	Defines the type of result such as surrogate, spike, or target analyte.
16	PercentRecovery	The percent recovery of a spiked QC compound such as a matrix spike, LCS spike, or surrogate.
17	RelativePercentDifference	RPD between to QC results such as MS/MSD.
18	ReportingLimit	Analyte reporting limit.
19	ReportingLimitType	Defines the type of reporting limit (PQL, CRQL, etc.).
20	ReportableResult	(YES or NO) Indicates which result is the useable result when results from two or more analyses for the same sample and method (ie dilutions, reanalyses, etc) are reported in the EDD.
21	**Filename**	File name of the EDD. The same as the LabReportingBatch in the Sample Analysis table (A3).
22	**DVModifiedConcentration**	ADR modified analyte result due to blank contamination.
23	**DVQualTemperature**	Data review qualifier for temperature outlier.
24	**DVQualPreservation**	Data review qualifier for preservation anomaly.
25	**DVQualHTSamplingToAnalysis**	Data review qualifier for holding time violation from sampling time to analysis time.
26	**DVQualHTSamplingToExtraction**	Data review qualifier for holding time violation from sampling time to extraction.
27	**DVQualHTExtractionToAnalysis**	Data review qualifier for holding time violation from extraction time to analysis time.
28	**DVQualHoldingTime**	Overall data review qualifier for holding time violation.
29	**DVQualMethodBlanks**	Data review qualifier for contamination in an associated method blank.
30	**DVQualSurrogateRecovery**	Data review qualifier for surrogate recovery outlier.
31	**DVQualMS**	Overall data review qualifier for associated MS and MSD recovery and/or RPD outlier.
32	**DVQualMSRecovery**	Data review qualifier for MS and/or MSD recovery outlier.
33	**DVQualMSRPD**	Data review qualifier for MS/MSD RPD .outlier.
34	**DVQualLCS**	Overall data review qualifier for LCS and LCS recovery and/or RPD outlier.
35	**DVQualLCSRecovery**	Data review qualifier for associated LCS and/or LCSD recovery outlier.
36	**DVQualLCSRPD**	Data review qualifier for LCS/LCSD RPD outlier.
37	**DVQualRepLimits**	Data review qualifier for result reported below the reporting limit.
38	**DVQualReportingLimits**	Data review comment (“OutX”) when reporting limit exceeds the project reporting limit.
39	**DVQualFieldQC**	Overall data review qualifier for Field QC.
40	**DVQualFieldBlank**	Data review qualifier for contamination in an associated Field Blank.
41	**DVQualEquipmentBlank**	Data review qualifier for contamination in an associated Equipment Rinsate or Equipment Blank.
42	**DVQualTripBlank**	Data review qualifier for contamination in an associated Trip Blank.
43	**DVQualFieldDuplicate**	Data review qualifier for an associated Field Duplicate RPD outlier.
44	**DVQualIC**	Overall data review qualifier for associated initial calibration outliers.
45	**DVQualInitialCalibrationRRF**	Data review qualifier for an associated initial calibration relative response

Order	Field Name*	Field Description
		factor outlier.
46	**DVQualInitialCalibrationRSD**	Data review qualifier for an associated initial calibration relative percent difference outlier.
47	**DVQualInitialCalibrationCC**	Data review qualifier for an associated initial calibration corrrelation coefficient outlier.
48	**DVQualICV**	Overall data review qualifier for an associated initial calibration verification.
49	**DVQualInitialCalibration VerificationRRF**	Data review qualifier for an associated initial calibration verification relative response factor outlier.
50	**DVQualInitialCalibration VerificationPD**	Data review qualifier for an associated initial calibration verification percent difference outlier.
51	**DVQualCCV**	Overall data review qualifier for associated continuing calibration outliers.
52	**DVQualContinuingCalibration VerificationRRF**	Data review qualifier for an associated continuing calibration relative response factor outlier.
53	**DVQualContinuingCalibration VerificationPD**	Data review qualifier for an associated continuing calibration percent difference outlier.
54	**DVQualOverall**	Overall data review qualifier for all QC and calibration qualifiers.
55	**TagLabSampleID (see comment)**	Temporary placeholder.
56	**TagDetQual01 (see comment)**	Temporary placeholder.
57	**TagNonDetQual01 (see comment)**	Temporary placeholder.
58	**TagDetQual02 (see comment)**	Temporary placeholder.
59	**TagNonDetQual02 (see comment)**	Temporary placeholder.
60	**surDVQualDet (see comment)**	Temporary placeholder.
61	**surDVQualNonDet (see comment)**	Temporary placeholder
62	**DVQualInstrumentPerformance CheckRunBatch**	Data review qualifier for GC/MS Tune outlier related to initial calibration.
63	**DVQualInstrumentPerformance CheckAnaBatch**	Data review qualifier for GC/MS Tune outlier related to continuing calibration.
64	**DVQualIPC**	Overall data review qualifier for GC/MS tune outliers.
65	**DVQualLabDup**	Data review qualifier for RPD outlier in laboratory duplicate.
66	**DVQualCode**	User-defined Reason Code
67	**FieldDupRPD**	RPD calculated from Field duplicate and parent sample
68	**DVQualMergedQualifier**	Merged lab and data review qualifiers
69	**DVQualMergedResult**	Final result (modified concentration if applicable)
70	**DVQualPercMoi**[1]	Data review qualifier for percent moisture
71	**DVQualLabDupNR**[1]	Data review qualifier for laboratory duplicate not reported
72	**DVQualLcsNR**[1]	Data review qualifier for laboratory control sample(s) not reported
73	**DVQualDissTotDiff**[1]	Data review qualifier for dissolved and total fraction differing by more than 10%
74	**Error**	Radiochemistry error
75	**DVQualSampleDupCount**[1]	Data review qualifier for sample count being >20 in a duplicate batch
76	**DVQualMsSampleCount**[1]	Data review qualifier for sample count being >20 in a matrix spike batch
77	**DVQualLcsCount**[1]	Data review qualifier for sample count being >20 in a laboratory control sample batch
78	**DVQualMbMissing**[1]	Data review for missing method blank
79	**DVQualPercMoiDissTotDiff**[1]	Combined data review qualifier for percent moisture and total vs dissolved difference outliers
80	**DVQualInternalStandard**[2]	Data review qualifier for internal standard outlier
81	**DVQualCalibrationBlank**[2]	Data review qualifier for calibration blank contamination
82	**DVQualRcm**[2]	Data review qualifier for resolution check mixture problem
83	**DVQualPem**[2]	Data review qualifier for performance evaluation mixture problem
84	**DVQualProfessionalJudgement**[2]	Data review qualifier for any reason deemed necessary by data-review chemist
85	**DOD_MDL**	Method detection limit for QSM 5.4

Comment: Fields that contain temporary placeholders hold information contributed during the review process that is used in generating reports. This information is kept with the output file so that if the file is ever imported back into the application, reports can be generated without having to rerun the review module.

* Field Names in bold font are added to the EDD during review and included in the exported reviewed EDD file

[1] Data review qualifiers in these cases are added for EPA Region II assessment. ADR.Net does not currently perform EPA Region II assessment.

[2] Data review qualifiers in these cases are added manually by the user and not assessed by automated data review.

Reviewed EDD Export File Specifications - Sample Analysis (A3)
Comma Delimited Text File

Order	Field Name*	Field Description
1	RecordID	Record number.
2	ProjectNumber	Project Number assigned by client.
3	ProjectName	Project Name assigned by client.
4	ClientSampleID	Client field sample identifier.
5	Collected	Date and time sample was collected.
6	MatrixID	Sample matrix.
7	LabSampleID	Internal laboratory sample tracking number for samples and lab generated QC.
8	QCType	Identifies the type of quality control sample, regular field samples are null.
9	ShippingBatchID	Unique identifier assigned to a cooler or shipping container used to transport field samples.
10	Temperature	Temperature in degrees C of the samples as received in the lab.
11	LabAnalysisRefMethodID	Laboratory reference method (i.e. 8260B, 6010B, etc.).
12	**PreparationType**	Preparation method number (i.e. 3010A, 3510C, etc.).
13	**AnalysisType**	Defines type of analysis (i.e. dilution, reanalysis, etc.).
14	**Prepared**	Date and time of sample preparation/extraction.
15	**Analyzed**	Date and time of sample analysis.
16	**LabID**	Identifier of laboratory performing analysis.
17	**QCLevel**	Level of analytical QC associated with analysis (i.e. Level III, etc.).
18	**ResultBasis**	Indicates if a result is expressed as wet or dry.
19	**TotalorDissolved**	Indicates if a result is expressed as total or dissolved (for metals only).
20	**Dilution**	Sample dilution during analysis.
21	**HandlingType**	Type of leaching procedure, if applicable (i.e. SPLP, TCLP, etc.).
22	**HandlingBatch**	Unique laboratory identifier for a batch of samples prepared together for a leaching procedure.
23	**LeachateDate**	Date and time of leaching procedure.
24	**PercentMoisture**	Percent moisture of sample.
25	**MethodBatch**	Unique laboratory identifier for a batch of samples with similar matrix and analyzed together by one method. Links samples to matrix spikes and duplicates.
26	**PreparationBatch**	Unique laboratory identifier for a batch of samples prepared together for analysis by one method. Links samples with method blanks and laboratory control samples.
27	**RunBatch**	Unique laboratory identifier for a batch of analyses performed on one instrument under the control of on an initial calibration. Links the initial calibration to associated samples.
28	**AnalysisBatch**	Unique laboratory identifier for a batch of analyses performed on one instrument under the control of a continuing calibration. Links continuing calibrations to associated samples.
29	**LabReportingBatch**	Unique laboratory identifier for a batch of samples, QC, and calibration standards reported as a group by the lab (i.e. order number, SDG #, etc.).
30	**LabReceipt**	Date samples received in laboratory.
31	**LabReported**	Date laboratory hardcopy submitted.
32	DataReviewCompany**	Company running the automated review software.
33	DataReviewDate	Date and time EDD was validated.
34	ValidatedBy**	Person running the automated review.
35	ValidationDate**	Date and time when automated data review qualifiers were reviewed
36	ApprovedBy**	Person performing secondary review of data review flags.
37	ApprovalDate**	Date and time of secondary review by "ApprovedBy".
38	FileName	File name of EDD (same as LabReportingBatch).
39	TagLabSampleID (see comment)	Temporary place holder.
40	TagDetQual (see comment)	Temporary place holder.
41	TagNonDetQual (see comment)	Temporary place holder.
42	TempFlag (see comment)	Temporary place holder.
43	LabMethodCategory	The category of the method, used by EDMS

Comment: Fields that contain temporary placeholders hold values created during the validation process. These values are used in generating reports. This information is kept with the output file so that if the file is ever imported back into the application, reports can be generated without having to rerun the validation module.

* Field Names in bold font are added to the EDD during automated data review and included in the exported data-reviewed EDD file

**Automated data review does not update these fields with any information but these fields are still part of the exported data-reviewed file. These fields may be populated manually by the user from various forms in the application prior to exporting.

*** Date/Time format: MM/DD/YYYY hh:mm

ATTACHMENT F

Responses to U.S. Environmental Protection Agency Comments on the Draft QAPP

Responses to Comments on the Draft Report submitted by the U.S. Environmental Protection Agency (USEPA)[1]

GENERAL COMMENTS

GENERAL COMMENT 1: QAPP Section 3.5.7 (Data Types; Page 27) indicates that data will be validated by Ahtna; however, Section 3.5.14 (Data Review Tasks; Page 29) indicates that data will be validated by Laboratory Data Consultants, Inc. (LDC). In addition, it is unclear why the data validator is not identified in Section 2.2 (Worksheet #3 and 5: Project Organization and QAPP Distribution; Page 5) or Section 2.3 (Worksheet #4, 7 and 8: Personnel Qualifications and Sign-Off Sheet; Pages 6 and 7). Please revise the QAPP to clarify the organization that will be performing data validation. Please also ensure the data validator is identified in all applicable QAPP sections and worksheets.

RESPONSE TO GENERAL COMMENT 1: *Section 3.5.7 of the Quality Assurance Project Plan (QAPP) was revised to indicate the data will be validated by Laboratory Data Consultants. Sections 2.2 and 2.3 were revised per the comment.*

GENERAL COMMENT 2: Section 3.5 (Worksheet #14 and 16: Project Tasks and Schedule; Pages 26 to 29) indicates that geospatial data will be collected during this investigation; however, the QAPP does not provide information regarding the use of global positioning system (GPS) units. For example, the QAPP does not include a standard operating procedure (SOP) or calibration, maintenance, testing, and inspection requirements for GPS units. Please revise the QAPP to include sufficient information for collecting geospatial data and using GPS units.

RESPONSE TO GENERAL COMMENT 2: *No geospatial data is anticipated for collection, as all soil gas probes and soil vapor extraction wells have been installed and surveyed. In the unlikely event that geospatial data will be collected in the future, Field Work Documentation SOP (FSOP-001) was updated to reference the manufacturer's handbook for the instrument that is used for collecting geospatial data at the Former Fort Ord.*

SPECIFIC COMMENTS

SPECIFIC COMMENT 1: Section 2.1, Worksheet #1 and 2: Title and Approval Page, Page2: According to Section 2.1 (Title and Approval Page) of the UFP-QAPP Manual, the Title and Approval Page should include the approval signature of the investigative organization's project quality assurance (QA) manager; however, this individual is missing from Worksheet #1 and 2. Please revise Worksheet #1 and 2 to include space for the approval signature of the investigative organization's project QA manager.

RESPONSE TO SPECIFIC COMMENT 1: *For this project, the Lead Organization's Technical Lead (Erin Corr) encompasses the role of QA Manager, and her approval signature is on Worksheet #1 & 2. Note that the optimized Worksheet #1 & 2 of the UFP-QAPP manual states "Signatories <u>usually</u> include the lead organization's Project Manager and QA Manager," so placement of the QA Manager signatory is not a requirement.*

[1] In a letter dated March 9, 2023 (see Administrative Record No. OU2-738.2). The comments are reproduced here as provided to the Army and there have been no changes to spelling, grammar, or punctuation.

SPECIFIC COMMENT 2: Section 2.4, Worksheet #6: Communication Pathways, Pages 8 to 10: This worksheet does not indicate that Regulatory Agencies will be notified of significant corrective actions or when changes to the QAPP occur in the field. Please revise Worksheet #6 to specify that the Regulatory Agencies will be notified of significant corrective actions and when changes to the QAPP occur, and include the timeframe for this notification.

RESPONSE TO SPECIFIC COMMENT 2: *For the communication drivers "Field corrective actions" and "Analytical corrective actions," Worksheet #6 includes a reference to Note 1, which describes the procedure for notifying the regulatory agencies. Worksheet #6 was revised so that the communication driver "QAPP changes during project execution" also references Note 1.*

SPECIFIC COMMENT 3: Section 2.4, Worksheet #6: Communication Pathways, Pages 9 and 10: The procedures for sample receipt variances and data import and export refer to the SGS Project Manager; however, the proposed analytical laboratory is Eurofins Air Toxics, not SGS. Please revise Worksheet #6 to reference the correct analytical laboratory.

RESPONSE TO SPECIFIC COMMENT 3: *Worksheet #6 was corrected per the comment.*

SPECIFIC COMMENT 4: Section 3.2.4, Step 4: Define the Boundaries of the Study, Page 17: This section does not discuss temporal boundaries. According to Chapter 4 (Step 4, Define the Boundaries of the Study) of EPA's Guidance of Systematic Planning Using the Data Quality Objectives Process, EPA QA/G-4, dated February 2006 (the DQO Guidance), this section should discuss the temporal boundaries that describe the timeframe that the study will represent and when the samples should be collected. This section should also discuss practical constraints that could interfere with sampling like property access. Please revise Section 3.2.4 to include this information.

RESPONSE TO SPECIFIC COMMENT 4: *Section 3.2.4 was revised per the comment.*

SPECIFIC COMMENT 5: Section 3.2.5, Step 5: Develop the Analytical Approach, Page 17: This section indicates that project decisions will be made based on two consecutive quarters of soil gas monitoring, but it is unclear how it was determined that two consecutive quarters of soil gas monitoring are sufficient. A minimum of four consecutive quarters of soil gas monitoring should be conducted before decisions are made regarding sampling frequency in order to ensure that potential seasonal changes in concentrations are evaluated. Please revise the QAPP to indicate that four consecutive quarters of soil gas monitoring will be conducted before decisions are made regarding sampling frequency. Alternatively, please revise the QAPP to include a detailed discussion about how it was determined that two consecutive quarters of soil gas monitoring are sufficient to make project decisions.

RESPONSE TO SPECIFIC COMMENT 5: *The quarterly soil gas monitoring program (SGMP) at Sites 2 and 12 (Sites 2/12) has been ongoing since the first quarter of 2015. Combined with the soil gas sampling completed for the Sites 2/12 Remedial Investigation (RI) Addendum in 2014, there are sufficient data to account for seasonal variations in concentrations (there are none apparent) and to support decisions based on two consecutive quarters of soil gas monitoring data. Additionally, as indicated in the analytic approach for soil gas monitoring in Step 5, there are multiple safeguards that lower the likelihood the sampling frequency of a soil gas probe will be reduced prematurely and contingencies for returning soil gas probes to a quarterly monitoring frequency depending on site conditions. The criteria in Step 5 for changing the monitoring frequency of a soil gas probe are also conservatively based on soil gas screening*

levels (SG-SLs), which are less than soil gas cleanup levels (SGCLs). The same decision rules have been successfully applied since the first regulatory agency-approved version of the QAPP (Revision 0; Administrative Record No. BW-2727A) was issued in 2015, and recommendations for changes in soil gas probe monitoring frequency are submitted for review and concurrence by the U.S. Department of the Army (Army) and the regulatory agencies, including USEPA, before they are implemented. The QAPP was not revised per this comment.

SPECIFIC COMMENT 6: Section 3.2.5, Step 5: Develop the Analytical Approach, Page 18: In the first group of bullet points on this page, the last bullet point states, "If a soil gas probe cluster is no longer needed for the soil gas monitoring program, then it will be proposed for decommissioning;" however, there are no criteria for determining when a soil gas probe cluster is no longer needed. In addition, the quoted statement does not consider whether probes may be necessary for rebound monitoring when the soil vapor extraction (SVE) system is turned off. Please revise the QAPP to include the criteria for determining when a soil gas probe cluster is no longer needed and to consider whether probes may be necessary for rebound monitoring when the SVE system is turned off. Please also revise Figure 3 (Analytic Approach for Soil Gas Probe Sampling Frequency) accordingly based on these revisions.

RESPONSE TO SPECIFIC COMMENT 6: *The determination of the need for a soil gas probe in the SGMP is based on data and professional judgment, and considers the potential need for future rebound studies (i.e., evaluating remedy status), though this is expected to be limited if a soil gas probe has met the criteria for removal from the SGMP. Additionally, the proposal to decommission does not constitute a definitive decommissioning. This proposal is submitted to the Army and the regulatory agencies for review and concurrence before it is implemented, after which a work plan is prepared and the regulatory agencies have another opportunity for review and comment before decommissioning can occur. The text was revised for clarity. Figure 3 was determined to be unnecessary and was deleted from the QAPP.*

SPECIFIC COMMENT 7: Section 3.2.5.2, Soil Gas Plume Limits, Page 18: The first bullet point in this section states, "If the maximum COC [contaminant of concern] concentration detected in a soil gas probe is greater than or equal to the SGCL [soil gas cleanup level], then that monitoring point is within the soil gas plume limits," and the second bullet point in this section states, "If the maximum COC concentration detected in a soil gas prove is less than the SGCL, then that monitoring point is outside the soil gas plume limits." However, the minimum COC concentrations should be used to evaluate whether monitoring points are within or outside the soil gas plume limits, not maximum COC concentrations. Please revise Section 3.2.5.2 to indicate that minimum COC concentrations will be used to evaluate whether monitoring points are within or outside the soil gas plume limits.

RESPONSE TO SPECIFIC COMMENT 7: *The terms "maximum" and "minimum" create confusion in the decision criteria, so the term "maximum" was deleted for clarity.*

SPECIFIC COMMENT 8: Section 3.2.5.7, Groundwater Plume Remediation, Page 22: The third bullet point on this page states, "If a groundwater monitoring well has COC concentration trends that are statistically decreasing but has adjacent soil gas probes with concentrations of COCs greater than SGCLs within 20 feet of the groundwater interface, then a recommendation will be presented for regulatory agency approval to discontinue operation of the SVE well;" however, this statement does not consider cases where vapor concentrations are increasing, but groundwater concentrations are not. If vapor concentrations are increasing, groundwater could be impacted, and therefore, the SVE well should

continue to be operated. Please revise this section to discuss cases where vapor concentrations are increasing, but groundwater concentrations are not.

RESPONSE TO SPECIFIC COMMENT 8: *The text was revised per the comment.*

SPECIFIC COMMENT 9: Section 4.2, Worksheet #18, Sampling Locations and Methods, Pages 34 to 41: The soil gas probes listed in this section are inconsistent with the soil gas probes listed in Table 24 (SGMP Analytical Schedule) provided in the most recent Operable Unit 2 Remedy Monitoring and Operations and Maintenance, Fourth Quarter 2021 through Third Quarter 2022, Former Fort Ord, California (OU 2 OMM Report). For example, Worksheet #18 indicates that soil gas probes SG-12-01-10, SG-12-01-20, SG-12-01-30, SG-12-01-40, SG-12-01-50, and SG-12-01-58 will be sampled; however, according to Table 24 in the OU 2 OMM Report, these probes have been removed from the soil gas monitoring program. Please revise the QAPP to discuss the inconsistencies between Worksheet #18 and Table 24 in the OU 2 OMM Report. Please also consider appending Table 24 in the OU 2 OMM Report to the QAPP or incorporating the information in Table 24 into the QAPP in some other manner.

RESPONSE TO SPECIFIC COMMENT 9: *Please note this QAPP only discusses soil gas probes and groundwater monitoring wells at Sites 2/12. The landfill gas compliance probes in Table 24 of the Operable Unit 2 Remedy Monitoring and Operations and Maintenance, Fourth Quarter 2021 through Third Quarter 2022 (Administrative Record No. OU2-738) are at OU2. The QAPP was not revised per the comment.*

SPECIFIC COMMENT 10: Section 3.5.16, Project Schedule, Page 29: The project schedule provided in this section is insufficiently detailed. According to Section 2.8.2 (Project Schedule) of the UFP-QAPP Manual, the QAPP should include a schedule of the work to be performed using a timeline or tabular format, and the timeline must include the start and completion dates for all project activities, as well as the quality assurance (QA) assessments that will be performed during the course of the project. Please revise the QAPP to provide a project schedule that includes the start and completion dates for all project activities.

RESPONSE TO SPECIFIC COMMENT 10: *It is acknowledged that the project schedule format presented in Section 3.5.16 is not consistent with Optimized UFP-QAPP Worksheet #14/16; however; the project schedule format required modification because the SGMP is ongoing and there are not specified start and end dates. This format is also consistent with other Fort Ord QAPPs that describe ongoing quarterly monitoring programs. Conversely, the Optimized UFP-QAPP Worksheet #14/16 project schedule format is designed for a single investigation event.*

SPECIFIC COMMENT 11: Section 5.2, Worksheet #20: Field Quality Control Summary, Page 43: The table in this section indicates that field duplicate samples will be collected at a frequency of 10 percent (%) per sampling year, and based on the stated frequency, it appears that field duplicate samples may not be collected during each sampling event. Since field duplicate samples are used to estimate sampling and analysis precision, they should be collected at a frequency of 10% per each sampling event or at a minimum frequency of one per sampling event, particularly because no other field QC samples will be collected. Please revise Worksheet #20 to indicate that field duplicate samples will be collected at a frequency of 10% per each sampling event or at a minimum frequency of one per sampling event.

RESPONSE TO SPECIFIC COMMENT 11: *Worksheet #20 was revised per the comment.*

SPECIFIC COMMENT 12: Section 5.4, Worksheet #22: Field Equipment Calibration, Maintenance, Testing, and Inspection, Page 45: This worksheet is insufficiently detailed. Specifically, the field equipment calibration, maintenance, testing, and inspection requirements are not provided. According to Section 3.1.2.4 (Field Equipment Calibration, Maintenance, Testing, and Inspection Procedures) of the UFP-QAPP Manual, Worksheet #22 should specify the calibration activity, maintenance activity, testing activity, inspection activity, frequency, acceptance criteria, corrective action, responsible person, and SOP reference for each piece of field equipment that will be used. Please revise Worksheet #22 to include this information.

RESPONSE TO SPECIFIC COMMENT 12: *Consistent with Optimized UFP-QAPP Worksheet #22, the manufacturer's instructions for the flow meter and vacuum pump used during soil gas monitoring were added to Attachment A. This equipment is factory calibrated. If the equipment fails, then it is replaced.*

SPECIFIC COMMENT 13: Section 6.1, Worksheet #23: Analytical SOPs, Page 46: This worksheet indicates that laboratory SOPs #83 and #91 include variances to the Quality Systems Manual (QSM), but it is unclear what the variances are. Please revise Worksheet #23 to provide a description of how each SOP varies from the QSM.

RESPONSE TO SPECIFIC COMMENT 13: *There are no variances to the QSM. Worksheet #23 was revised accordingly.*

SPECIFIC COMMENT 14: Section 7.2.1, Assessments and Corrective Action, Page 55: The last row of the table on Page 55 appears to be cut off, and it is unclear what information is missing. Please ensure all information in the table is visible to the reader.

RESPONSE TO SPECIFIC COMMENT 14: *The table was revised per the comment.*

SPECIFIC COMMENT 15: Figure 3, Analytic Approach for Soil Gas Probe Sampling Frequency: Several issues were identified on Figure 3. For example, for the blue box stating, "Is the probe necessary for plume delineation or evaluating remedy status?," there appears to be two arrows indicating "No." The arrow to the right of the blue box should be eliminated; otherwise, the other two questions may not get asked. There are also two "No" arrows from the next box stating, "Are adjacent probe COCs above the SGCLs?" In order to resolve these issues, the third box stating, "Is annual data sufficient for plume delineation and/or evaluating remedy status?," should be moved first and only one arrow for "No" should be allowed for each decision. Similar issues were identified with other boxes on this figure, and as such, most or all of the arrows should be revised so that each decision box only has two options. Please revise Figure 3 to address these issues.

RESPONSE TO SPECIFIC COMMENT 15: *Figure 3 was determined to be unnecessary and was deleted from the QAPP.*

ATTACHMENT G

Responses to California Department of Toxic Substances Control Comments on the Draft QAPP

Responses to Comments submitted by the California Department of Toxic Substances Control (DTSC)[1]

GEOLOGICAL SERVICES UNIT (GSU) COMMENT 1: Revision to Table 1. Revisions to Table 1. Soil Gas Probe Identification, Sample Schedule, and Purge Specifications are warranted to clarify the sampling schedule status for soil gas probes SG-12-07-65, SG-12-17-60, and SG-12-20-70. The report notes that the soil gas sampling schedule presented on Table 1 has been revised after review of the past four quarters of data: Fourth Quarter 2021 through Third Quarter 2022. Soil gas probes SG-12-07-65, SG-12-17-60, and SG-12-20-70 were sampled during this timeframe and should, therefore, be updated on Table 1 to have the "Investigation" status, as noted in the report detailing the previous four quarters of data (Ahtna, 2022).

RESPONSE TO GSU COMMENT 1: *Soil Gas Quality Assurance Project Plan (QAPP) Table 1 was updated per the comment.*

HUMAN AND ECOLOGICAL RISK OFFICE (HERO) COMMENT 1: Step 2 should clearly list the study goals and the associated actions and alternate actions for each study goal.

The study goals are:

- To adequately assess site conditions within the site physical and temporal boundaries,
- To comply with the ROD, Basewide RI Sites and ESD No. 1,
- To determine if COCs in soil gas will partition into groundwater at concentrations exceeding ACLs, and
- To operate the SVETs to reduce COC concentrations in soil gas that may partition to groundwater at concentrations exceeding ACLs

The action for each study goal should be identified. Example – what criterion/criteria will lead to a decision that site conditions have been adequately assessed. Alternate action is what will be done if that criterion/criteria are not reached.

Same logic for each study goal, i.e., numerical or qualitative criteria that will lead to an action and alternative action.

RESPONSE TO HERO COMMENT 1: *The text in Soil Gas QAPP Section 3.2.2 was revised to include a reference to Step 5 (Section 3.2.5), where criteria for specific actions and alternative actions are already identified.*

HERO COMMENT 2: The analytical reporting limits for each analytical method should be listed.

RESPONSE TO HERO COMMENT 2: *Analytical reporting limits for each analytical method are listed in Soil Gas QAPP Section 3.6, Worksheet #15.*

[1] In a letter dated March 16, 2023 (see Administrative Record No. BW-2792T.4). The comments are reproduced here as provided to the Army and there have been no changes to spelling, grammar, or punctuation.

ATTACHMENT H

Responses to California Central Coast Regional Water Quality Control Board Comments on the Draft QAPP

Responses to Comments submitted by California Central Coast Regional Water Quality Control Board[1]

COMMENT 1: Section 2.2, Worksheet #3 & 5: Project Organization and QAPP Distribution – Please update this section revise the USACE Project Manager contact, as appropriate.

RESPONSE TO COMMENT 1: *When the Draft version of the Soil Gas QAPP was issued, Curtis Payton occupied dual roles as the U.S. Army Corps of Engineers (USACE) Project Manager Forward and the U.S. Department of the Army (Army) Base Realignment and Closure (BRAC) Environmental Coordinator (BEC). However, since that time, other personnel have taken on the responsibilities of the USACE Project Manager Forward and Mr. Payton is solely the BEC. James Specht remains the USACE Project Manager as previously identified. Section 2.2, Worksheet #3 & 5 was revised to show this.*

COMMENT 2: Section 4.1, Worksheet #17: Sampling Design and Rationale – Please update to include the soil gas plume contaminant(s) of concern (COC) that were delineated by soil gas probes SG-12-01, SG-12-03, SG-12-05, SG-12-08, SG-12-11, SG-12-12, and SG-12-19 through SG-12-24.

RESPONSE TO COMMENT 2: *As stated in Section 4.1, "The installed soil gas probe locations were selected to delineate the [tetrachloroethene] PCE and [trichloroethene] TCE soil gas plumes identified initially in 1992." The information provided in the "Rationale" column in Worksheet #17 is only intended to explain the reason why a soil gas probe cluster was installed in a particular location, which may or may not have a specific COC (PCE or TCE) as a driver because the extent of the COC plumes at the time the probes were installed was unknown. Accordingly, the soil gas probe clusters listed in the comment could delineate either or both PCE and TCE. Worksheet #17 was not revised.*

COMMENT 3: Table 1, Soil Gas Probe Identification, Sample Schedule, and Purge Specifications – Table 1 indicates soil gas probes SG-12-07-65 and SG-12-17-60 are sampled quarterly however, soil gas probe SG-12-20-70 is shown as removed from sampling. These three soil gas probes were added back into the program following the Central Coast Water Board and Department of Toxic Substances Control (DTSC) comments on the November 2021 Sites 2 and 12 Technical Memorandum, Draft Soil Gas Rebound Study (Rebound Study). The Rebound Study indicated that rebound may be occurring at these soil gas probes and there was limited soil gas data collected following the soil vapor extraction treatment system (SVETS) shutdown. Therefore, please confirm the sampling frequency for soil gas probe SG-12-20-70 and modify Table 1, as appropriate.

RESPONSE TO COMMENT 3: *To clarify, per responses to comments on the Draft Final Site 2/12 Soil Gas Rebound Study (Administrative Record No. BW-2905B), the U.S. Department of the Army (Army) agreed to sample soil gas probes SG-12-07-65, SG-12-17-60, and SG-12-20-70 in the second quarter of 2022 only, and then determine the need for additional soil gas monitoring based on the results of the second quarter 2022 monitoring. Soil gas probe SG-12-20-70 was previously removed from the soil gas monitoring program (SGMP) in 2017 because it met Soil Gas QAPP decision rules to do so (see Administrative Record No. BW-2840A); therefore, any additional sampling at this probe conducted for assessing rebound or other purposes is considered to be an investigation separate from the quarterly SGMP. Soil gas probe SG-12-20-70 was sampled in the second quarter of 2022 and the third quarter of*

[1] In a letter dated March 13, 2022 (see Administrative Record No. BW-2792.3). The comments are reproduced here as provided to the Army and there have been no changes to spelling, grammar, or punctuation.

2022, at which time it met Soil Gas QAPP decision rules again to no longer be sampled (i.e., COC concentrations were stable at concentrations below soil gas screening levels [SG-SLs]). Conversely, soil gas probes SG-12-07-65 and SG-12-17-60 have apparent increasing COC concentration trends that justify adding them back to the quarterly SGMP, which is why they are included in Table 1 and SG-12-20-70 was not. However, soil gas probe SG-12-20-70 was added to Table 1 because groundwater monitoring well MW-12-29-180U, which is associated with soil gas probe SG-12-20-70 for evaluating partitioning of COCs between soil gas and groundwater, was not sampled in the Second Quarter of 2022 as planned. Therefore, SG-12-20-70 will be sampled quarterly in the near-term, though under "investigation" status and not as part of the SGMP.

ATTACHMENT I

Responses to Fort Ord Community Advisory Group Comments on the Draft QAPP

Responses to Comments submitted by Fort Ord Community Advisory Group (FOCAG)[1]

COMMENT 1: The FOCAG appreciates being sent this Plan that deviates from the former Version. It would be helpful for Ahtna Global, LLC to share a brief explanation in the document, of the differences in this Revision (1) How this Draft Plan deviates from the previous version and (2) Why the need in February 2023 for a new version. Perhaps an introductory summary could be included as "lay people" do read these documents.

RESPONSE TO COMMENT 1: *Section 1.0 of the Soil Gas Quality Assurance Project Plan (QAPP) provides an introductory summary that contains a bulleted list of the items that have been updated since the Final Revision 7 of the Soil Gas QAPP (Administrative Record Number BW-2792S) was issued. The U.S. Department of the Army (Army) updates QAPPs for the former Fort Ord approximately annually to ensure currency with respect to standard operating procedures (SOPs), laboratory analytical methods, laboratory certifications, project personnel, sampling schedules, etc.*

COMMENT 2: We note that Curtis Payton has a dual role in the Project's Organization;
1) Lead Agency Department of the Army (BRAC)
2) Lead Organization USACE Project Manager

RESPONSE TO COMMENT 2: *When the Draft version of the Soil Gas QAPP was issued, Mr. Payton did have dual roles, as stated in the comment. However, since that time, other personnel have taken on the responsibilities of the U.S. Army Corps of Engineers (USACE) Project Manager Forward and Mr. Payton is solely the Army Base Realignment and Closure (BRAC) Environmental Coordinator (BEC). Section 2.2, Worksheet #3 & 5 was revised to show this.*

COMMENT 3: We also note Derek Lieberman as Project Manager and remember Derek Lieberman from the Army's "Community Involvement Workshop" days beginning in the 1990's where he would provide presentations on an overhead projector to a room full of people and take questions from the audience. It is comforting to know he is still on the project because of his extensive institutional memory and historical perspective on the subject issues.

RESPONSE TO COMMENT 3: *Comment appreciated and acknowledged.*

COMMENT 4: Although this is titled as a Comprehensive Basewide Report, there are some things missing that the FOCAG considers significant. The document's Transmittal Sheet states that comments are not specifically requested. However, the FOCAG is submitting some comments for the Administrative Record.

RESPONSE TO COMMENT 4: *To clarify, the Soil Gas QAPP is not a Comprehensive Basewide Report. The comment may be referring to the Comprehensive Basewide Range Assessment Report (Administrative Record No. BW-2300M), which was out for review in the same timeframe as the Draft Soil Gas QAPP (Administrative Record No. BW-2792T). The transmittal sheet for the Comprehensive Basewide Range*

[1] In a letter dated December 22, 2022 (see Administrative Record No. OU2-702Q.5). The comments are reproduced here as provided to the Army and there have been no changes to spelling, grammar, or punctuation.

Assessment Report (Administrative Record No. BW-2300M.1) does state that comments are not specifically requested; however, the transmittal sheet for the Soil Gas QAPP (Administrative Record No. BW-2792T.1) states that comments are requested by March 8, 2023.

COMMENT 5: 3.1.1 Background and History (page 12) provides a location of the Subject as including the area of State Highway 1 and the Union Pacific Right-of-way railroad tracks, at the westernmost part of former Fort Ord. The Fort was put on not only the EPA's Superfund Sites but made one of the National Priorities List, as one of the worst of the worst.

RESPONSE TO COMMENT 5: *The National Priorities List (NPL) primarily serves as an information and management tool and is part of the Superfund process (i.e., they are not separate designations; if a site is on the NPL, it is a Superfund site, and if it is a Superfund site, it is on the NPL). Fort Ord was originally proposed because it met the eligibility requirements of the NPL. Inclusion of a facility or site on the NPL does not reflect a judgment of the activities of its owner or operator, nor does it indicate a classification of sites based on extent of contamination or risks to human health and the environment (i.e., inclusion on the NPL does not equate to "worst of the worst"). It is intended primarily to guide the U.S. Environmental Protection Agency (EPA) in determining which sites warrant further investigation, to assess the nature and extent of the public health and environmental risks associated with the site, and to determine what remedial action(s) may be appropriate. See https://www.epa.gov/superfund/basic-npl-information for more information.*

COMMENT 6: The FOCAG asks if the proponents of the proposed SURFWAY roadway next to, and sometimes replacing, these former railroad tracks have been made fully aware of the toxicity below and around this area? Please respond.

RESPONSE TO COMMENT 6: *The Army is not aware of a proposed SURFWAY project; however, there is no "toxicity" to report to property users in this area. As indicated in the Soil Gas QAPP, the railroad tracks traverse through the western portion of the former Fort Ord, on the west side of State Route 1. This is the area of Remedial Investigation (RI) Site 2, the former Main Garrison Sewage Treatment Plant (STP), and RI Site 3, the former Beach Trainfire Ranges, which are now part of Fort Ord Dunes State Park.*

Based on the results of the RI for Site 2, no remedial action for soil at Site 2 was necessary (Administrative Record No. RI-025); however, in 1997, as part of the maintenance and cleanup activities associated with the closure of Site 2, sludge was removed from the drying beds and evaporation ponds, the asphalt-lined drying beds were demolished, and about 3 feet of soil was excavated and removed (Administrative Record No. BW-2791). Historically, a volatile organic compound (VOC) plume in groundwater extended from Site 12, on the east side of State Route 1, to Site 2; however, operation of the Sites 2 and 12 (Sites 2/12) groundwater treatment system (GWTS) since 1999 has successfully remediated the VOC plume in the Site 2 area (Administrative Record No. BW-2927).

Remedial actions at Site 3 have also been completed. Approximately 162,800 cubic yards of lead-contaminated soil were removed and post-remediation sampling determined the remaining sitewide average lead concentration in soil was 161 milligrams per kilogram (mg/kg), which is protective of plants, animals, and human site users at Site 3. Additionally, munitions and munitions-related items are not expected to be found at Site 3 (Administrative Record No. OE-0526).

COMMENT 7: Soil gas chemicals of concern, PCE and TCE, are the subject chemicals of this Plan, however many other chemicals of concern (C.O.C.'s) are in this area. It is located in the Prohibition Zone of the Special Groundwater Protection Zone at the former Fort Ord. Monterey County restricts installation of new supply wells here.

RESPONSE TO COMMENT 7: *The Record of Decision for Sites 2/12 (Administrative Record No. RI-025) identifies eight groundwater COCs at Sites 2/12, which includes tetrachloroethene (PCE) and trichloroethene (TCE). COCs in groundwater are addressed by operation of the Sites 2/12 GWTS (Administrative Record No. BW-2927) and implementation of the groundwater monitoring program per the Groundwater QAPP (Administrative Record No. BW-2785Q). The Soil Gas QAPP addresses soil gas monitoring at Site 2/12, and COCs in soil gas are identified in the Explanation of Significant Differences No. 1, Basewide Remedial Investigation Sites 2 and 12 (Administrative Record No. BW-2794). Per the Remedial Investigation/Feasibility Study (RI/FS) Addendum at Sites 2/12 (Administrative Record No. BW-2721B), the remediation goal for soil gas at Sites 2/12 is to reduce concentrations of VOCs to levels that will not result in concentrations of VOCs in groundwater that continue to exceed aquifer cleanup levels (ACLs) and thereby prolong the period of unacceptable human health risk. Accordingly, PCE and TCE are identified as the COCs for soil gas because these were the only two compounds in soil gas that could adversely affect groundwater.*

COMMENT 8: Soil gas measurements are being conducted at the nearby Dunes Shopping Center, Site 12. Figure #1 in this document is identified as "Site 12 Location, Soil Vapor Extraction and Treatment System and Soil Gas Monitoring Map". There are about 31 spots in the large Dunes Shopping Center Parking Lot that are highlighted on this overhead area photo as locations of Soil Gas Probe Clusters and Soil Vapor Extraction Wells. Offsite, next to State Highway 1 is the Soi/ Vapor Treatment Unit. The Soil Vapor Pipeline is connected to seven Soil Vapor Extraction Wells.

Figure 1 is of rather poor photo quality and the boundary to the north is bounded by lmjin Parkway, to the east is Second Avenue, to the west is Highway 1. There is no date on this map as to when this overhead photo was taken. The FOCAG went on GoogleEarth Pro and selected a location of Best Buy located in that shopping center, to expand on this Figure 1 view somewhat. We find much better photo quality, dated June of 2022, and also find the following;

1) Just on the east side of 2nd Ave are the Montage Wellness Center and Montage Medical Group, a Hotel Springhill Suites by Marriot and dozens and dozens of new residential houses.
2) Just to the North of lmjin Parkway, the old barracks have been cleared and are prepped for new clustered residential housing.
3) Just on the South of the Figure 1 overhead photo is what is called 11th Avenue. There is a new hotel here too and cleared and prepped land for further development.

The point to this is a FOCAG question; How many of these new residents, residential property owners, commercial property owners, visitors to the commercial stores and buildings, know about the soil gas issues immediately nearby?
Please respond.

RESPONSE TO COMMENT 8: *The satellite image it is intentionally set as a background image at 40% transparency so that the data presented (CT plume extent, groundwater elevation contours, groundwater flow directions, and groundwater wells) are not obscured and will be apparent to the reader. Del Monte Boulevard and Reservation Road are also labeled on the figure to provide the reader with a frame of reference. The image was obtained from ESRI (for more information, please visit their website: https://www.esri.com/en-us/home) and the date is June 2022. The source and image date have been added to the figure and will be added to future figures that have aerial imagery.*

Because the former Fort Ord is a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or "Superfund") site, the U.S. Department of the Army (Army) includes a notice in the quitclaim deeds for Fort Ord property where hazardous substances were stored, released, or disposed of. It is also a requirement that these deed notices be included in subsequent deeds whenever the property is transferred or sold to another entity, such as a municipality, business, or individual homeowner; therefore, new residents, residential property owners, and commercial property owners have received these notices. In addition, the commercial property owners and the businesses occupying the commercial property at The Dunes on Monterey Bay are notified every three months about the soil gas monitoring program.

A Human Health Risk Assessment (HHRA) was performed to evaluate potential human exposures and health risks based on the indoor air and sub-slab soil gas data collected at in the retail spaces at The Dunes on Monterey Bay. Non-cancer and cancer risks were calculated for Indoor Retail Worker and Indoor Shopper receptors and found to be well below or at regulatory risk targets. Results of the HHRA suggest that, if VOCs are migrating into the stores, indoor air concentrations are de minimis (Administrative Record Nos. BW-2721B and BW-2793). Additionally, the historical maximum extent of the PCE and TCE soil gas plumes has never extended outside the parking lot for The Dunes on Monterey Bay retail center, and operation of the soil vapor extraction and treatment system has successfully reduced concentrations of PCE and TCE across most of the site to less than soil gas cleanup levels (Administrative Record No. BW-2927). Based on this information, notifying residential property owners outside of this area and visitors to the commercial stores and buildings is unnecessary.

ATTACHMENT J

Responses to California Central Coast Regional Water Quality Control Board Comments on the Draft Final QAPP

Responses to Comments submitted by California Central Coast Regional Water Quality Control Board[1]

COMMENT 1: Appendix H, Responses to California Central Coast Regional Water Quality Control Board Comments on Draft QAPP – The response to Central Coast Water Board Comment 3 indicates that soil gas probe SG-12-20-70 was added to Table 1 because groundwater monitoring well MW-12-29-180U, which is associated with soil gas probe SG-12-20-70 for evaluating partitioning of COCs between soil gas and groundwater, was not sampled in the Second Quarter of 2022 as planned. The response also indicates that SG-12-20-70 would be sampled quarterly under "investigation" status rather than part of the soil gas monitoring plan. It would help to clarify that this soil gas probe will be sampled if Table 1 was updated to show that SG-12-20-70 will be sampled quarterly with a note that it is being sampled under "investigation" status rather than continue to show it as removed.

RESPONSE TO COMMENT 1: *Table 1 was updated for clarification per the comment.*

[1] In a letter dated June 15, 2023 (see Administrative Record No. BW-2792U.2). The comments are reproduced here as provided to the Army and there have been no changes to spelling, grammar, or punctuation.